DRIVERLESS VEHICLES:

LAW & INSURANCE UPDATE

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Alex Glassbrook (PI and insurance barrister, cyclist, driver and technology enthusiast) reviews the government's recent paper on the law and insurance of self-driving vehicles, notes some changes of approach and tries to predict the future ...

Introduction

[1] The opinions expressed in this article are mine alone. They are not expert in any engineering or scientific sense. I base my views upon my practice as a barrister dealing with liability and insurance questions, sadly often arising from road traffic accidents. I also write from a lively interest in transport and the built environment, gained largely from my daily cycle ride to work in London as well as from my experience as a driver.

We have come a long way in just over a decade. This month, the Department of Transport's unit dealing with self-driving cars published its latest consultation paper, seeking views on its proposals to support advanced driver assistance systems and automated vehicle technologies[2].

Even in 2005, when Professor Malcolm Clarke published "Policies and Perceptions of Insurance Law in the Twenty-First Century", self-driving vehicles were not (so to speak) on the radar. The peculiar danger of road traffic, from an insurer's perspective, was the human nature of the driver. The particular problem was the driver's tendency to "underestimate and underprovide for risk".

> "Motoring is one of several spheres of human activity for which Parliament has been convinced that the experts are right and the people are wrong: that most people underestimate and underprovide for risk, and that the cumulative actual loss and damage to the community is unacceptably great. So this is one of the situations for which Parliament has made insurance compulsory"[3].

The publication of the July 2016 Department of Transport paper brings matters up to date. Or nearly so.

The July 2016 paper describes the proposed extension (under the Modern Transport Bill) of the existing regime of compulsory road traffic insurance to include fully automated (ie. self-driving) vehicles. In particular, extensions are proposed to include cover for liabilities arising not from driver fault but from defects in the vehicle (product liability), as well as to cover injury to the driver of such a vehicle.

These are suggestions, subject to consultation. It is clear from the July 2016 paper that the proposed extension of compulsory insurance is not necessarily the final shape of insurance for 21st century vehicles.

It is, in a sense, odd that fully automated vehicles should be made subject to compulsory insurance. As Professor Clarke wrote in 2005, compulsory insurance was imposed by parliament on drivers who tended to misjudge their ability to control fast cars. The fully

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[2] Referred to in this paper as "DoT July 2016". The full text is at www.gov.uk/government/uploads/system/uploads/attachment_data/file/536365/driverless-cars-proposals-for-adas-and_avts.pdf

[3] Clarke, "Policies and Perceptions of Insurance Law in the Twenty-First Century" (Oxford, 2005), p.20.

automated vehicle (which could regulate its own speed and drive within pre-set, careful limits) would remove that overconfidence. So why are automated vehicles being brought within compulsory insurance?

The History

Self-driving cars (or "fully autonomous vehicles") are in an advanced stage of commercial development. Such development has accelerated over about the last 3 years. There are still uncertainties as to the technology, but the Department of Transport paper considers it possible that such vehicles could come to market within the next decade, by the mid 2020's[4].

Trials of self-driving cars on public roads started, notably in several US states that were home to manufacturers. In February 2015 the British government welcomed testing of the technology in the UK – particularly in the traffic "Megacity" of London - seeing its potential social, environmental and industrial benefits[5].

That was transparently a drive for business for the UK (the report emphasised – favourably by comparison with allegedly more rigid rules elsewhere – the liberality of British regulation relating to the testing of new traffic technologies).

The February 2015 report was bold. It identified as "the next step" in such development:

> "... the introduction of vehicles in which the driver can choose whether they want to drive or not. If they select an autonomous mode, they can allow the vehicle to take care of driving while they make use of the journey time in other ways"[6]

It added that:

> "This represents a major opportunity – allowing drivers to safely use the driving time however they wish, from reading a book, to surfing the web, watching a film or just chatting face to face with other passengers."[7]

[4] DoT July 2016 p.6
[5] Referred to as "DoT February 2015". See p.11. The full text is at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401562/pathway-driverless-cars-summary.pdf
[6] DoT February 2015 p.6, para.3
[7] DoT February 2015 p12

Devices that take over a particular task of driving (such as cruise control, speed limiters, self-parking, distance control and, arguably, Sat Nav) are now commonplace. Fully autonomous driving technology, whereby a computer takes over control of the car entirely, has been in development for some time. Some manufacturers of electric cars have emphasised it as a particular feature of their vehicles.

The development of electric cars was motivated mainly by environmental concerns, stemming mainly from the pollution caused by fossil-fuel driven engines.

As to those concerns, the environmental benefits of electric cars are not self-proving. The point is made (eg. by Dr Robert E Smith of University College London, speaking on artificial intelligence this month[8]) that self-driving cars are not the best available means of transport from the perspective of energy-efficiency. The energy wastage of many small, individual engines powering many small vehicles is greater than that of a single, powerful engine powering a single, large vehicle such as (Dr Smith notes) existing technology such as a tram.

And the electricity required by such cars has to be generated – sometimes by fossil-fuel driven power plants. Travelling through a South African airport last year, I saw terminal buildings dominated by posters and display stands advertising the launch of two electric vehicles by a major car manufacturer – a fully-electric hatchback and a hybrid sports car.

Unfortunately for the manufacturer, South Africa was then experiencing daily power cuts, due to the inadequate supply of coal to its power stations. The posters were an instant reminder both of the lack of reliable recharging and of the polluting fossil fuel behind the clean new cars.

This article is not concerned with the environmental debate about electric cars. That debate involves not just design of vehicles but affects national energy and international environmental policies. The need for cleaner transport is proven. The means of its delivery are for discussion elsewhere.

This article has a different focus, namely the social (particularly the legal and insurance) implications of the fully self-driving feature which, as I have said, has become the most

[8] http://www.latitudefestival.com/line-up/artist/artificial-intelligence-w-prof-arthur-i-miller-dr-robert-e-smith

prominent "added extra" of commercially-developed electric cars, but which remains under development.

This article unfortunately comes within a few months of a fatal accident involving a self-driven car on a road in the United States – the first such fatal accident. Whether and how that accident sheds light upon the development of the technology remains to be seen. But the implications of the self-driving feature are broader than that case.

Self-driving feature: what it is and what it is not

The self-driving feature is an attempt to automate fully the driving of a car.

It attempts to automate the driver's human senses (sight in particular) and reactions (particularly the adjustment of the speed and path of the car).

Some points follow.

First, a fully automated car is intended to be able to navigate without the assistance of physical boundaries, such as rails. A tram or train runs along rails and cannot (absent a catastrophic malfunction) leave that route. By contrast, an autonomous car is intended to be capable of driving on any road, so the decisions of its driver are relatively complex.

Secondly, the self-driving feature on any vehicle is not flawless. It depends upon accurate perception and an appropriate response. As matters stand, the reliability of the technology is unproven. But, even at its best, the system's response could not be perfect. Fully autonomous driving technology, even at its peak, would in all likelihood reduce rather than extinguish risk.

The key devices of a self-drive system are sensors mounted on the vehicle (including cameras, laser imaging, radar and ultrasound) and preloaded maps. Global positioning systems (GPS) can be used for route finding but are insufficiently accurate for fine control. Cars can also be "connected" or "co-operative", meaning that they can communicate in real time with other cars and with roadside infrastructure[9]. As has been pointed out,

[9] Parliamentary Office of Science & Technology, Postnote Number 443, September 2013, p.2, at www.parliament.uk/briefing-papers/post-pn-443.pdf.

however, that would require a number of foundations, including compatible systems and reliable network coverage, nationwide.

The self-driving feature "sees" its surroundings, but only in that it detects obstacles before it in the moment, or that its map software already featured. The map "knowledge" is restricted to immoveable objects and features; the sensors detect moving features (other vehicles, people, animals etc). A self-driving device must also be capable of learning as it drives.

So the self-driving feature is limited by its sensory equipment and by the content of its software.

No scientist claims that a device using Artificial Intelligence (AI), such as a self-driving system, is yet capable of perfect decision-making[10]. Nobody would seek to claim a perfect decision-making capacity for humans. Whether AI will ever equal a human capacity for decision-making – flawed as it is - is a fascinating subject (extending to the nature of human consciousness and the workings of intuition). But that is largely a matter of guesswork.

But the likelihood is that, just as humans make mistakes, AI devices such as self-driving systems will err as well, even when operating properly, within their technological limits. The key questions are as to how the technology will develop and what is meant by "self-driving".

Guardian angel or fallible assistant?

A self-driving system is, as the technology stands, an assistant to the human driver. It can describe its perception. It can warn. But it is questionable whether or not it can yet take over the processes of perception and reaction that are essential to the control of a vehicle moving at speed.

The Vienna Convention on Road Traffic 1968, upon which UK traffic regulations are based, provides that every moving vehicle shall at all times have a driver and that the

[10] Dr Smith illustrated this by the example of the Japanese game, "Go", a complex chess-like game. A supercomputer learnt the potential outcomes of the game and was pitted against human grandmaster players. The computer won 4 out of 5 games. Dr Smith's point was that, despite its ability rapidly to learn the possible moves and to process them, the supercomputer was still beaten by a human.

driver shall at all times be able to control his vehicle[11]. In 2014 the Convention was amended to accommodate autonomous vehicles, though with the equivalent provision that the driver must at all times be able to deactivate or override its systems.

There is some uncertainty as to the effect of this. The UK signed but did not ratify the convention. The Department of Transport's 2015 paper makes it clear that it complies with the Convention in relation to the *testing* of fully autonomous cars on UK roads (by the clear proviso that "a test driver is present and takes responsibility for the safe operation of the vehicle"[12]).

In fact, the existing technology might already comply with the "override" requirement. The Department of Transport notes that "fail safe" devices, such as "electronic braking systems still allow full manual braking in the event of a failure, and the first steer by wire system on the market retains a conventional mechanical steering column which engages in the event that the electronic system fails"[13].

A shut-off or override of a fully autonomous system would be similar to those devices, though either would require the presence of a driver who could bring the car safely to a halt. So there is a challenge there to the aim of providing fully autonomous transport to those who could not (for example through disability) drive a car. Accordingly, the Department of Transport appears to keep the question of eligibility to "drive" such vehicles a live issue "prior to such vehicles becoming available on the market"[14].

Systemic problems: not everybody has the same car

If every vehicle on the road had a collision-avoidance device, then fully-automated driving might theoretically be possible. In that case, devices might be set to recognise each other and to take timely evasive action, should the risk of a collision arise. That is the model of universal communication and co-operation between all vehicles.

But, even assuming that model, it is unlikely that every vehicle on every road would have a collision-avoidance device. Non-motorised vehicles such as bicycles, for example, would

[11] DoT February 2015 p20 para.3.3
[12] DoT February 2015 p.8, para.9.
[13] DoT February 2015 p28 para.4.34
[14] DoT February 2015 p36

be an unlikely fit for such a device and, even with it, the sudden automation of the movement of a bicycle would seem highly complicated to achieve and risky to carry out. And then there is the risk to pedestrian road-users.

The likelihood is that, for some time to come, roads will be used by new and old technology vehicles, as well as by non-motorised vehicles and by pedestrians. Even if technology were to introduce self-driving systems to all motorised vehicles, those vehicles would still have to react to non-automated objects and beings.

If so, the role of the self-driving system would appear likely to be limited to a collision-warning system.

There is this transitional, near-future possibility, assuming adequate technology: that government could promote (then, if successful, legislate to require) zones where the only permitted driving is fully automated. The case for such zones might be compelling in central city areas, where parking space is limited and where "app cars"[15] might be used instead. The only motorised vehicles allowed in such zones might be self-driven, electric vehicles travelling at low speeds[16]. Pedestrian and cycle traffic might be kept separate (as has happened in parts of some towns and cities).

Whether technology and policy would support such zones is, again, guesswork. A fully-automated environment such as that might, however, significantly reduce the risk of accidents (so affecting future insurance needs – see below), as well as support other aims such as reducing pollution.

A further application is the use of fully autonomous vehicles to transport freight by road. This would be by use of technology that allows vehicles to travel in a "road train" (or "platoon"), short distances apart, so as to reduce drag, fuel consumption and thereby costs and pollution. Again, this model seems to imply a sophisticated, efficient and adaptable "co-operation" system, including reliable network coverage nationwide.

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[15] An "app car" would be a self-driven car that could be summoned via a smartphone app, to the passenger's location. Presumably, just as taxi apps now allow the passenger to request a particular type of vehicle, so an app car could be requested to fit the number of passengers. Not needing a driver, the size of a self-driven app car could presumably be more compact than usual (potentially even a pod for one). Whether the advantages of individual app cars would outweigh those of the relatively low-technology public transport solution (eg. automated trams) would be debatable.

[16] See 2013 POST Note, above, at p.2.

Law of the near future

The Department of Transport 2015 paper (under the title "Clarification of Liabilities") proposed that a number of legal points be dealt with before 2017:

> "There needs to be greater certainty around criminal and civil liability in the event of an automated vehicle being in a collision. Under the current legal framework these issues would be dealt with on a case by case basis by the Courts. We will aim to provide additional clarity and certainty in legislation, to provide a sound basis upon which to allocate criminal and civil liability."

Under the heading "Promoting Safety", it said that:

> "The Government will consider whether a higher standard of "driving" should be demanded of vehicles operating in an automated mode than would be expected of a conventional driver."[17]

And the following legal points were set for clarification by Summer 2017[18], namely:

- "review [of] existing legislation and [to] provide clarity on how liability passes between the driver and the vehicle manufacturer according to the mode of operation"
- "review the allocation of criminal and civil liability between driver and manufacturer and amend the appropriate legislation, if necessary" and
- to consider the possibility of requiring of a vehicle operating in automated mode "a higher standard of driving than would be expected of a conventional driver".

The recent, July 2016 Department of Transport paper appears to take a different line. It postpones the question of law reform for fully self-driving cars, which is does not see emerging as a technology for "a while"[19] (though this tends to contradict its belief that such technology could come to market within a decade).

The government now proposes leaving current laws in place, "taking a step-by-step approach, and regulating in waves of reform" so as to be able "to learn important lessons

[17] DoT February 2015, both at p.10, para.18
[18] DoT February 2015 pp.35, 36
[19] DoT July 2016 p.8

from real life experiences of driving of increasingly automated vehicles"[20]. To insurance, "we propose to make the minimum changes required to ensure clarity"[21], which appears to mean bringing automated vehicles within the existing, compulsory motor insurance regime.

So the timetable for the waves of reform might no longer include considering the particular questions of law set in the February 2015 report, by Summer 2017. The answers to those questions (if they are still questions at all) might have been postponed beyond 2017[22].

If so, the reason is probably commercial: European competitor states (eg. Germany) have reportedly found themselves weighed down by particular legal questions[23]. The UK presents itself as a friendlier environment for innovation in autonomous vehicle testing, with more flexible regulation. The specific questions and timetable of February 2015 might have been removed from the July 2016 document for pragmatic commercial reasons.

Liability questions, if and when the first autonomous vehicles come to market in the UK, are therefore likely to be left (to a great extent if not entirely) to the courts.

Commentators[24] tend to agree that the civil liability implications would be broadly as follows, assuming that self-driving vehicles were not objectionable on the basis of the Vienna Convention and current law were otherwise to apply:

- Human fault might establish liability in negligence (contributory or entire) if, in the circumstances of the accident, the driver ought reasonably to have taken control of the vehicle and avoided or reduced the effect of the accident.

[20] DoT July 2016 p.8
[21] DoT July 2016 p.18 para.2.8
[22] See Figure A at p.9 of DoT July 2016
[23] As reported at http://www.theregister.co.uk/2016/07/18/selfdriving_car_black_boxes_and_minimum_attention/
[24] See in particular Dr Ina Ebert at https://www.munichre.com/en/reinsurance/magazine/topics-online/2016/01/automated-vehicles/index.html and (from an American perspective) John Villasenor, senior fellow of the Brookings Institution, in April 2014, at http://www.brookings.edu/research/papers/2014/04/products-liability-driverless-cars-villasenor and Gary Marchant and Rachel Lindor in the Santa Clara Law Review in 2012 at http://digitalcommons.law.scu.edu/lawreview/vol52/iss4/6/. I have also referred to Lucy McCormick's excellent twitterfeed, https://twitter.com/lawofdriverless

- Fault on the part of the manufacturer might establish liability on the basis of a defect in the product, under the law of product liability and/or contract law.
- In an accident involving a fully automated vehicle and a vehicle without such technology, one or more of the above approaches might apply.

Those points seem straightforward when baldly stated, but it is easy to predict legal contortions (and different results from different courts) especially in the third category and in relation to contributions.

That might particularly be the case in relation to different technologies and differing autonomous capabilities, between models of car. Competition between computer manufacturers and the resulting incompatibility of systems suggest that a common system is unlikely to evolve. If so, some cases might produce questions for experts.

However, there are key features that could be made common. For example, the Department of Transport 2015 report posits that "under certain traffic, road or weather conditions, the vehicle's automation systems may request the driver to take control"[25]. So the fitting of such an alarm (audio, vibrating and/or visual) could be a regulatory requirement. That solution would assume that the driver was capable of intervening.

Presumably if the driver was unable to steer the car by reason of disability, the car might be set to halt in a safe place upon operation of the "fail safe" control (so as to comply with the Vienna Convention requirement of driver control).

Further Future Law

In the more distant future (though probably not too distant), the law will change with the technology, if the technology catches on.

The key question, from a crystal ball-gazing perspective, will be whether fully automated vehicles become the dominant technology, eventually making manual vehicles obsolete. That obsolescence could come about by statute (and for reasons other than technological superiority of the navigation systems – the more likely reason might be the outlawing of fossil-fuel driven engines).

[25] DoT February 2015 p.17 para.2.8.

As discussed above, self-driving, electrical pods[26] could become the only vehicles permitted in certain zones. If that were the case, then any dispute arising from a collision in that zone would be adjudicated according to the laws applying to full automation. In a fully-automated zone, that would probably be a dispute limited to product liability (as a driver might not be permitted to take manual control in such a zone[27]).

The question then arises as to the likelihood of there being any litigious dispute at all. App cars within a fully automated urban zone would presumably be operated by a limited number of companies, who would (whether directly or via their insurers) deal with disputes through their own agreed procedures – both as between themselves and with the vehicle manufacturers. The data stored by app cars in that situation ought to be sufficient to determine where fault lay.

This might lead eventually to a similarly stripped-down, reformed law in relation to road traffic. A fully automated traffic system ought to lead to very few collisions. Where collisions occur, the responsibility for damage ought to be capable of assignment on the basis of previously agreed rules. The form of those rules is difficult to predict.

But we are not there yet. That might be a Utopian vision (though recent innovation in traffic design – particularly the segregation of urban cycle lanes – suggests not).

But the near-future will be, as I have described, unfortunately more litigious than the likely destination. As the Department of Transport puts it, the near-future is "the transitional world of mixed fleets, made up of both conventional and automated vehicles", with "complex and time-consuming"[28] disputes.

The Politics of Speed

An attraction of fully automated cars, from a safety perspective, would be the powerful argument to limit its speed systemically. All the equipment necessary to limit speed would be on board. Co-operative systems would make speed limit infringements instantly

[26] Such as those tested in Milton Keynes: http://www.wired.co.uk/article/milton-keynes-driverless-pods-lutz-pathfinder

[27] The concept of "driver" might be largely redundant (save for the "fail safe") in the case of a small, self-driven pod.

[28] DoT 2016 p.17

detectable (perhaps even instantly billable). But systemic speed limitation could make such infringements obsolete, by removing the ability to speed.

Speed limitation is already an available feature (as is distance-keeping). But the development of fully autonomous cars might have these interesting and welcome effects: the easier detectability of speeding and, perhaps as a consequence, the ability to limit speeds of vehicles to the lawful limits.

Whether or not a government would feel able to do that would be a political matter (in part informed, no doubt, by the attractor of speed to car ownership), but technological developments would make the process easier.

The counter argument to speed limitation (that drivers should be allowed to drive at speeds exceeding safe limits) should be put to the test, against the background of automated vehicles. The positive effects of speed limitation upon road safety and the quality of the environment could be profound.

Future Insurance

Full automation, should it reach the robust safety standards required, might not eliminate risk, but it would in all likelihood greatly reduce the incidence of road traffic accidents.

For the time-being, the government proposes to bring automated vehicles simply within the existing motor insurance regime. That is a regime of compulsory insurance. That is a perfectly sensible response for the time-being (as it maintains protection against the negligence of drivers of both partially and non-automated vehicles).

But the move towards full automation in the long-term would imply a move away from compulsory insurance, which in the motor field was a response specifically to bad decision-making by human drivers.

The government reports that it is continuing to work with the insurance industry "to develop requirements governing insurance of highly and fully automated vehicles". The insurance industry has insured the current testing phase of fully automated vehicles in the

UK. And the first British insurance policy for consumer use of automated vehicles (including cover for hacking) became available last month[29].

There will be a route-change for the UK: the government had also intended to "engage with the EU over their plans for automated vehicles". That will now be part of the larger task of unpicking EU from British motor insurance law (if that is the outcome of that aspect of post-EU referendum negotiations)[30].

Conclusion

Law adapts to technology. The law has met innovation in transport (and its adverse effects) before, particularly after the mass production of motor cars.

Motor insurance will almost certainly change. The absorption of automated vehicles into compulsory motor insurance is the only sensible response in the short term, but thereafter the safety benefits of full automation might even be such as to change the case for compulsory insurance.

In certain circumstances, "society expects insurers to play a parental role" wrote Professor Clarke in 2005[31]. He went on:

> "The strong arm of technology has strengthened the hand of human beings to a degree that marks it out from the past. On the one hand, technology has increased people's potential for inflicting damage, and with it the need for compensation. The motor vehicle comes quickly to mind."

We might at last be reversing that position. Artificial intelligence might soon provide the means to reduce the speed of motor vehicles and to force the awfulness of road traffic accident injuries into retreat. The long-term benefits of vehicle automation should be nurtured, even if the route immediately ahead is difficult.

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[29] http://uk.businessinsider.com/insurance-for-self-driving-cars-is-now-a-reality-2016-6?r=US&IR=T
[30] Eg. the right of direct action against insurers across the EU. Outside the law, the impact upon technological development has also been noted.
[31] Clarke, p.253

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