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Submitted to **Law Commission Consultation on Automated Vehicles: Passenger services and public transport**

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About you

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University of Sheffield Law Students

Are you responding to this consultation in a personal capacity or on behalf of your organisation?

Other

If other, please state::

Professor Richard Percival responding on behalf of his students at Sheffield University.

What is your email address?

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Operator licensing: a single national system

Consultation Question 1: Do you agree that Highly Automated Road Passenger Services (HARPS) should be subject to a single national system of operator licensing?

Other

Please explain your answer::

[other]

Sheffield Law Students consider the alternative: self-regulation.

The appeal of this alternative to government regulation lies in its potential to achieve regulatory objectives comparatively quickly and effectively, which, as we have highlighted, is something that is not currently being achieved in existing peer-to-peer markets. We discuss the main advantages of a self-regulatory approach below.

First, when businesses come together to develop rules as they typically do in a self-regulatory system, those involved are likely to have a higher degree of technical and industry expertise than an outside government regulator. Take for example the General Medical Council (GMC), which is run partly by the professionals it regulates. The highly specialised, technical nature of this profession requires area-specific expertise, which is something that only the professionals are able to provide. The GMC is then able to use this information to set standards in education and training, develop rules and investigate patient concerns. Likewise, the AV peer-to-peer market will no doubt be complex, given both the technological and innovative nature of automated vehicles, and the potential for this market to offer yet another diverse spectrum of business models. Allowing the market and its participants a steer in the development of rules may be necessary to harness the required expertise.

Moreover, a self-regulatory approach may allow platforms to better internalise ethical behaviour, since rules are based on social norms and conduct of peers, rather than top-down prescriptive rules. Any regulation imposed by the government may not receive the full support of affected platforms, which can translate into weak compliance. This may result in those adversarial situations whereby platforms look to find ways of avoiding externally imposed legislation. On the other hand, compliance with self-regulatory systems may be stronger due to the benefits of buy-in by market members who may have helped design the rules and who may have a vested interest in their success. This degree of commitment may also prove beneficial for both peer providers and peer consumers, as it may encourage platforms to 'raise the bar' and reach higher standards.

Perhaps the strongest argument in favour of self-regulating the AV peer-to-peer market is that it is flexible. As stated earlier, the rapid change that platforms encounter in existing peer-to-peer markets now requires regulations to be changed and updated more frequently. Self-regulatory systems can be adjusted more swiftly and easily, and an SRO may be more willing to experiment with rules and regulations since it can more easily retract them. One example can be found in the Digital Advertising Alliance, which implements and enforces responsible privacy practices across the digital advertising market, and regularly revises guidelines to adapt them to new innovations such as Online Behavioural Advertising and Political Advertising. On the other hand, government regulation can be a time consuming, cumbersome process and may entail significant procedural hurdles, which may also suggest an explanation for the government's inability to keep up with the developments in existing peer-to-peer markets. Ultimately, a self-regulatory approach would be more capable of adapting to however this potential AV peer-to-peer market develops.

Nevertheless, it may still prove tempting for the government to introduce a stringent framework for the AV peer-to-peer market, given the current regulatory issues we have discussed. Whilst it does remain necessary to address such issues, it is arguably just as important to create rules that will allow emerging platforms and new entrants to innovate; the flexibility of self-regulation allows the potential to achieve this. Again, a self-regulatory system includes market experts who review current activities; identify best practices; and develop these into market guidelines, which naturally continue to evolve over time in response to feedback from market leaders. This may allow platforms to operate more efficiently and minimise the costs of compliance, which in turn will be beneficial for both peer consumers and peer providers. Additionally, it is more likely that an SRO will use less stringent "moving target" regulations that change over time in response to market conditions, which allows for both gradual and radical innovation.

One may assume that self-regulation is a weaker option than government regulation because of its less stringent rules or because it may fail to effectively enforce them. Specifically, there is criticism that a self-regulatory system is susceptible to 'regulatory capture', a term used to describe the influence industry has on its own regulation at the expense of public interest. For example, the self-regulatory nature of the GMC has faced criticism related to the autonomy it gives to the sector and the perception that many practitioners see self-regulation as a license to operate without oversight or fear of sanctioning. However, where this has occurred, it has been primarily down to poor institutional design rather than it being an inherent weakness in every self-regulatory system. Take for example the Forest Stewardship Council, which has structured its governance in such a way that has prevented the Council from being dominated by business interests. Namely, its structure has been separated into three different areas, economic, environmental and social, each with equal representation. This demonstrates that, although there remains a valid concern of regulatory capture in a self-regulatory system, it is a challenge that can be negated by a thorough and well-designed regulatory structure.

Consultation Question 2: Do you agree that there should be a national scheme of basic safety standards for operating a HARPS?

Not Answered

Please explain your answer::

Operator licensing: scope and content

Consultation Question 3: Do you agree that a HARPS operator licence should be required by any business which:

Not Answered

Please explain your answer: :

Consultation Question 4: Is the concept of "carrying passengers for hire or reward" sufficiently clear?

Not Answered

Please explain your answer::

Consultation Question 5: We seek views on whether there should be exemptions for community or other services which would otherwise be within the scope of HARPS operator licensing.

Please share your views::

Consultation Question 6: We seek views on whether there should be statutory provisions to enable the Secretary of State to exempt specified trials from the needs for a HARPS operator license (or to modify licence provisions for such trials).

Please share your views::

Consultation Question 7: Do you agree that applicants for a HARPS operator licence should show that they:

Not Answered

Please explain::

Consultation Question 8: How should a transport manager demonstrate professional competence in running an automated service?

Please share your views::

Consultation Question 9: Do you agree that HARPS operators should:

Yes

Please explain::

[yes]

According to Broussard, “[w]hen the driver disappears, we already know what happens: Cars get dirty, smelly and damaged.” If there is no driver, the onus cannot be on them to clean the mess. Therefore, the Law Commission must consider whether this is to be another responsibility of the HARPS operator. The current position suggests that many HARPS-operated vehicles will be fitted with “a camera that points inward, allowing for capturing on video of a rider that tries to trash the interior of a car.” Waymo are currently using cameras “to check the interiors after each trip for forgotten items or spills” in their self-driving taxis. Although these cameras may fulfil the deterrence aspect of a driver, “providing some semblance of behavioural guardrails”, there is not much they can do to make a passenger stop littering, vomiting or carrying out any other action that will leave the car or bus a mess. The camera’s role with regards to perception perhaps even more limited than its deterrence role. They may be able to capture a person vomiting in a vehicle, but these cameras may not be able to identify a sticky seat, or somebody sticking used chewing gum out of view. They definitely will not be able to detect smells either: “[t]here’s no sensor for grime, mess or stink.” Therefore, the onus is transferred, to an extent, to future passengers. “[I]n the future, they may be able to use an app to flag unhygienic cars for Uber and Waymo. But that’s a lot of time and frustration to potentially put on users.” Presuming the HARPS operator receives the knowledge that a car has arrived to pick up a passenger in an unhygienic condition, the onus will then fall on them to direct the car to a cleaning centre “for a human to clean it and get it back on the road.” However, some companies seem to have more lofty aspirations with regards to cleaning that would not place any onus on an operator at all: “self-cleaning cup holders” and “auto-clean seats [with] material that is near impossible to stain.” There is also talk of a ‘mobile cleansing pod’ which will “intercept an unoccupied car suspected of not meeting cleanliness standards while it is still on the road”, and patents have been designed for automated vehicle cleanliness systems. But we are a long way off from these technologies, and in the interim, it must be considered who is responsible for a car or bus being clean. Is it the person monitoring the CCTV? Should it be down to the passenger to report it on the app? Should the buck stop with the HARPS operator when it comes to cleanliness? Could the onus fall with the manufacturers and the materials they choose to use? Or is it a mixture of these? What is evident, however, is that companies do not know this answer either: a Waymo spokesperson, when asked, “did not include information about how, exactly, this happens.” Nix, the Uber lead on self-driving cars, also declined to answer when asked what would happen if a human left bodily fluids in a car, saying they “are still envisioning what it might look like.” Therefore, we advise the Law Commission to further consider how a cleanup service will work, and how this could affect the responsibility placed on HARPS operators of automated buses and taxis.

Consultation Question 10: Do you agree that legislation should be amended to clarify that HARPS operators are "users" for the purposes of insurance and roadworthiness offences?

Not Answered

Please explain::

Consultation Question 11: Do you agree that HARPS operators should have a legal duty to:

Other

Please explain::

[other]

Even with technological advancements such as CCTV, it is unlikely those monitoring the feed will be able to ‘see’ everything, and certainly won’t be able to identify odours or stickiness— this perception will then fall on the user. Users may not be best pleased at having to report things, or having to wait for another vehicle because the one that arrived was not in a habitable condition. There will also likely be an onus on someone to decide if a vehicle is in a ‘bad enough’ condition to be sent for cleaning. We urge the Law Commission to consider how, if CCTV is used, the feed is monitored by HARPS operators. It must also be acknowledged that if the deterrence of a camera fails, there is no second safeguard: there is nobody present to ask a rider to take their mess with them.

Consultation Question 12: Do you agree that HARPS operators should be subject to additional duties to report untoward events, together with background information about miles travelled (to put these events in context)?

Not Answered

Please explain::

Consultation Question 13: Do you agree that the legislation should set out broad duties, with a power to issue statutory guidance to supplement these obligations?

Not Answered

Please explain::

Consultation Question 14: We invite views on whether the HARPS operator licensing agency should have powers to ensure that operators provide price information about their services.

Not Answered

Please explain::

Not Answered

Please explain::

Consultation Question 15: Who should administer the system of HARPS operator licensing?

Please share your views::

Consultation Question 16: We welcome observations on how far our provisional proposals may be relevant to transport of freight.

Please share your views::

Privately-owned passenger-only vehicles

Consultation Question 17: Do you agree that those making "passenger-only" vehicles available to the public should be licensed as HARPS operators unless the arrangement provides a vehicle for exclusive use for an initial period of at least six months?

Not Answered

Please explain::

Consultation Question 18: Do you agree that where a vehicle which is not operated by a HARPS licence-holder is authorised for use without a user-in-charge, the registered keeper should be responsible for:

Not Answered

Please explain::

Consultation Question 19: Do you agree that there should be a statutory presumption that the registered keeper is the person who keeps the vehicle?

Not Answered

Please explain::

Consultation Question 20: We seek views on whether:

Please share your views::

Please share your views::

Consultation Question 21: Do you agree that for passenger-only vehicles which are not operated as HARPS, the legislation should include a regulation-making power to require registered keepers to have in place a contract for supervision and maintenance services with a licensed provider?

Not Answered

Please explain::

Consultation Question 22: We welcome views on whether peer-to-peer lending and group arrangements relating to highly automated passenger-only vehicles might create any loopholes in our proposed system of regulation.

Not Answered

Please explain: :

Consultation Question 23: We seek views on whether the safety assurance agency proposed in Consultation Paper 1 should be under a duty to ensure that consumers are given the information they need to take informed decisions about the ongoing costs of owning automated vehicles.

Please share your views::

Accessibility

Consultation Question 24: We seek views on how regulation can best promote the accessibility of Highly Automated Road Passenger Services (HARPS)? In particular, we seek views on the key benefits and concerns that regulation should address.

Please share your views::

Consultation Question 25: We provisionally propose that the protections against discrimination and duties to make reasonable adjustments that apply to land transport service providers under section 29 of the Equality Act 2010 should be extended to operators of HARPS. Do you agree?

Not Answered

Please explain::

Consultation Question 26: We seek views on how regulation could address the challenges posed by the absence of a driver, and the crucial role drivers play in order to deliver safe and accessible journeys. For example, should provision be made for:

Not Answered

Please explain::

Other

Please explain::

[other] When coping with the loss of the human place managers of a driver, operators and regulators should look toward developing systems and regulatory frameworks that facilitate the marriage of humans and machines in order to confront societal needs and expectations of paying passengers. It does require genuine "practical solutions." Although including humans into the system is an important suggestion, it must be acknowledged that, over time, the need for these systems may depreciate as the wider public become more familiar with HARPS. The recommendations made by the Consultation Paper in relation to stewards are central to these issues. The Law Commission's reference to stewards limits their role to assisting more vulnerable passengers. However, it is argued that they have a much more valuable role than first envisaged by the Law Commission.

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whilst the Law Commission does not address the social role of the driver, making the assumption that it does not need to be replaced, it is evidently key to public transportation.

The driver's social function is, thereby, evidenced as being vital to public transportation. However, we will now look at how this social function operates in practice and the substantial impact this role has on communities. The Head of the transportation group Greener Journeys believes that public transportation is one way to "create more cohesive communities" as a public transportation driver can be the only person someone comes into contact with in a day. This shows the social impact that a human driver can have on a community as they are a source of companionship and communication for someone who may not have any other opportunities for such social interaction. Taxi driver Emily-Jo Sedgwick holds that she acts as a "confidante", engaging in conversation and "gossip" with her local passengers. Whilst this is anecdotal evidence, this illustrates how integrated drivers are in their local community due to their social function. They act in a social role, allowing passengers the opportunity to partake in social interaction where they otherwise may be unable outside of this context.

Not Answered

Please explain::

Consultation Question 27: We seek views on whether national minimum standards of accessibility for HARPS should be developed and what such standards should cover.

Please share your views::

We believe that a national minimum standard of accessibility should definitely be developed for HARPS so that in all parts of the UK those who need extra assistance and have disabilities will be able to utilise their services. As reported in the Family Resources Survey 2017/18, 49% of those with disabilities in the UK reported themselves as having mobility impairments. Because of this it would be important to ensure that all HARPS have a lower than average step in height so that those with such issues will find it easier to board and alight the vehicle. 26% also reported impairments with dexterity, so there should be simple controls within the vehicle that can be operated with minimal exertion. Additionally, as previously discussed, there should also be visual and audible instructions to aid those with hearing or sight impairments respectively.

Overall, the possibility that AVs provide to help the elderly and those with disabilities lead a more independent life is very high, but it can only be achieved if AVs are implemented with this goal in mind. So far Uber and Lyft have already started some preliminary work with automated vehicles and collaborating with different disability communities to ensure they are kept in mind throughout the whole process. Notably, Lyft has already conducted sessions with around 50 riders with vision impairment taking trips in driverless cars. These are very positive steps and we hope that companies and governments continue to collaborate and work with these communities to ensure that AVs upon their introduction are able to meet the needs of those who can benefit most from them.

Initially, the absence of a driver may be seen as one that could lead to difficulties for those who have disabilities or are elderly. This is due to the additional support and assistance that a driver could potentially give to them. This viewpoint, however, is not one that is held by many major charitable organisations or the wider public. In a government research project on 'Public attitudes towards self-driving vehicles' the participants consistently identified that one of the primary benefits of AVs would be to those with mobility issues. Additionally, many older people expressed enthusiasm at the prospect of fully automated vehicles as they could potentially provide increased mobility and also more freedom. With AVs many people who are unable to operate cars due to disabilities or other general impairments resulting from old age will be able to travel independently, without relying on another person to help them. This sense of autonomy and freedom is something that many who are disabled feel they are lacking in their everyday lives, and the positive impact that AVs could have to provide more freedom and autonomy is quite substantial.

This potential benefit however can only be realised if AVs are implemented with accessibility in mind and for it to not be an afterthought. Co-design is one way that a future with fully accessible AVs can be achieved and it is very positive to see that this was highlighted in the Consultation Paper. In this response we will be mainly focusing on AV's as taxis or private hire vehicles, but many of these same accessibility requirements will also translate over to HARPS being used as buses too. In relation to accessibility, the two main areas to look at regarding AVs as Taxi's or Private Hire Vehicles are the initial booking/hailing process and also the actual vehicle itself.

Accessibility of the Initial Booking/Hailing

There are several ways that customers can book or hail a vehicle. One of which being the traditional form of hailing where a prospective customer either signals to a taxi that is driving on the street or approaches one parked at a rank. With AV's hailing already moving vehicles may not be a suitable option as firstly this may lead to cars driving around aimlessly for extended periods of time without having a passenger in them. And secondly the car being able to recognise a pedestrian who is hailing from one who is not may also be a technical issue that can be hard to resolve - particularly in busy areas with a lot of pedestrian traffic. A vehicle being hailed at a rank however seems much more feasible and specialised automated ranks could be set up for AVs to do this. This however may not be the best option for those who need special assistance or additional services. It may be especially problematic for such customers as typically a driver is able to adapt to these needs on request and necessity of the customer when they are hailed. However, as there would be no driver in an AV it would be more practical and convenient for any extra needs to be assessed and addressed before the vehicle reaches this customer. One way and possibly the most realistic way that this would happen would be through a ride hailing application similar to Uber and Lyft. This system would be fully integrated so that the users will not only be able to connect to the dispatching system, but will also include information about their disabilities or additional requirements. The dispatching company would then assess the information and send a car that is suitable for the needs of the customer. As we envisage this information to be provided through an app, instead of another person assessing the needs of those who have disabilities and extra requirements, it will be left to the programme itself. This could lead to possible issues as mentioned above in the section about Artificial Intelligence and Machine Learning. Some facilities that may be needed would perhaps be costly for the company to implement and therefore without proper regulation and/or laws to prohibit this, it may lead to the companies charging more due to these specialised needs. We know that it is morally and legally impermissible to do so, as detailed in the Equality Act 2010 and also the governments Inclusive Transport Strategy where they detail that it is imperative for disabled people to be able to "travel confidently, easily and without extra cost". Thus, the dispatching companies need to assure that their software is programmed to highlight those requiring slightly altered or extra services due to disability or old age but not charge them any extra for it.

Uber have already launched a somewhat similar feature to what has been described. It is available in the largest cities in the UK and called Uber Assist – a customer can select an Uber Assist vehicle which is targeted for those who need additional assistance and particularly 'older people, riders travelling with assistance animals, those who have visual or hearing impairments, or riders with foldable wheelchairs' and this service is the exact same price as a standard Uber X vehicle. This is slightly different to what has been described as, as with Uber Assist the exact needs are still not known until the vehicle arrives, but for AVs we envisage them being already integrated into the system.

Accessibility of the Vehicles

There are several obstacles that may be encountered when designing AVs to be accessible. Firstly, it is extremely important to consider the notion of Universal Design – "design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability". The prospect of Universal Design in AVs is something that has been greatly favoured by many disability communities as this would mean that all vehicles could be used by all possible customers. This would mean that there is no distinction between the services for those who are disabled and those who are not so there would never be a shortage of more accessible vehicles and also it would promote a sense of equality as all customers are using the same service. Additionally, certain design features that would be essential for the elderly and disabled could also be generally beneficial for all. For example, vehicles that have ramps and a lower step in height are necessary for those using wheelchairs or with ambulatory difficulties, but they would also prove beneficial for those with prams and rolling luggage.

However, many automotive industry experts have said that this would be almost impossible to implement and believe that cars tailored to an individual's needs are far more practical. Designing a vehicle that can meet all possible needs would be extremely difficult as having a vast number of features in one vehicle would be costly to produce and may also confuse the customer if there are too many features and options within the car itself. Since total Universal Design would be very costly, we believe that instead to ensure AVs are still an invaluable resource for disabled and elderly, there should be a basic level of accessibility enforced on all automated vehicles that will be used as taxis or private hire vehicles. For example all AVs in a fleet would provide simple audio and visual instructions for those with either hearing or vision impairments and have a slightly lower step in height than the average motor vehicle so it is easier to enter and exit for those with ambulatory and some physical impairments. There should then be a minimum percentage requirement of vehicles that will then have a higher level of accessibility and include some additional elements that will meet more complex needs.

Currently local authorities can decide the percentage of vehicles they want to be accessible and the latest taxi and private hire vehicle statistics (2019) show that 66% of authorities require all or part of the taxi fleet to be wheelchair accessible. The number of authorities that require all or part of the PHV fleet to be wheelchair accessible however is only at 5%. To avoid the low percentages of authorities that require accessibility for PHVs being replicated for AVs we believe that as mentioned above all AVs should meet a minimum standard of accessibility which would be regulated for nationally and then the local authorities would then be at their own discretion to set goals for the amount of AVs that would require the higher level of accessibility.

Additional areas that could be considered for the vehicles with higher levels of accessibility are wheelchair lifts and ramps that can be easily operated by the customer. Many who require wheelchairs also have other physical impairments that may affect other parts of their body, so the ramp or lift should also be able to be voice operated, perhaps through commands given to the app which connects to the vehicle on arrival. The Ruderman Foundation spoke to representatives and members of different disability communities to find out the different features they would want in order to improve their journey in an AV. Apart from the suggestions that we have already given, one particular suggestion stood out and we think that it is of high importance that this is included and not overlooked. The Intellectual and Developmental Disability Community suggested that it was imperative that the interface allowed a GPS link to be sent to family and/or caregivers. This would allow users some more independence, but still give the assurance to family and caregivers that they are reaching their desired location. A similar feature can already be used with Uber, so with AVs it would simply be a matter of making this more prominent.

Another issue regarding the accessibility of the vehicles also ties in to safeguarding issues. There is always possibility for emergencies to arise in driverless vehicles, however for the elderly or those with disabilities, the likelihood for sudden health related emergencies are higher. For this reason, we believe that there should be safeguards such as live camera feed installed in all AVs that is connected to the operator's office, which can then be monitored, and then appropriate assistance deployed in the case of an emergency. Although having cameras would help in some emergency cases, some disability groups are still not sure that this measure would go far enough. Another additional safeguard could be a 'panic' style button that will immediately contact emergency services and alert them of them of your vehicles location so help will be immediately dispatched.

[CCTV to safeguard passengers]

One way this could function is through the blanket implementation of CCTV. Even with driven public transport, the increased presence of CCTV made one in five respondents in one study feel safer and in another, CCTV was the most popular measure for enhanced security. Systematic reviews of CCTV systems have

found them to be most effective in the UK with CCTV in car parks having a "significant desirable effect on crime." Nevertheless, CCTV was doubted in its effectiveness when it was not live monitored or had low picture quality. Essentially, CCTV in isolation does not work. One woman suggested that CCTV on the London Underground needed to be "look[ed] at as it happens and getting help when it's needed." Double-decker buses and trains already use live-monitoring systems where CCTV installed upstairs or in all the carriages can be watched by the driver or train manager so they can control the behaviour of all the passengers on his bus. It is not a major sidestep to suggest that this CCTV could instead be watched by a supervisor working for a HARPS operator perhaps, as suggested by the Consultation Paper, sitting in front of a bank of screens to watch people and exercise control when incidents happen. This is assuming that CCTV monitoring falls under the responsibilities of a HARPS operator and that they respond to situations. However, CCTV is only ultimately effective if it is followed up with efforts to respond to incidents and used to punish, potential criminals or incident-causers must fear the consequence of someone seeing what they are up to.

Consultation Question 28: We seek views on whether operators of HARPS should have data reporting requirements regarding usage by older and disabled people, and what type of data may be required.

Not Answered

Please explain: :

Regulatory tools to control congestion and cruising

Consultation Question 29: We seek views on whether the law on traffic regulation orders needs specific changes to respond to the challenges of HARPS.

Please share your views::

Consultation Question 30: We welcome views on possible barriers to adapting existing parking provisions and charges to deal with the introduction of HARPS.

Not Answered

Please explain::

Consultation Question 31: We seek views on the appropriate balance between road pricing and parking charges to ensure the successful deployment of HARPS.

Please share your views::

Consultation Question 32: Should transport authorities have new statutory powers to establish road pricing schemes specifically for HARPS?

Not Answered

Please explain::

Consultation Question 33: Do you agree that the agency that licenses HARPS operators should have flexible powers to limit the number of vehicles any given operator can use within a given operational design domain?

Not Answered

Please explain::

Consultation Question 34: Do you agree that there should be no powers to impose quality restrictions on the total number of HARPS operating in a given area?

Not Answered

Please explain::

Integrating HARPS with public transport

Consultation Question 35: Do you agree that a HARPS vehicle should only be subject to bus regulation if it:

Not Answered

Please explain::

Not Answered

Please explain::

Consultation Question 36: We welcome views on whether any particular issues would arise from applying bus regulation to any HARPS which transports more than eight passengers, charges separate fares and does not fall within a specific exemption.

Please share your views::

buses remain a relevant tool for public transport and the regulation of the UK public transport sector can be traced back to the innovation and advancement of buses. However, APTV (HARPS) as a newly developed system, should therefore be considered as a completely distinct means of transport from the already existing modes of public transport and subsequently should not be constrained by the contemporary regulatory systems in place. This system would operate distinctly, offering wider and more flexible options, tailored to the customer needs and further facilitated by the adoption of a unified framework application. This application can be said to promote communication and sharing of information between operators, customers and regulatory authority, ensuring greater flexibility, and ease of access in public transport. This new system should not however hinder the operation of existing means of public transport such as buses, and adequate measures should be implemented to ensure coexistence and development, during its initial stages of deployment.

Consultation Question 37: We welcome views on whether a HARPS vehicle should only be treated as a local bus service if it:

Please explain::

Consultation Question 38: We seek views on a new statutory scheme by which a transport authority that provides facilities for HARPS vehicles could place requirements on operators to participate in joint marketing, ticketing and information platforms.

Please share your views::

Other comments

Is there any other issue within our terms of reference which we should be considering in the course of this review?

Please share your views::

SHEFFIELD STUDENTS 1: THE LOSS OF THE DRIVER

THE LOSS OF THE DRIVER

The inauguration of autonomous vehicles (HARPS) will undeniably precipitate a radical alteration to the fields of both personal and public transportation. This demands the introduction of a regulatory framework which is futureproof and is prepared for the advent of HARPS. When designing such framework, one assumption needs to be challenged: The Law Commission need to appreciate that drivers and their passengers are more than passive actors who drive and are driven from A to B. They are humans.

Humans are more than “anonymised parcels of flesh” and bring their own idiosyncratic difficulties. The dream of HARPS demands “a more careful examination for the consequences of the futures they envision.” Too often the Consultation Paper asks what HARPS mean for operators, however it is necessary to ask what the introduction for HARPS and the the simultaneous loss of a driver means for current passengers of taxis and buses. Our response to the Consultation Paper carefully examines what the consequences to passengers will be when human drivers are lost. It is posited that the human drivers do much more than operate a steering wheel, and consequently the impact of HARPS is much more complex than it first appears. Our tripartite response focuses on: questioning how the in-vehicle environment will ensure comfort and cleanliness; how HARPS will safeguard passengers; and how HARPS will mitigate the loss of the actual living-breathing-walking-talking human driver.

Maintaining the internal cleanliness and quality of vehicles:

When considering the consequences of there being no drivers on public transport utilising autonomous vehicles, we found that the Law Commission seemed to consider maintenance only in light of responsibility for roadworthiness and safety. But in contemplating where the onus falls in relation to these issues, the Consultation Paper appears to have entirely omitted a consideration of who should be responsible for ensuring passenger comfort and cleanliness within a HARPS-operated vehicle. In fact, there is no discussion in the Consultation Paper of the circumstances that may cause either a human-operated or an autonomous remotely operated vehicle to become unhygienic, uncomfortable and unpleasant for the rider, let alone a consideration of how this can best be mitigated, and by whom. This section of our response will firstly consider the onus on drivers; it will then go on to categorise human behaviour in these situations. Finally, it will consider the current response to this problem, including potential solutions, that we believe the Law Commission should look further into.

In contemplating whether this is a problem worth considering, it is important to think about what humans do in providing maintenance in the form of cleanliness and comfort. Insight into this issue can be gained through anecdotes from drivers, who are “acutely aware that customers tend to do ... annoying things like wiping hamburger-greasy fingers on armrests and turning floor mats into swamps of slush.” At times, passengers— the “drunk people, and the babies who spit up, and the people who are ill with gastrointestinal issues” may even “leave human substances behind.” These occurrences, which are not uncommon, are currently mitigated by taxi drivers in private hire vehicles. Whilst a rider who creates mess gets to “shut the door and leave the contents of their stomach behind” , their prerogative to do so “sets off a whole series of headaches for the driver.” If a passenger vomits in a taxi cab, “the driver is responsible for cleaning it up.” For the drivers in Biba’s article, this means a two hour round trip, and can cause a taxi to be out of service for the rest of the night, resulting in lost earnings. In worst-case scenarios, a taxi may be out of order for “a few days” until the odour dissipates. Maintaining the cleanliness and interior condition of vehicles is costly: Pritam Singh, a Lyft driver in Manhattan, “drops about \$200 a month cleaning— really, sometimes it feels like sanitising— his Toyota Camry.” Singh “vacuums and scrubs the interior of his Camry daily” , and spends his own money on stocking paper sick bags and bottles of water. There are also less common occurrences that require a cleanup, which results in lost time and money; Alf Townsend recalls taxiing a couple from a building merchants, whose can of paint exploded all over the taxi as a result of a sharp left turn. Singh is just one example of many human drivers who take extra precautions to try and ensure every passenger has a

clean, comfortable ride in his vehicle—it is a passenger expectation. It is in the interest of the driver to take these precautions, as if somebody is sick in their car, the driver then “has to take two hours to detail the cab”, usually out of his or her own pocket.

It should also be noted that not everybody that vomits in a vehicle is intoxicated: “around 60% of the population has experienced some nausea from car travel, whereas about a third has vomited in cars before the age of 12.” Motion sickness “most often results from a sensory conflict between inputs from the visual and vestibular systems.” Studies into autonomous vehicles have shown that motion sickness is likely to increase in autonomous vehicles in comparison to cars with a driver, because “occupants are assumed to engage in non-driving tasks, taking the eyes off the road ahead, [and] flexible seating arrangements may involve rearward facing seats.” Occupants lose the ability “to predict sufficiently accurately the future path of the vehicle, which is known to be a main determinant of sickness.” According to Meredith Broussard, this means that “[a]t least 1 out of 10 self-driving cars will often contain someone who is experiencing motion sickness.” Therefore, this increased risk of motion sickness in autonomous vehicles means that it is vital we consider how this problem will be dealt with when it occurs, as it is likely to be a more prominent issue than initially presumed.

The problem, although more adequately documented with regards to taxis, is also one applicable to buses. For example, “First Manchester, which operates hundreds of services across the region, said it takes up to 25 minutes to clean each bus, every evening ... with chewing gum, Metro newspapers, plastic bottles and chocolate wrappers scattered along the aisles and under seats.” This cleaning has to be carried out by a person, who has to work late hours at the end of the day in order to ensure that passengers the following day can step on to a bus that meets their expectations with regards to cleanliness, comfort and quality.

Therefore, the onus on taxi drivers and bus companies is a large one: “people are disgusting” but also have high expectations with regards to their experience. This is one area of life where we expect other people to clean up after us.

Based on the aforementioned anecdotes, human behaviour with regards to maintaining cleanliness, comfort, and the quality of journeys can be categorised into two general roles: perception and deterrence.

Perception can be as simple as knowing if a car smells, or identifying litter. A driver's perception, for example, is how they will be able to tell if their taxi still has an odour from the passenger who vomited in it the night before, or how they can tell if their bus has food wrappers all over the floor. If someone does leave a mess, immediately “a human driver will be there to see it, clean it up, and maybe roll down the windows to air out the car.” Perception can also influence a driver's—ultimately discretionary—decision whether or not to take a passenger: it is not uncommon for a taxi driver to refuse a ride if a passenger is vomiting, drunk, or wants to bring hot food into the cab. The underlying reasons for refusals are evident above: the cost and time involved in cleaning the vehicle, should a mess be created; and the loss of earnings, should the mess render the vehicle unfit for passengers. It is pondered as to how HARPS would be programmed to make discretionary judgments of a human-like nature, as they will “not be human-like in understanding”, and any deviation from strict rules will either be impossible, or down to machine-taught AI systems which will need to be developed as the system grows.

Contrarily yet perhaps surprisingly, perception may also work in favour of the passenger: the aforementioned anecdote from Alf Townsend about the riders who spilt a can of paint all over the inside of his cab actually ended in him deciding how he “could possibly charge a very nice couple for a complete accident? After all, cream emulsion paint is not quite the same as a drunk” person creating a mess. Alf's perception of the incident influenced his fair reaction to his cab being rendered unusable.

This argument of perception is applicable to both taxi drivers and bus drivers. Notwithstanding, it seems that both passengers and drivers have lower expectations when it comes to the cleanliness and comfort of buses, with bus drivers unlikely to enforce rules such as ‘no food on the bus’; something which would almost definitely be a point of contention for most taxi drivers. The crucial message with regards to perception is this: Should a driver detect something unsavoury, they usually possess, or are able to access, the means to be able to deal with the issue. An autonomous vehicle with no human employee present is unable to perceive unclean and unhygienic issues in vehicles with the same ease, and incapable of doing anything about it as rapidly as an already-present human.

Deterrence, on the other hand, refers to the driver's presence being an influence on the behaviour of passengers. Many riders in both buses and taxis “are aware that the driver is observing them ... keeping careful watch over ... behaviour.” In Connor and Tewksbury's study of social control on public buses, they found that “... passengers, aware of driver habits to turn around and look at riders, generally refrained from prohibited behaviour while the bus was idle.” However, once the bus was in motion, passengers were “more likely to engage in prohibited activities ... discarding food wrappers and soda cans on the floor during times when drivers were less likely to monitor them.” This implies that people are more likely to feel accountable to somebody who can call them out; but it is important to acknowledge that this feeling of responsibility is weaker in a bus, as there is less of a personal affective link between the driver and bus, and partially explains why they are messy. Passengers may “have social guilt about intentionally littering in the car of a person inches in front of them in the driver's seat”, so much so that it can be enough to dissuade them from carrying out whatever uncivilised act they were contemplating committing. We are trained to acknowledge that the driver is in charge, and that they would disapprove of us making a mess of their car, and this “dictum shapes our in-car behaviours.” It is not just true deterrence in the form of fear of punishment that impacts behavioural choices; it is also the positive sense of respect for the driver's property. In the words of Eliot, “the driver serves as an ever-present dampener of uncivilised activities inside the vehicle.”

However, the anecdotes equally illustrate that solely relying on the driver as a deterrent does not always effectively prevent customers from defacing the interiors of a bus or taxi. This has led to calls from drivers in different regions “to be able to charge passengers \$50 for throwing up in their taxis.” Ride-hailing apps such as Uber have also cottoned on to the idea of deterring the unsanitary behaviour of passengers by issuing cleaning fees to riders who have left drivers with a large mess to sort out. However, this arguably can “encourage people to think that money can buy them immunity from the requirement to treat other people (including taxi drivers) with at least a modicum of respect”, and that encouraging “good behaviour” is more appropriate than trying to deter people with fines, as this will have little impact on those who can easily afford these fees. It would likely be easy enough for HARPS to have a financial penalty system in place; but it is less obvious as to how the system would encourage respect, and make customers aware that further down the line, a human tasked to clean will be impacted by any messes left. Regardless, it can be inferred that people are more likely to make an effort to contain their messes if there is a driver present.

This response has so far hopefully proven that maintaining the cleanliness and comfort of vehicles is a relevant topic for the Law Commission to look further into, as it is a pertinent issue in current human-driven modes of public transport, and the issue of motion sickness is likely to be exacerbated in autonomous vehicles. It is also important to note at this point that the driver fulfils important roles of deterrence and perception with regards to mess in vehicles. Therefore, if the driver is removed, what can we expect? How will the problem be mitigated, and by whom?

According to Broussard, “[w]hen the driver disappears, we already know what happens: Cars get dirty, smelly and damaged.” If there is no driver, the onus cannot be on them to clean the mess. Therefore, the Law Commission must consider whether this is to be another responsibility of the HARPS operator. The current position suggests that many HARPS-operated vehicles will be fitted with “a camera that points inward, allowing for capturing on video of a rider that tries to trash the interior of a car.” Waymo are currently using cameras “to check the interiors after each trip for forgotten items or spills” in their self-driving taxis. Although these cameras may fulfil the deterrence aspect of a driver, “providing some semblance of behavioural guardrails”, there is not much they can do to make a passenger stop littering, vomiting or carrying out any other action that will leave the car or bus a mess. The camera’s role with regards to perception perhaps even more limited than its deterrence role. They may be able to capture a person vomiting in a vehicle, but these cameras may not be able to identify a sticky seat, or somebody sticking used chewing gum out of view. They definitely will not be able to detect smells either: “[t]here’s no sensor for grime, mess or stink.” Therefore, the onus is transferred, to an extent, to future passengers. “[I]n the future, they may be able to use an app to flag unhygienic cars for Uber and Waymo. But that’s a lot of time and frustration to potentially put on users.” Presuming the HARPS operator receives the knowledge that a car has arrived to pick up a passenger in an unhygienic condition, the onus will then fall on them to direct the car to a cleaning centre “for a human to clean it and get it back on the road.” However, some companies seem to have more lofty aspirations with regards to cleaning that would not place any onus on an operator at all: “self-cleaning cup holders” and “auto-clean seats [with] material that is near impossible to stain.” There is also talk of a ‘mobile cleansing pod’ which will “intercept an unoccupied car suspected of not meeting cleanliness standards while it is still on the road”, and patents have been designed for automated vehicle cleanliness systems. But we are a long way off from these technologies, and in the interim, it must be considered who is responsible for a car or bus being clean. Is it the person monitoring the CCTV? Should it be down to the passenger to report it on the app? Should the buck stop with the HARPS operator when it comes to cleanliness? Could the onus fall with the manufacturers and the materials they choose to use? Or is it a mixture of these? What is evident, however, is that companies do not know this answer either: a Waymo spokesperson, when asked, “did not include information about how, exactly, this happens.” Nix, the Uber lead on self-driving cars, also declined to answer when asked what would happen if a human left bodily fluids in a car, saying they “are still envisioning what it might look like.” Therefore, we advise the Law Commission to further consider how a cleanup service will work, and how this could affect the responsibility placed on HARPS operators of automated buses and taxis.

To try and make cleaning easier and less costly, Litman envisages that “self-driving taxis and buses will have ‘hardened interiors’ (vinyl seats and stainless steel surfaces), minimal accessories, and security cameras.” He talks about interiors being “plastic and chrome” to mitigate the issue of uncleanness, but acknowledges that “vehicles will occasionally contain garbage or unpleasant odours, or be damaged.” However, vehicles may be found in this state more often than ‘occasionally’. Even if the issue of cleanliness is mitigated by hardened interiors— it is acknowledged that the New York City Subway trains are cleaner than the London Underground carriages— this may have a knock-on effect elsewhere in terms of cleanliness, as, conversely, the New York stations are perceived as less clean than their London counterparts. Litman’s predictions and the aforementioned anecdotes from taxi and bus drivers show that people are going to be messy, potentially more so without the deterrence of a driver being present; yet this directly conflicts with the perceptions many have for how autonomous vehicles will be used. Car designers, for example, are “imagining a future where car interiors look more like a high-tech living room”, with “users want[ing] to do all sorts of activities in the car once self-driving is activated, including playing guitar, yoga and knitting.” One company, Yanfeng, believes that “shared self-driving cars can be compared to hotel rooms, which are made to be clean and fresh for every new customer, regardless of how many people have used it before.” This desire for luxury is certainly understandable, but the practicalities of having a plush vehicle with no driver to ensure that the vehicle stays in this condition perhaps throws a spanner in the works when it comes to companies like Yanfeng’s vision. Having a ‘maid service’ between passengers is not efficient, it will be costly, and will drive prices up, therefore excluding lower socioeconomic groups within society from the AV experience. It could also result in different ‘classes’ of AVs: those riding in clinical, sterile vehicles becoming segregated from those who can afford to pay the premium for luxury. We urge the Law Commission and other relevant stakeholders to think further with regards to the implications of keeping vehicles clean, and how projecting these costs on to the customer can lead to “potential social equity issues.”

From this, it can be seen that there is no consensus with regards to maintaining the cleanliness and quality of vehicles without a human driver present. The theoretical solutions offered by various stakeholders come with much cost and inconvenience— whereas a driver can simply get out and throw some litter in the bin if their presence has not deterred a passenger from leaving it, a HARPS-operated vehicle would have to return to a cleaning centre, wasting valuable time and money. The potential solutions also have various implications with regards to spreading the responsibility in an unclear manner, and the impact on socio-economic division. The Law Commission, in looking further at the responsibilities of HARPS operators, should consider unforeseen onuses such as maintaining the cleanliness of a vehicle, and the wider implications of this.

We hope that we have demonstrated that maintaining the standard of a vehicle does not just apply to the exterior of the vehicle in terms of maintenance and servicing, but that passengers have an expectation of a clean, comfortable vehicle— despite being the ones to deface the vehicle. A driver fulfils two main roles in relation to maintaining cleanliness: perception, and deterrence. Even with technological advancements such as CCTV, it is unlikely those monitoring the feed will be able to ‘see’ everything, and certainly won’t be able to identify odours or stickiness— this perception will then fall on the user. Users may not be best pleased at having to report things, or having to wait for another vehicle because the one that arrived was not in a habitable condition. There will also likely be an onus on someone to decide if a vehicle is in a ‘bad enough’ condition to be sent for cleaning. We urge the Law Commission to consider how, if CCTV is used, the feed is monitored by HARPS operators. It must also be acknowledged that if the deterrence of a camera fails, there is no second safeguard: there is nobody present to ask a rider to take their mess with them. Although technology, including the aforementioned CCTV, has been developed in suggestion to these issues, much of this technology, such as “self-cleaning cup holders” is years away from implementation, let alone perfection. For example, automated public transport may have in-built ‘discretion’ on whether to allow certain passengers to board in the same manner a human driver may refuse the carriage of a visibly drunk person. However, the system would need to be carefully scrutinised by regulators to ensure that an automatic machine learning system for identifying drunk people who may cause mess did not discriminate against disabled people whose manner of walking may trigger a similar response. Any regulatory structure devised by the Law Commission would need to be sensitive to these potential problems. The lack of an interim strategy from these companies, and the complete omission of the issue in Consultation Paper 2, “seems to reflect a naive view of what people are like and how much invisible labour drivers put in to keep their cars clean”, and the wider issues and potential discrimination that systems replacing humans may encounter. It may also be within the public’s interest for HARPS to not routinely exclude drunk people who may have a negative impact on cleanliness, as it may result in difficulty to disperse groups of drunk people, or leaving drunk people vulnerable with little options on how to safely get home. The polycentric nature of these issues may be difficult to address with adequate regulation and may require elements of local regulation based on an area’s needs, as opposed to the proposed national system. In addition, a nudge-style method of influencing behaviour may be considered as a method to educate passengers on respecting autonomous vehicles for the benefit of future passengers. The Law Commission should take more effort to acknowledge that, with these new proposals, “the new heroes of the autonomous ride-sharing age might just be the car detailers.”

Safeguarding passengers:

When considering the consequences of there being no drivers on HARPS-operated public transport, the Law Commission considered remote supervision only in the light of responsibility for road and traffic safety and seemed to only consider safeguarding passengers briefly. However, “passengers expect not only a reliable, clean and comfortable environment but also a safe one.” This section of our response will first identify how bus and taxi drivers safeguard passengers; it will then go on to discuss how in-vehicle personal safety is key to the success of the introduction of HARPS. Finally, it will consider the potential solutions to this problem that we believe the Law Commission and HARPS operators should seriously consider.

Anyone who has ever been a passenger in a bus or in a taxi will appreciate that bus and taxi drivers have multifaceted roles. Security and safeguarding passengers is a vital aspect of this role away from actually operating the bus. One passenger said to a researcher, “I’d prefer to have security ... rather than spend money on comfortable seats and other things. Security has to be the most important.” It should be noted that existing technology could replace simple and uncomplicated tasks. For example, monitoring the vehicle mechanics, returning lost items, charging passengers and systems currently on the market that are installed and connect the car to call centres of human advisors who can remotely assist to “alert the authorities in [an] accident or theft ... and lock and unlock doors.” But, safeguarding passengers from “unpleasant and frightening” passengers is not so simply replaced by technology.

Most of the available research on crime on public transport in the UK comes from Transport for London (TfL) research on buses. Research found that almost all bus drivers had experienced or witnessed an “incident, anti-social behaviour or crime” in the previous month. A reasonable amount of unpleasantness is part and parcel of life and the “ubiquity of aggression is an inevitable by-product of living in cities” but in the intensity of the environment of public transport can lead to frightening incidents.

Crime and anti-social behaviour incidents that “contaminate the on-board environment” include, but are not limited to, passengers shouting abuse, aggressive groups of intimidating young adults, physical assaults, unwanted sexual behaviour and harassment, racial abuse, spitting and drunken antics. Although a “certain amount of conflict will be built into the service driver-passenger relationship”, a lot of incidents are passenger-on-passenger aggression. In 2018, thirty percent of Londoners were worried about personal security when using public transport. Significantly, seventy-five percent of interviewees could mention something that made them concerned about their in-vehicle personal security. In 2012, TfL found thirty-six percent of Londoners took precautions to attempt to prevent from becoming a victim of crime. Personal prevention methods include sitting near someone else or closer to the driver. These statistics highlight that safety and security should be key priorities which ultimately link to economic development in the sense that when people feel safe they are more likely to engage with public transport systems, which generates revenue.

Drivers of buses and taxis’ role in mitigating the potential unsavoury behaviour of their passengers should never be underestimated. They act as social controllers and regulate behaviour. “Bus riders are constantly subjected to mechanisms and processes of behaviour regulation. Both bus drivers and the bus environment itself function as discernible social control agents and structures, enforcing behaviour conformity.” It is not controversial to say that a lack of driver could “result in an increase in the probability of criminal actions and non-compliance with the rules.” One way this has been understood is identifying drivers as ‘place managers’. This concept was conceived by Marteaché and others. They are ‘place managers’ because they have the “authority to control behaviour in their assigned area” that is to say the bus space or the taxi vehicle and they are critical because they “either proactively work to prevent crime or respond to issues as they unfold.”

Bus and taxi drivers are effectively ‘place managers’ because they are granted power through their access to resources and recourse to consequences. One of the primary manifestations of their power is as a gatekeeper. Their position gives them the decision making power to grant people the privilege to travel on the system and they also have the power to eject riders. This can act as an “effective deterrent” to bad behaviour. Aside from social norms of queues at ranks, taxi drivers are said to have ‘rational bias’ towards refusing passengers that are deemed, based on signals, as plausible attackers. This is another form of gatekeeping. Because of their powers and influence, having drivers or staff members on buses makes “a lot of people feel more comfortable travelling and not just at night.”

Beyond the gatekeeping role, once passengers are let into the “mobile community” of the taxi or on the bus, drivers have developed “special mechanisms” for controlling passengers and ensuring passenger behaviour conforms to rules and regulations throughout the journey. These examples include how drivers may act and bus stops may be designed so that as people walk towards a bus they become strung out in a line rather than in a crowd around the door and using the bus mechanics to get passengers to speed up so the driver can keep to schedule. Connor and Tewksbury refer to surveillance through mirrors. In their ethnographic study, they report overhearing passengers using the driver as a form of behaviour control within their own social setups, as one parent said to their child, “[the driver]’s looking at you, make sure you behave.” They concluded that “the continual presence of watchful and authoritative drivers serves to accomplish rider conformity to established bus behaviour.” This continuous authoritative surveillance by a human driver will not exist in HARPS; recommendations for alternatives are analysed later.

Whilst managing the environment, human drivers do have to enforce the rules and handle issues in order to safeguard trust in the system. However, they do not always strictly apply the rules. These decisions include the rules behind letting people on when they do not quite make the fare, deciding whether 16 year olds should be charged an adult or child ticket, and allowing passengers to bring food or large suitcases into public transport. Each human driver applies rules with flexibility and adaptability. They use discretion, and a system that is “not human-like in understanding” faces similar great challenges explored earlier in relation to maintaining cleanliness of vehicles.

Current prototypes of HARPS as a replacement to buses only provide small seating capacities of around eight to ten passengers. Whilst little appreciation for the continuing need for personal space, Merat, Madigan and Nordhoff suggest this is “likely to exacerbate feelings of tension and stress” that are already ubiquitous in public transport journeys for lots of people. However, it is not clear what the relationship between antisocial behaviour and passenger capacity of HARPS will be.

What is clear, without a driver, an analysis of the consequences of removing the driver turns to the issue of what happens to the mobile community without this obvious designated social controller. Current research shows fellow passengers, mostly strangers, do not intervene and that “riders themselves largely do not exert social control on one another.” Without a driver, no individual would assume the authority on board and with no driver to control or recourse to during incidents, this could cause an unexpectedly massive cultural change to the in-vehicle environment of a bus or a taxi with complete uncertainty about whose role it would be to intervene. Systems need to be put in place so that passengers can be empowered by HARPS operators and given the confidence to know how to and to actually deal with situations.

Some commentators have argued that “fully automated vehicle technology is not yet ready for commercialisation.” One of the main obstacles is demand, public acceptance and willingness to actually use these services. Parents abroad have been found to be using Uber to ferry children to school. UK Ubers require an accompanying adult whilst taxis are more flexible. It is questioned how HARPS will answer this question and whether relegation will limit HARPS users by age. However, if parents are trusting their offspring in taxis with unknown drivers, it could be inferred that parents would be willing to put them in taxis without drivers. However, acceptance is multidimensional and hard to predict. Early research was predominantly focused on traffic safety concerns. When considering articles that widen the scope to other passenger concerns, the lion’s share of research has been conducted on buses. These initial studies have found fears regarding in-vehicle security and personal safety when there is no staff on board alienate and stymie consumers from actually choosing to use services, which is in line with other public transport options. In order to alleviate fears, currently, Bus and taxi drivers are subject to regulation on compulsory criminal record checks, although that will no longer be relevant for HARPS. Fear of crime or an incident in a HARPS may lead to a strong possibility of a call for the development of reference systems for passengers who chose to use HARPS taxis and pooling HARPS, akin to buses, in order to prevent or reduce incidents of passenger to passenger stranger misbehaviour. It is suggested that those systems could be based on the Uber reviewing and rating model but may struggle to be adopted or effective in practice. Especially, if it meant that if a user got one bad rating they would be unable to access HARPS under some form of technological gatekeeping.

Feeling safe and secure on public transport is the most concerning issue and emphatically links to frequency of use, even on existing public transport options. This is compounded by the cycle of fear. The theory is that if fear reduces the number of people travelling, this hampers safety in numbers which consequently increases levels of fear. Greater fear arises with unfamiliar technology. It is not easy to trust HARPS.

The University of Pennsylvania’s study found that sixty percent of potential passengers were actually fully unwilling to ride when there was no employee on the bus. However, this is only valuable insofar as future intentions because these respondents were only briefly acquainted with the technology through introductory information on the online survey. In a Finnish study—a country in which citizens trust strangers—sixty-four percent of passengers answered that their sense of in-vehicle security in the driverless shuttle was worse or much worse than in the conventional bus, despite traffic safety being deemed to be better. The interviewees in this study had just experienced actually riding on a CityMobile2 autonomous bus for nearly one kilometre in Vantaa, Finland. In-vehicle safety has been delineated in the academic literature as meaning ‘the fear of becoming a victim of a crime’ and feelings of being insecure. Other barriers to acceptance include unfamiliarity with the technology and concerns regarding vehicle operational safety. However, the same studies have found passengers are dramatically more willing to ride a HARPS when “a transit employee is on board to monitor the vehicle and provide customer service” compared to not. Salonen adequately summarises the issue: the presence of a driver was key, as HARPS are “better at negotiating traffic environmental challenges than interpersonal conflicts between people or controlling emergency situations with many people involved.”

This is pertinent because, in order to be mainstream, public transport must adhere to society’s wishes and understand their customers. Even if those wishes, which present as unwillingness to ride, could be dismissed as “mere ethical squeamishness” about removing drivers. The success of the introduction of HARPS rests on passengers actually using the systems in place, otherwise “the vision cannot be realised.” Investment into addressing anxieties about in-vehicle personal security will potentially lead to more passengers trusting HARPS and therefore more revenue for operators. Although, a paradox does arise. Research also found strong evidence that a “planned and comprehensive approach to security” is desired by passengers. What that approach will look like is still open to many possibilities and much debate. In light of what is suggested by the Consultation Paper, some of the strongest potential responses are analysed below.

When technology and labour are discussed in tandem, complete displacement of human beings is often initially feared. For HARPS, this is a fear that bus and taxi drivers will be made redundant. However, when technology changes the parameters of someone’s occupation, a shift or transformation of a role is often proven to be the consequence rather than wholesale replacement so bus and taxi drivers may not all be fully out a job. The same is true for HARPS and they will remain to be “partial[ly] contingent on human agency.” It could be the case that former bus and taxi drivers are retrained to work as those human agents. For safeguarding passengers, it is envisaged that active management of riders will transform to passively managing behaviour and in-vehicle safety through alternative and new means.

One way this could function is through the blanket implementation of CCTV. Even with driven public transport, the increased presence of CCTV made one in five respondents in one study feel safer and in another, CCTV was the most popular measure for enhanced security. Systematic reviews of CCTV systems have found them to be most effective in the UK with CCTV in car parks having a “significant desirable effect on crime.” Nevertheless, CCTV was doubted in its effectiveness when it was not live monitored or had low picture quality. Essentially, CCTV in isolation does not work. One woman suggested that CCTV on the London Underground needed to be “look[ed] at as it happens and getting help when it’s needed.” Double-decker buses and trains already use live-monitoring systems where CCTV installed upstairs or in all the carriages can be watched by the driver or train manager so they can control the behaviour of all the passengers on his bus. It is not a major sidestep to suggest that this CCTV could instead be watched by a supervisor working for a HARPS operator perhaps, as suggested by the Consultation Paper, sitting in front of a bank of screens to watch people and exercise control when incidents happen. This is assuming that CCTV monitoring falls under the responsibilities of a HARPS operator and that they respond to situations. However, CCTV is only ultimately effective if it is followed up with efforts to respond to incidents and used to punish, potential criminals or incident-causers must fear the consequence of someone seeing what they are up to.

Furthermore, building on comments made about how bus and taxi environments are “strategically outfitted” for social and behavioural control. Suggestions have been made that HARPS designs should be equipped with “features that maximise the safety potential of driverless buses as well as alert systems that allow the operator and passengers to communicate effectively” . These could work alongside the usual notices and warnings that are usually displayed in the interiors of

buses and taxis. Currently, drivers regulate behaviour through verbal commands so technology may serve to be able to communicate commands through intercom systems between HARPS and operators, and operate as a form of consequence to CCTV use as mentioned above and in lieu of stewards discussed later.

The responsiveness of a group of anti-social youths to a big voice from a speaker compared to a stern bus driver remains to be seen. However, in other environments it has been shown to work: StaffSafe developed an alarm system for a retail environment. The solution has been installed in over seventy percent of McDonald's restaurants, many of which are open twenty-four/seven, across the United Kingdom. Essentially, staff members struggling to deal with an anti-social behaviour incident press a button, which puts them through to an off-site independent security team who can view CCTV and communicate through intercom. It acts as a first line defence system as the off-site security team can communicate over speakers to those customers causing the incident and warn them that the police will be called, which thereby safeguards staff and other customers.

Although design features can enhance the perception of safety, designers, operators and regulators need to ensure they also have practical implications for safety and that they are deliberate plans that "design out" much crime. This means that passengers without drivers need to have the required information to know how, when and why to operate these systems, as the usual staff training will not be available. It should be appreciated that these suggestions are not mutually exclusive but could work together to maximise safety through a package approach. In existing public transport, "design and location, staff, CCTV, alarms and help points, [and] police all have a role to play in enhancing positive experiences." These aspects will all have a bigger part to play when drivers no longer have a role.

Perhaps the best way to respond is to accept that driverless will not necessarily mean humanless. The Law Commission and operators behind HARPS must accept defeat on HARPS being completely "divorced from human agency" straight away, as it will "not solve any social problems." Simply, human involvement cannot be sacrificed completely and "continued human involvement will occur as a matter of principle" — even if just because the presence of an employee with the responsibilities of a driver has such a demonstrably positive impact on respondents' willingness to ride. The "absence of a capable guardian is a precondition of crime." On-vehicle staff presence has been found to be a key measure for personal security in crime surveys; however, this is only effective when they are accessible and visible. When discussing safety on trains, respondents have been recorded as stating "it would be good to have CCTV but it's staff walking through that would be much better [and] having announcements is not the same at all." This is relevant to more contexts than just trains. Clearly passengers on public transport prefer the presence of active human safeguarding opposed to passive, reactive measures such as alarms, remote voices. .

When coping with the loss of the human place managers of a driver, operators and regulators should look toward developing systems and regulatory frameworks that facilitate the marriage of humans and machines in order to confront societal needs and expectations of paying passengers. It does require genuine "practical solutions." Although including humans into the system is an important suggestion, it must be acknowledged that, over time, the need for these systems may depreciate as the wider public become more familiar with HARPS. The recommendations made by the Consultation Paper in relation to stewards are central to these issues. The Law Commission's reference to stewards limits their role to assisting more vulnerable passengers. However, it is argued that they have a much more valuable role than first envisaged by the Law Commission.

For now, the following questions remain: who, where and how will humans interact with the system. Dong, DiScenna and Guerra strongly recommend, to ensure the use of these services, that transit agencies should consider deploying employees on HARPS, at least to provide customer service and potentially monitor operations of the technology. Prague 4 Municipal District is trialling driverless buses. CityMobil2, an EU research project that is running these trials across Europe, provides the vehicles. The project covered 7 demonstration sites that carried 60,000 passengers. Interestingly, in Prague 4, for "safety reasons" and "emergency situations" a decision has been made to ensure employees are present on every bus. It is argued that the consumer service role of these employees could be inclusive of safeguarding passengers in-vehicle security, ensuring a clean and comfortable environment and providing the soft human benefits as discussed elsewhere in this response at least until passengers become more used to travelling in driverless vehicles and can use the design alternatives confidently. We affirm the Law Commission's recommendation that any and all stewards and on-board staff should be subject to criminal record checks, in line with how drivers are currently.

There is a limitation on the arguments forwarded above: Monitoring in place of driver has to be weighed up against the assumption that a driver actually has a deterrent effect. This stems from the fact that the crime reports referred to previously clearly prove that even with drivers present, safeguarding incidents still occur. The argument we pose is that without drivers, the problem will get much worse than it currently is. The level of influence a driver has to safeguard passengers is very subjective and may depend on previous personal experiences. Understanding those personally subjective opinions is essential for assessing how services perform. Some predictions have been made that safeguarding passengers may be easier and better once HARPS are bigger vehicles that can accommodate more passengers. Some research has also tentatively suggested that technology may be able to begin to be able to do everything a driver does without the risk of human discretion. Google has a patent for vehicles that could use facial recognition to identify passengers that ultimately could, for example, prevent unauthorised persons from putting a child in a taxi. This appears to be a promising move towards a humanless system. However, when put into context, these plans are merely visions that face the same obstacles of acceptance by the wider public that HARPS initially do— arguably, potentially even more so, especially given the vast amounts of data operators will have to have to employ for functions such as facial recognition. The feasibility of these functions being operational at the same time as HARPS buses and taxis are introduced is highly doubted.

Potentially, it is not even required that the responsible person needs to be a 'driver' or employee of the HARPS operator. Salonen makes a unique recommendation for an almost utopian solution. He recommends hybrid solutions with local businesses, who have the opportunity to set up pop-up style sales whilst granting passengers a sense of security. The Law Commission should ensure that regulation recommendations should not legally impede the possibility of schemes such as this.

Keeping passengers safe has to be a top priority. Designers, operators and regulators need to appreciate the importance of safeguarding passengers of HARPS. There are possibilities for systems to mitigate the impact of the loss of the driver but using stewards during transition periods may be the easiest approach for the introductory periods.

The 'Softer' impacts of the human driver

In this section, we will look at the 'softer' impacts of the human driver on transportation. We have chosen to define the 'softer' aspects of the driver as the interface between the passenger and the driver in a transportation model. This includes the driver's role as information provider, the driver's social function and finally, the

driver's emotional role. We will first discuss the driver's role as information provider on board public transportation and how the loss of this role can be accounted for in the introduction of HARPS. Next, we will analyse the social role of the driver and the consequences of the loss of this role in HARPS. We will then make the same evaluation of the emotional function of the driver. Our final section will look at whether artificial intelligence can replace the human driver and alleviate the adverse impacts we have noted regarding the loss of the social and emotional function of the driver. We will conclude that AI may not be an appropriate total substitution for a human driver and we endorse that a human on board each HARPS could be considered as a potential solution.

First, a key function of the driver, as identified by Toren as the fourth most important responsibility of a bus driver, is their role as an information provider. However, with the introduction of HARPS, the driver's role as an information provider vanishes. A focus group evaluating the deficiencies that will accompany the disappearance of the driver, identify that if a passenger is unsure about any aspect of the journey such as the fare, the schedule or the route, they will seek the answers from the driver of the vehicle. Therefore, the removal of a human driver will create a deficit in passenger information as there will be no human on board to resolve queries. This reduces the efficiency, comfort and ease of travel as there will be no immediate resolution to passenger problems in HARPS.

This issue is exacerbated by the notion of already anxious passengers. Public transportation is currently a common source of psychological anxiety. This anxiety can stem from stress associated with transportation transfers due to the "frequent missing and incomplete information." Accordingly, removing a human driver from HARPS who can provide such information will negatively impact travel, making it less accessible to more vulnerable passengers.

Furthermore, the necessity for a physical driver on board a vehicle is underpinned by the idea that human drivers are able to facilitate communication when passenger instructions are unclear. For instance, human drivers would be able to "translate" slurred instructions from drunk passengers, as well as from tourists who lack fluency in the local language. Recent developments in app-directed travel have somewhat accounted for this issue. For example, the "speaker" button on the Google Maps app allows passengers to communicate a location in the driver's local language via the app, curbing the potential for miscommunication. However, this does not account for such a significant language gap that cannot be bridged by app-based communication. For instance, where the passenger must rely on hand gestures and vague directions to communicate their destination to the driver. In such cases, human drivers will be able to play "destination Pictionary" and rely on alternative communication other than speech for those passengers that are unable to speak the language fluently. This illustrates the integral importance of the human driver as they are able to understand different methods of communication that are inherent to human interaction. However, with the inauguration of HARPS, such human qualities will be lost in public transportation.

However, we propose that there are ways to rectify this loss in the introduction of HARPS. The Law Commission acknowledge the necessity of providing passengers with accessible fare information. This resolves the issue of the lack of the driver to answer fare-related queries. Nonetheless, as aforementioned, the human driver's role as information provider goes beyond this. It extends to complex, minute tasks that will sometimes be unpredictable such as the previously mentioned ability to translate incomprehensible instructions from drunk passengers or tourists. Therefore, to address this problem, we suggest that HARPS must be regulated to allow for more stringent measures to be put in place to compensate for this loss of information. The IEEE's study concluded that, without a driver present, "auditory and visual guides" would be necessary to help autonomous vehicle users compensate for the lack of the human on board. We endorse this proposal and believe that this could help mitigate the problem to an extent. Accordingly, we believe that the Commission should aim to ensure the regulatory structure for HARPS is able to require an operator to provide such clear and accessible information without a driver on board. This should include all the information that the average bus or taxi driver has to hand such as fare, route and schedule information. As previously mentioned in the above safeguarding passengers section, we additionally contend that a potential solution to this issue could be to employ a human on board as a steward to account for the loss of the driver as information provider in more niche situations.

Second, we will analyse the social role of the driver. This role of the driver is of paramount importance to day-to-day travel, yet the Law Commission fails to account for the loss of this role in the introduction of HARPS. The vitality of this social role is evident in the stringent requirements for social skills and attributes in the employment process of a driver. In assessments of the role of the bus driver, it has been acknowledged that drivers must possess certain social skills to be employed. This includes the ability to "to interact effectively with verbal and listening communication skills" as well as being able to demonstrate attributes such as "honesty, trustworthiness, flexibility, and demonstration of a sound work ethic." This illustrates how social ability is attached to the profession of the bus driver, confirming the idea that there is an inherently social element associated with the position. An attendee of the American Public Transportation Association Sustainability and Multimodal Operations Planning workshop even claimed that "we hire on ability and fire on attitude." Consequently, it is evidenced that the social function of a driver is vital to public transportation.

This is principally because drivers act on the "front line" between companies and the public and are, therefore, required to have social aptitude in order to represent the company. Toren's analysis of the bus driver's role in Israel went so far as to rank a driver's ability to "be courteous and polite to passengers" as the third most important responsibility of the driver. This illustrates that a driver's ability to interact effectively with passengers cannot be overlooked- it is a key part of the profession. Therefore, whilst the Law Commission does not address the social role of the driver, making the assumption that it does not need to be replaced, it is evidently key to public transportation.

The driver's social function is, thereby, evidenced as being vital to public transportation. However, we will now look at how this social function operates in practice and the substantial impact this role has on communities. The Head of the transportation group Greener Journeys believes that public transportation is one way to "create more cohesive communities" as a public transportation driver can be the only person someone comes into contact with in a day. This shows the social impact that a human driver can have on a community as they are a source of companionship and communication for someone who may not have any other opportunities for such social interaction. Taxi driver Emily-Jo Sedgwick holds that she acts as a "confidante", engaging in conversation and "gossip" with her local passengers. Whilst this is anecdotal evidence, this illustrates how integrated drivers are in their local community due to their social function. They act in a social role, allowing passengers the opportunity to partake in social interaction where they otherwise may be unable outside of this context.

Therefore, the evidence indicates that the social role of the driver is of high importance. We will now look at the implications of the loss of this role that will accompany the introduction of HARPS. The most significant implication will be the social deprivation that comes as a result of the disappearance of a "third place." Lipson and Kurman define the "third place" as somewhere that is neither home nor work, but an additional place where you "hang out" and engage in "spontaneous social activities"- public transportation is a "traditional" example of this. However, with the inauguration of HARPS, people may begin to miss the "enforced human contact" that existed in public transportation models involving a human driver. This is an important observation that the Law Commission fails to address. The removal of the driver without any form of replacement constitutes a gap in society. This absence could have adverse impacts, depriving people of human contact to which the Law Commission has provided no solution.

The social exchanges which are ordinarily unappreciated between passenger and driver can be seen as having a “hidden value.” This can be underpinned by the idea that day-to-day ‘meaningless’ social interaction has positive effects on reducing stress as well as on general health and well-being. This is especially true of the most vulnerable in society. It has been successfully proven that social interaction can alleviate some negative symptoms of dementia. Therefore, the removal of such interaction through the introduction of HARPS, whilst encouraging efficient travel, sparks negative effects for individuals in terms of emotional health and well-being.

Third, we will address the emotional role of the driver. This function extends beyond a social role and includes actions that are not required of the driver, yet are often still undertaken. These actions that contribute to the comfort and well-being of the public are, by definition, so ‘human’ that an automated machine would struggle to entirely replicate them. Examples of such behaviour can be found anecdotally. Broussard discusses a student’s experience with motion sickness in a taxi, saying that “the kindness of the driver” played a fundamental role in her experience in the taxi as he “stopp[ed] the car, asking her if she needed a minute to breathe, giving her a box of tissues, showing he wasn’t angry at her.” Whilst this fails to provide an example of efficient or economic transportation, it illustrates how a human driver had a vital impact on a passenger’s experience by exhibiting human emotional behaviour, showing sympathy and understanding. As we will later discuss, these are behaviours which significantly impact the experience of a passenger and cannot be completely substituted by technology. This emphasises the negative implications that could accompany the retirement of human drivers in HARPS.

Taxi and bus drivers also have to be prepared for unexpected and extremely unusual circumstances. Journalist Anna Lavygina’s experience of giving birth in a taxi highlights the emotional element that a driver can add to a journey. Whilst this does not constitute the everyday experience of a taxi driver, it illustrates the importance of the human driver’s role in such exceptional situations. Lavygina illuminates the impact that the taxi driver had on her journey to the hospital, saying that he was “amazingly calm and collected...telling me all about his wife’s birthing experiences.” The driver’s ability to comfort her made a traumatic journey significantly more bearable. The journalist goes on to say how the taxi driver washed and returned the clothing she left in the car, and even sent presents for the baby. This shows how the driver’s ‘official’ role may not extend to these functions, but the role that drivers play in our society evidently goes beyond just driving. HARPS may be able to serve as a successful substitute for drivers in transporting passengers and freight efficiently, yet they will be unsuccessful in compensating for the non-official emotional functions that the driver often provides just by being human. The loss of such a position in our society will evidently be great due to the profound impact drivers have on the individual and the community.

Evidently, the loss of the human driver as a result of the introduction of HARPS has the potential to cause profound and adverse impacts. We will now evaluate whether these impacts can be mitigated by Artificial Intelligence (AI). To achieve this, we will assess the functionality of assistive service robots as they exist today in providing social interaction and companionship in the absence of a human. We will then evaluate whether AI could be a legitimate replacement for the human driver in HARPS, providing the same “sense of being with another” that is essential for gratifying social and emotional interaction.

Primarily, we will analyse a specific type of AI- socially assistive service robots. We will focus on the effectiveness of these robots to serve in social and emotional roles in an alternative context to AVs, amongst the elderly and dementia patients. An assistive service robot can be defined as an “actuated mechanism...with a degree of autonomy, moving within its environment, to perform tasks and services.” Socially assistive service robots are used to provide companionship and to facilitate participation in wider-society, principally in the context of care homes for elderly patients and people with dementia. These robots are able to express basic emotions, partake in high-level and complex conversation as well as establish social relationships. An example is Paro- a robotic seal used by the elderly. This device responds to positive treatment such as stroking, as well as negative behaviour such as being hit. Paro, and similar devices, have been proven to promote beneficial responses with elderly users as well as with dementia patients. Positive results included reduction in feelings of loneliness as well as promoting improvement in communication and social ability. This exhibits how socially assistive robots can be seen as able to substitute human interaction by performing a social function in this context. This is especially true of highly functioning assistive robots that can engage in complex dialogue and mimic emotions such as Bandit. Accordingly, socially assistive robots appear to be highly functioning in performing the social and emotional roles in this context.

Applying this to HARPS, this suggests that AI may function in place of the human driver. If social presence is defined as “the sense of being with another,” an artificial interaction with a robot can compensate for the loss of the human driver in HARPS as AI can adequately form social responses. This would hypothetically fill the gap left in the absence of a physical driver as these socially assistive robots are able to do almost everything a human is capable of regarding social interaction. Relating this to the introduction of HARPS, whilst the Commission fails to suggest a replacement for the human driver, the use of AI is an alternative that could be considered.

However, whilst socially assistive robots are successful in increasing feelings of social inclusivity amongst the elderly and dementia patients, this is only because they exist to reintroduce those in a position of isolation back into society. These robots serve as a “social facilitator” to aid vulnerable people with their transition back into wider-society. In this context, AI is not supplementing human contact, but facilitating further contact between users and their medical support or users and their relatives. Accordingly, these results may not apply to AVs as the use of such AI in a HARPS context would not serve as a ‘facilitator’ but, instead, as a replacement for the human driver. Therefore, it cannot be concretely concluded that AI would provide the same results of increasing socialiability in HARPS as it would be used in place of the human driver’s social and emotional roles.

Furthermore, we believe that AI in HARPS vehicles will be unable to perform the same functions and roles as a human driver. These are the attributes discussed above that we consider highly valuable to the well-being of society. With regards to the social role of the driver, the complexity of human interaction cannot be underestimated. Socially assistive robots are able to engage in high-level communication, yet they are still unable to mirror the complicated conversational ability of a human. Primarily, non-verbal communication is an underestimated part of human interaction. This form of communication includes “facial expressions, gaze behaviour, gestures, postures and body movements.” Whilst these are not dialogue functions, they allow for a “smoother flow of conversation” which invoke a positive reaction in those party to the communication. This shows the limitations of the ability of AI in conversation- they may be able to adequately engage in complicated dialogue, yet they cannot exercise the social cues to ease the flow of conversation. Therefore, they are unable to successfully compensate for the driver’s social role which has a positive impact on the health and emotional well-being of society.

Additionally, we believe AI will be unable to successfully exhibit the emotional traits of the human driver which, as discussed above, is of paramount importance to a passenger’s experience of public transportation. Whilst there is evidence to suggest that humans are capable of forming emotional attachment to machines, anthropomorphising them and giving them human names, this does not amount to the same emotional gratification that comes from human-human communication. For instance, Guerra’s example of Mark Tilden’s multi-limbed robot. This machine serves to defuse landmines by stepping on each mine causing it to detonate, destroying each leg. When used in practice, the test was halted by an army colonel, believing that it was “inhumane” to watch the “burned, scarred and crippled machine drag itself forward on its last leg.” Whilst this appears to imply an emotional connection between the machine and the army colonel,

suggesting a machine can act in an emotional role, this relationship was not genuine and fails to provide the same emotional satisfaction that a human could offer. This is because the relationship is “unidirectional” as the robot is unable to be a “genuine partner” to the interaction. They are incapable of experiencing the same legitimate emotions in return. Consequently, AI is unable to provide the same emotional gratification that exists in human-human interfaces and would be an insufficient total substitute for the emotional role of the human driver.

Therefore, AI may be a point for the Law Commission to consider. However, as evidenced, AI will struggle to sufficiently compensate for the totality of the loss of the human. Therefore, we believe AI could only act as a partial replacement model in HARPS. If the Commission adopts such an approach, we will now identify the ethical implications of introducing AI to alleviate the loss of the human.

Primarily, should the Commission consider AI as a partial substitute for the loss of the driver, we believe that there will be ethical implications of the use of AI in HARPS. The High-Level Expert Group on Artificial Intelligence (AI HLEG), set up by the European Commission, identifies that a “trustworthy AI” must be ethical, proposing principles that AI must embody in order to achieve this. Consequently, we consider that analysing the ethical implications of introducing AI in place of a human in HARPS is of vital importance. The three principal ethical implications we note are deception, disingenuous artificial interaction and the replacement of genuine human interaction.

First, a potential side-effect that can be identified from the use of AI in HARPS is the potential deception that may result. In order to be able to compensate for the social loss of the human driver, a passenger must fully immerse themselves in the belief that the AI interaction is genuine. This involves forcing someone to delude themselves in order to achieve the same social satisfaction as they would experience with a human driver. For instance, Bratton argues that it is easier to make a human believe that a robot has emotions than it is to create a robot that actually has emotions. This is because the foundational basis of AI relies on users to “suspend disbelief” in order to experience familiarity with an artificial machine rather than the actual creation of a robot that possesses genuine emotions. Therefore, the only way AI would be functional in HARPS is to deceive the users into believing that this is genuine human interaction rather than communication with a robot. However, the House of Lords Select Committee on Artificial intelligence, in their report ‘AI in the UK: ready, willing and able?’, established that a key principle of AI is that “the autonomous power to hurt, destroy or deceive human beings should never be vested in AI.” AI’s function in HARPS would, accordingly, be contrary to this principle. Enabling AI to fully compensate for the social role of the driver involves the necessity to replicate human-like attributes to such an extent that it amounts to deception. Consequently, utilising artificial technology in place of legitimate social interaction between passenger and driver could be considered unethical.

Additionally, as aforementioned, socially assistive service robots are functional in decreasing feelings of loneliness and social isolation amongst vulnerable people. However, they also have deceptive potential towards the same group of people. Elderly people or those suffering with dementia may experience confusion through their experience with these robots, mistaking them to be real, living beings. This an unreasonable use of AI which has serious ethical consequences as the most vulnerable people in society would need to be deceived in order to falsify genuine human interaction. Applying this to HARPS, the same deception implications could occur. Vulnerable people accessing HARPS may be unable to fully differentiate the AI interface from human-human contact. Consequently, as vulnerable groups in society may be unable to recognise that high functioning AI is not legitimate human interaction, this can be said to be an unethical use of AI. However, we additionally believe that, given the high social functionality of some AI, such deception will extend beyond the most vulnerable to the rest of society, rendering this deceptive and unethical AI.

Second, another ethical consequence of AI is the disingenuous and artificial interaction that could result. We have touched on the adverse social implications that will accompany the removal of the human driver above. However, we will now discuss the disingenuous nature of interaction with artificial intelligence and how this has implications for society. We believe that for some people, AI will fail to be convincing, regardless of its conversational or emotional ability. Consequently, AI may appear “manipulative” and “fake” as anything that it says or does in occupying the social role is with a programmed purpose. This is due to the robots inability to express “authentic” feelings as their display of ‘emotion’ comes not from an expression of “inner self or true character”, but instead from “artificially generated” responses. This is therefore also contrary to the aforementioned European Commission’s principles of ethical AI, which claim that “broader society [and] other sentient beings...should also be considered as stakeholders throughout the AI system’s life cycle” We believe most of society will be able to identify that communication with AI is not authentic, rendering this interaction disingenuous. As a result, AI would fail to satisfy the social gap left in the wake of the removal of the driver. Accordingly, AI in HARPS will fail to comply with the Commission’s sixth principle as this will have negative implications for wider society and will result in increased loneliness and social isolation experienced by the users of HARPS (as discussed above).

A final ethical implication we have identified is the capability of AI to inhibit genuine human interaction, replacing it with an insufficient alternative. The same studies that show how technology decreases the experience of loneliness in elderly people also found that the same group expressed fears that this would completely replace human interaction and result in a decline in their overall social experience. Therefore, whilst AI may have satisfactory conversational ability to an extent, they are not “adequate replacements for human love and attention,” showing how AI will be unable to satisfy the emotional role of the driver. This illustrates how an ethical implication of replacing human contact with AI is that it will not be a replacement. AI cannot replicate the genuine human interaction required to achieve emotional satisfaction. This is furthered by studies that showed how elderly patients believed interaction with AI robots to be “not...genuine” and compared it to “communicat[ion] with nothing.” Consequently, this highlights that an ethical risk of AI applied in HARPS is that, not only will it be insufficient in substituting the emotional role of the driver, it will deprive people (especially vulnerable people) of genuine human connection. This is an unethical and unjustified use of such technology in HARPS.

Overall, we contend that the use of AI in HARPS has the potential to amount to deception and deprivation of genuine human connection. We have discussed how these are undesirable ethical implications. Therefore, we hold that a total substitution of the human driver for AI could be inappropriate. However, even acting as a partial replacement for a human driver, we believe that these ethical effects could still be present and, consequently, would have to be alleviated.

We will now consider whether the ethical effect of deception can be mitigated. We contend that if AI is to be integrated with HARPS, such AI must comply with the Select Committee on Artificial Intelligence’s principle of AI, holding that “All citizens have the right to be educated to enable them to flourish mentally, emotionally and economically alongside AI.” We interpret this to mean that, in this context, there must be clear signposts informing citizens of the limited conversational and emotional ability of AI in HARPS. This could alleviate the effects of deception as the limitations of AI will be made apparent to the user, making it clear that AI will be unsuccessful in providing complete social and emotional gratification. Therefore, the user will not have to fully immerse and deceive themselves to benefit from their interaction with AI as they will be aware from the outset of its shortcomings.

We further this point claiming that, if the Law Commission does endorse partially replacing the human driver with such technology, every effort should be made to make it clear that such interaction is disingenuous and artificial. For example, the highly advanced human-like robot Sophia. This robot is one of the most advanced of her kind, notably being the world’s first robot citizen and spokesperson for the United Nations Development Programme. However, Hanson Robotics, Sophia’s creators, insisted on maintaining her appearance as half-human/half-robot, allowing the mechanical workings in her head to be visible rather than

covering with a wig. They claim this is due to the importance of recognising that the interface with Sophia, whilst convincing, is not genuine human interaction- she is still a robot incapable of human emotions. We believe the same logic should be applied to the potential use of AI in HARPS by not applying anthropomorphic features to any such design. This will curb the potential for further deception.

With regards to the resulting disingenuous interaction that could accompany the use of AI in HARPS, we believe there is no such mitigator for this ethical risk. This is because no automated machine will fully be able to replicate the social and emotional roles of the driver to an acceptable standard. Any attempt to do so could result in an inappropriate and insufficient replacement for a human driver, causing social deprivation and depletion in community well-being. Therefore, we endorse to the Law Commission that an on board steward could be a potential solution to these highlighted issues and that AI should be considered only as an accompaniment rather than a replacement for the social and emotional roles of the driver.

Conclusion:

In conclusion, there is a consensus that HARPS will transform the way people move anywhere and everywhere. Indeed, when introduced, HARPS are likely to change the game. This utopia demands critical analysis because it has important social stakes. But there is no simple answer.

This tripartite response has thematically approached the effects that losing the driver may have on the internal mobile community of HARPS. The impact to in-vehicle passenger safety, cleanliness and the loss of a human being could be very different depending on the way designers design, operators operate, and regulators regulate.

The regulatory structure needs to be sensitive to the impact of the dehumanisation of passenger services. It needs to be remembered that today's technology is no panacea: "[u]ltimately we are still trying to breathe life into inanimate machines." It is vital that the value of humans is taken seriously; as place managers, litter deterrents, safeguarding incident interveners, information providers and conversationalists. This appears to have been underappreciated by the Law Commission, and regulation will need to respond practically and thoughtfully to dehumanisation. Response options could include the implementation of design features that assist with upholding cleanliness and avoiding safeguarding incidents; but these may not sufficiently mitigate 'softer' issues with no obvious technological solution. Solutions such as CCTV systems; specialised designs; employing stewards; and efforts to educate passengers on how to interact with those systems do not come effortlessly or without expense.

This is a regulatory challenge with no certain answer. We hope this thematic discussion highlights important issues on the value of the human driver that should not be forgotten. Although the Consultation Paper has not directly addressed our identified issues, in the light of the questions raised by the Law Commission, this is how we would respond.

SHEFFIELD STUDENTS 2: AUTOMATED VEHICLES IN THE PEER TO PEER MARKET

Automated Vehicles in the Peer-to-Peer Market

Introduction

The Law Commission has acknowledged the interest in peer-to-peer lending services for Automated Vehicles, due to the growth of the sharing economy in the current market. It has suggested who will be responsible for the Automated Vehicle during peer-to-peer transactions i.e. those carrying passengers for hire or rewards will require a HARPS license, and have provided an exception where this will not be the case. However, we feel that the Commission has failed to address what is an equally important issue, namely, the need for regulating a new potential peer-to-peer market: the AV peer-to-peer market. In this response, we firstly look at examples of three existing markets in the peer-to-peer economy to highlight the diverse spectrum of business models that is currently on offer. Second, we analyse some of the regulatory issues that have emerged as a result of this diversity, and how these are the precise issues that regulators may wish to consider in light of the emergence of a new AV peer-to-peer market. Finally, we argue that such issues are suggestive of a new approach to regulation, specifically, one that is much more capable of adapting to however this AV peer-to-peer market develops. We feel that one potential way this could be achieved is by adopting a self-regulatory approach.

The Peer-to-Peer Economy

The internet has enabled the creation of marketplaces to facilitate the (re)sale of goods, sharing/renting goods, sharing/renting accommodation, sharing/renting rides and the provision of personal services. These marketplaces are a form of peer-to-peer exchange which is now referred as the peer-to-peer economy. A true peer-to-peer economy involves two individuals interacting to buy and sell goods and services directly to one another without an intermediary third party or the use of an incorporated entity or business firm. Specifically, a peer-to-peer transaction is the commercial exchange of goods and services which often takes place through online platforms. The involvement of a platform within the transaction is a form of peer-to-peer exchange however this exchange does not engage in a true peer-to-peer activity. The peer-to-peer economy differs from traditional capitalism, whereby organised business firms own the means of production and also the finished product. Peer-to-peer is a people's economy based on 'access to' rather than ownership of physical and human assets like time, space and skills. This response will now set out an account of the roles and responsibilities of the key players in a peer-to-peer transaction and their relationship with one another.

In its most basic form, the platform acts as a "matchmaker" bringing together demand for and supply of goods or services to be exchanged or shared whilst supplying peers with add-on services to the transaction such as insurance, chat function, review systems and background checks. The platform allows peers to monetise the service they are providing whilst also earning revenue themselves through transaction costs over the peer-to-peer exchange on the platform. The platform acts as an invisible middleman that makes transactions and interactions among the sellers and buyers as smooth as possible. In a peer-to-peer transaction with no third party involved, such as the platform, arguably there is a greater risk that the product will not be of the quality expected, or that the buyer may not pay. Therefore, the platform reduces this risk by facilitating and regulating the transactions and peers on the platform.

The peer provider is an individual who supplies goods or services in a peer-to-peer transaction. The peer consumers are those purchasing, acquiring or renting goods/services from peer providers on the platform. In peer-to-peer markets, peer consumers not only have a role as peer consumers, but also may act as peer providers and peer reviewers. This is due to the interchangeable nature of the roles of buyers and sellers in a peer-to-peer market.

Three Distinct Models in the Peer-to-Peer Market

There is no single form of exchange in the peer-to-peer economy. There are in fact a number of different models existing on the spectrum of peer-to-peer. This section will highlight three different examples of peer-to-peer exchange in order to demonstrate the diverse nature of the peer-to-peer economy.

Airbnb

Airbnb differs from a true capitalist firm as Airbnb itself does not privately own their means of production, which consists of the accommodation and experiences they list on their website. The peer providers who have accounts with Airbnb own the accommodation and experiences which are listed on the website rather than the platform itself. Airbnb neither engages in true peer-to-peer activity. This is because consumers and providers using the platform are not directly transacting with one another without the involvement of an intermediary; Airbnb itself is the intermediary third party. Therefore, Airbnb acts as a hybrid between traditional capitalist firms and true peer-to-peer activity. It may be more beneficial to envisage a spectrum in which a true capitalist business sits on one end and a true peer-to-peer market sits on the other. It is likely that Airbnb sits in the middle of this spectrum. The platform's role as an intermediary facilitates transactions between peer providers and peer consumers and it provides services to those respective parties. These services include a network to connect buyers and sellers and to process payments but using private contractors to deliver services directly to customers.

The Scope of the Services

The platform facilitates transactions between peers in which the peer provider can earn money, from the peer consumer, by renting out their accommodation. Airbnb monetises the transaction by collecting a commission from property owners, which is generally around 3% and by collecting transaction fees from guests of between 5% and 15% of the reservation sub-total. Airbnb also collects a commission fee from the same owners offering experiences which is generally 20% of the sub-total of the experience.

When peer providers accept a booking from peer consumers, the terms of service state, they are entering into a contract directly with each other. Airbnb expressly states that it is not a party to any contractual relationship between its members. The terms further state that no joint venture, partnership, employment, or agency relationship exists between peers and Airbnb as a result of the agreement or their use of the Airbnb Platform. Therefore, the platform explains they have no control over and does not guarantee existence, quality, safety, suitability, or legality of any listings. Nor do they have control over or guarantee the truth or accuracy of any listing descriptions, ratings, reviews or the performance or conduct of any peer.

Rating and Review System

After completing a booking, the peers can leave a public review about one another and submit a star rating. The terms of service expressly state that ratings and reviews are not verified by Airbnb for accuracy thus they may be incorrect or misleading. Peers are informed that the reviews they leave must be accurate and cannot contain offensive or defamatory language. The placement and ranking of listings in search results on the platform depends on factors such as host and guest requirements, price and calendar availability. In particular, the terms of service state that Airbnb uses cancellation history, review and ratings to determine placement of listings within search results. When a peer provider cancels a confirmed booking Airbnb may publish an automated review on the listing indicating that it was cancelled by the peer provider.

Redress and Disputes Resolution

In the event of a dispute between peers the platform has a resolution centre in which peers may send or request money for refunds. If a peer provider claims and provides evidence that a guest damaged the accommodation, they can submit a 'damage claim' and seek payment through the resolution centre. If the provider escalates the issue to Airbnb's attention, the consumer is then given the opportunity to respond. If the consumer agrees to pay the provider for the damage or that Airbnb determines on the burden of proof that the peer consumer is responsible for the damage claim, Airbnb will collect the sums from the consumer or against the deposit. Peers must, when requested by Airbnb, participate in mediation. This is conducted by Airbnb or another third-party selected by them. Peers do reserve the right to terminate their participation in mediation or the resolution process at any time.

Uber

Another example of a hybrid utilising elements of both a traditional capitalist structure, and incorporating the elements of a true peer-to-peer market is Uber. Uber is a taxi hiring service, in which people may book a transport vehicle according to their needs and the platform provides such transportation vehicles to the customer. It is considered a peer to peer service as the transport vehicles are solely owned and operated by their true owners, rather than the platform itself; unlike traditional taxi companies and hire services who may own wholly or part of the vehicles that are operating under. In comparison to Airbnb, Uber facilitates services such as bookings, and payment transactions between the peer provider and peer consumer, as an operator. Therefore, it can be reasonably said that Uber sits in the middle-left of the spectrum where a true capitalist business sits on left and a true peer-to-peer marketplace sits on the right. Nevertheless, Uber may be more similar to traditional capitalist business than a true peer-to-peer marketplace compared to Airbnb; who sits in the middle of the spectrum, due to their requirements in law to subscribe as an operator.

Scope of Services

The vehicles branded as Uber vehicles are not governed by traditional regulations for taxis, but they are regarded as Private Hire Vehicles which are governed by the PhV regulations of the United Kingdom. The vehicles are solely owned by the peer providers; who are required to register the vehicle as a Private Hire; as well as license themselves as drivers if they want to operate as one. Uber is regarded as an operator, who under current legislation is the only entity allowed to accept booking on behalf of the peer providers. The services Uber provides as an operator includes: accepting bookings, identifying suitable transportation providers, keeping records, remote monitoring of trips booked by way of the Uber app, receiving and dealing with feedback, and managing lost properties and queries. However, Uber is not a party to the transportation contract between the peer provider and the peer consumer, and acts merely as a disclosed agent for the peer provider in communicating the provider's assent in entering the contract.

Uber does not charge the peer customers for the use of their booking services. However, they do charge a 25% fee on all fares for its use of software, collection and transfer of fees, credit card commissions and distribution of invoices. The transportation fare itself is calculated by Uber; who takes in account of factors such as traffic, surges, and tolls; which is estimated before the trip itself and provided to the consumer by way of the app. Uber limits their liability in relation to the booking services; such as negligence, direct losses to business and consequential losses, but do not indicate about liability privy to the transportation contract.

Ratings and Review System

Unlike Airbnb, Uber does not allow for consumers to leave reviews, however they use a rating system of 5 stars: in which both the peer consumer and peer

provider can submit a rating for the corresponding parties. These ratings are anonymous and reflect both the driver and the passenger's experiences in interacting with each other. The rating system does not exist to tailor better experiences for the actors using the Uber platform, but it may affect future interactions between peer providers and consumers, as the personal rating can only be improved by other peer actors. Uber's terms do not give an indication on what they do with such ratings, but there have been talks of utilising their position as an operator and banning drivers with low ratings: although the threshold of a low rating has not been indicated.

Redress and Dispute Resolution

In the case of accidents, the liability is limited to the party privy to the transportation contract; the driver, as Uber disclaims liability for damage arising from breach of terms such as quality, or safety and the onus falls onto the third-party peer provider. Nevertheless, Uber does have the right to resolve complaints from both the consumer and the driver, and have the discretion to resolve disputes. In relation to the consumer contract between Uber and the peer consumer, there exists a dispute resolution clause calling for mediation and arbitration with the ICC in Netherlands. In any event, the amount of damages concerning liability will not exceed 500 Euros therefore disclaiming any form of onerous liability on them as an operator. Nevertheless, Uber may lose their operator license per the PhV acts if they act in a way that is deemed unfit for the district council therefore Uber has an incentive to act as a mediator to the peer actors.

BlaBlaCar

Unlike Uber, who operates as an actor in the boundaries of Private Hire Vehicles, BlaBlaCar exists solely as peer advertising platform which provides services by way of allowing peer providers to advertise their products and services in order to perform a carpool trip with the peer consumer. Consumers can then use the BlaBlaCar products in order to book a trip with an advertised driver in which BlaBlaCar collects a small service fee, or use the free in which BlaBlaCar can help exchange contact numbers between the peer provider and consumer. Out of the three service models we have analysed, BlaBlaCar is the closest model to a true peer-to-peer marketplace rather than a traditional capitalist firm. Therefore, on the spectrum, BlaBlaCar sits closer to that of a true peer-to-peer marketplace.

Scope of Services

As BlaBlaCar does not operate any licensed private hire vehicles for trips tailored to the peer consumer, it is not subject to the PhV acts of United Kingdom. BlaBlaCar's services may be narrow to the extent, compared to Uber, that trips cannot be tailored accordingly to the consumer, but only to choose from a selection of adverts from drivers who must satisfy numerous requirements; and one of them being that the car is being used for the purpose of carpooling. This allows for both the drivers and BlaBlaCar to escape the provisions of PhV acts; instead categorises itself as not in the course of business by way of carpooling. The peer consumer can either exercise the booking services BlaBlaCar offers, or to exchange contact information through BlaBlaCar's platform to arrange a trip independently.

The fees relating to services of BlaBlaCar is two-fold; firstly, there is a cost contribution which is decided by the driver, although BlaBlaCar does offer a guideline depending on factors of the trip, and consequently limits the amount of cost the driver may ask for in order to prevent profiteering. There is also a service charge that BlaBlaCar makes its profits from, calculated in relation to the total amount of the cost contribution. Similar to Uber, BlaBlaCar puts the burden of contractual relationship between the peer provider and consumer.

Rating and Review System

BlaBlaCar encourages consumers to leave reviews about the drivers, and vice versa, although people are precluded from reviewing about another passenger in the same vehicle, or about another member not privy to the trip. These reviews will be published from the day of publishing, and will be visible on the corresponding parties' profile for 14 days; which can then be responded to. BlaBlaCar reserves the right, as other platforms, to delete any reviews or comments if it is deemed to breach its T&Cs. Lastly, BlaBlaCar may terminate accounts that has a small number of reviews in order to improve their performances.

Redress and Dispute Resolution

BlaBlaCar explicitly states that it is not party to any agreement privy to the transportation trip as it is strictly between the peer provider and the consumer. They also disclaim any validity, truthfulness or legality of the adverts, seats and trips offered on the app as it is the peer providers controlling such information. Accordingly, they exclude liability for loss and injury occurred due to erroneous information provided by driver, cancellation of a trip, non-payment for the cost contribution and the behavior of the peer providers and consumers throughout the trip. The law that governs the interactions between the actors in BlaBlaCar's platform is that of English law, and BlaBlaCar provides a forum for resolving disputes between actors; which is the standard European Commission's dispute platform.

Regulatory Issues Within Peer-to-Peer Markets

As mentioned, Airbnb, Uber and BlaBlaCar are just three examples amongst a plethora of new and emerging business types that the peer-to-peer economy has to offer, and it is this variety which has proceeded to challenge existing regulatory frameworks. Most of these new economic players in the peer-to-peer economy are operating in a grey regulatory area, where what is legal or illegal remains unclear and where incumbent government regulation is unsuited to oversee their emerging practices and technological developments. Essentially, the peer-to-peer economy creates new ways of providing services that are traditionally often highly regulated, thus, regulatory conflict is inevitable. In this section, we attempt to lay out some of the current issues that regulators may wish to consider in light of the emergence of a new AV peer-to-peer market.

Information Asymmetry

Information asymmetries arise where one party has more or better information than the other. Asymmetry in information may cause peers to participate selectively in transactions. This is due to a fear of unfair trade as the party with all the information may use this imbalance to their advantage. This selective behaviour is at the expense of other peers trading within that market. Therefore, information asymmetries have the potential to make higher quality traders, less likely to participate within markets. Higher quality traders are those who ensure a balance of information. The consequential issue is that these information asymmetries lead to fewer transactions than are socially optimal due to an uncertainty around the quality of the transaction.

It has been suggested that users in peer-to-peer transactions may lack informed consent when agreeing to platform terms of service. For example, Radin has established the increasing complexity of contracts on digital platforms. In addition to this, there is an issue of awareness in the rapidly changing nature of contracts where the frequency of such changes results in peers having to agree to new terms of service every couple of days. Without a full legal understanding

of these terms and conditions, as well as access to prior, older versions for comparison, both peer providers and peer consumers are therefore liable to be governed by what is referred to as 'shadow terms'.

Another concern surrounding existing peer-to-peer markets is the development of trust between its participants. Peer consumers typically have less information than they would in a traditional exchange, due to the general anonymity and substitutability across the range of services that the peer-to-peer economy has to offer. As highlighted earlier in our review of the three platforms, rating and review systems have been introduced which have been a central element in helping build trust between peer consumers and to help them make informed choices. However, these systems arguably prove to be more problematic than they are beneficial. For example, Airbnb does not monitor reviews before publication; the only monitoring that takes place after publication is when peers inform the platform of unfair, incorrect or fraudulent reviews. Thus, it is fair to say that unfair and incorrect reviews go unnoticed unless the platform is notified. This means these systems have the capacity to be manipulated by dishonest participants. This inaccuracy is then heightened considering Airbnb uses their rating and review systems to promote and regulate the listings in search results.

Uber deactivates peer providers if their rating falls below the minimum required. This mechanism is used to signal quality to peer consumers whilst also using it to prohibit poorly performing peers from using the platform. This seemingly appears to be effective until consideration is given to the fact that Uber only monitor reviews arbitrarily. Moreover, all three case study platforms do not provide any information to its users relating to the reliability of the reviews and the ratings left by peers. There are also questions about the selection and presentation of reviews by platforms. The platforms terms of service provide that peers are to provide accurate information, yet there is no guarantee. If rating and review systems are going to continue to play an integral role in helping peer consumers make informed decisions, the extent of their effectiveness and reliability will need to be reconsidered in future regulation.

Status of Peers

There is a consensus amongst platform operators that peer providers are viewed as 'micro-entrepreneurs', rather than actual employees. This is also arguably the view proceeded by the Law Commission in the consultation paper, since it aims define any person utilising their automated vehicle for hire or reward as a 'business'. In theory, peer providers can contribute their product or service freely and can therefore withdraw at any given time, so in this sense, it remains difficult to categorise individuals as employees of the platform. However, to those who may find it difficult to earn a comfortable living elsewhere through more traditional employment, peer-to-peer 'work' may be relied upon as a substitute to generate a source of income. Take Uber for example, where it has been reported that a substantial number of drivers now rely on the work as their primary income source. This raises a number of potential issues, perhaps the most significant being that, given the nature of the relationship between platform and peer provider, the latter is exposed to greater risk, lower job security and lesser benefits than what a traditional 'employee' would be. There have been few cases in the UK that have addressed this issue; in 2016, two Uber drivers James Farrar and Yasseen Aslam, succeeded in a bid to become classified as 'workers' under the Employment Rights Act 1996 and were thus entitled to the minimum wage and holiday pay. However, such cases have only gone so far to address what appears to be an increasingly important issue across the peer-to-peer economy.

The Distinction Between Private and Professional Capacities of Peer Providers

One fundamental question surrounding existing peer-to-peer markets remains to be answered, namely, is it desirable to apply the same rules designed for well-established business' to peer providers? For example, should a peer offering their AV as a service be expected to observe the same legal obligations as well-resourced companies who place their AV's on the platform? This is not only a matter of differences in expertise and experience, but it is also a question of feasibility, fairness and the reasonable expectations that peer consumers might harbour in relation to peer providers. Where regulatory expectations are set too high for those who, say for example, are using the platform as a mere extra source of income, they may feel that placing their AV on the platform is more trouble than it is worth and become disincentivised to enter the market. This has obvious implications for innovation within the market.

Another point worth noting is that small 'semi-professional' providers may not be able to adequately deal with transaction issues independently of a platform. Airbnb in this regard is helpful to peers, as it has implemented an advanced 'resolution centre' which mediates disputes between peers over issues such as guest refunds and cancellations. However, without the involvement of the platform to oversee such disputes, it presents obvious difficulties for individuals who do not have the experience or expertise. Larger, more well-resourced companies on the other hand have the requisite funds and resources to settle disputes, for example, through using third-party mediators. Moreover, particularly in the case of the three platforms we have discussed, peers are left to seek advice on areas such as local tax regulations, licensing and safety regulations; complying with such regulations may prove difficult for those who do not possess all of the information required. This could again, amount to a disincentive for non-professional peer providers to engage with peer-to-peer platforms and provide their service.

Ultimately, blurring the distinction between private and professional capacities in peer-to-peer transactions may result in market failure, as applying a regulatory regime developed for full-time or large-scale professional providers to small, semi-professional providers will create barriers to entry, thus stifling peer-to-peer exchange. This is an obvious issue that will need to be addressed if we want to encourage peers to place their AV's on peer-to-peer platforms and allow this new market to innovate.

Liability

It appears that peer-to-peer platforms remain insistent on excluding legal liability for various factors and rather choose to displace this to peer providers themselves. For example, Airbnb requires its users to provide their own home insurance. Equally, there are no health and safety inspections of homes and, despite encouraging hosts to install smoke and carbon monoxide detectors, they do not require such proof. Each factor carries obvious risks for both peer consumers and peer providers.

Moreover, Phipps describes how a traffic incident involving an Uber car was the responsibility of the driver and not the platform and only after several instances of rape were reported in the news did a clean criminal record become an essential requirement for all Uber drivers. This shift in corporate responsibility has wider implications for society as a whole. For example, it is at a host's discretion whether to provide adequate wheelchair access for Airbnb rooms, or in ride-sharing platforms, for drivers to cover rural areas or cater for children. Considering how often these services are now utilised, it is arguably in the public interest to make such factors a standard and necessary requirement, yet these issues have not yet been adequately addressed by either platforms or regulators.

Additionally, only a small number of platforms systematically pre-screen and verify peer providers' identities and backgrounds; it is only Uber out of the three

platform case studies yet to implement this practice. Uber's initiative to do so is due to the physical interaction between peers during the transaction. The peer-to-peer transactions taking place on Airbnb also involve physical contact between peers, yet they fail to require such checks. For example, the peers may meet on the guest's arrival in order for the host to hand over the keys and to provide basic information about the accommodation. Physical contact is also involved in the transactions on BlaBlaCar, as the ride is essentially shared between both peer consumer and peer provider on the way to the final destination. Without pre-screening and the verification of peer's identity and background, the risk of potentially violent offenders participating in transactions becomes more likely. In the context of potential AV peer-to-peer markets, the aforementioned point is troubling as the platform will likely share geographical location data amongst its users in order to facilitate transactions.

Finally, regard should be given to the fact that all three platforms discussed above do implicitly assume a degree of responsibility for the quality and performance of peer-to-peer transactions, in that they set certain their own terms and conditions. For example, a platform manages payments, intervenes in disputes between peers and imposes rules on cancellations. However, it is these same platforms that systematically exclude any liability in relation to the contracts concluded between peers, and they declare that they are not a party to such contracts. Additionally, all three platforms exclude liability for actions of peers and the accuracy of information provided by them. For example, whether they are a commercial or a private provider, non-performance, non-compliance of the performance by the peer providers and the accuracy of information's provided within peer-to-peer reviews on the platforms. In any potential peer-to-peer market this discrepancy risks to confuse or mislead users with regard to the responsibility of the platform in the case of problems with the transaction. Regulatory uncertainties around liabilities in an AV peer-to-peer market may disincentivise individuals from pursuing peer-to-peer transactions which may actually be profitable and productive.

As highlighted, these are all challenges which regulators may wish to consider in light of the emergence of a new AV peer-to-peer market. One issue in the market is information asymmetries which can leads to fewer transactions than are socially optimal; therefore, in relation to future regulation, consideration will need to be given to this matter in order to decrease these asymmetries. Another issue is whether the same regulatory rules should be applied to peers acting in a private capacity and with those acting in a professional capacity? There is a risk that applying the same regulatory regime to both forms of peers will create barriers to entry, thus stifling peer-to-peer exchange. Finally, in regard to liability, there are a number of problems any regulator may face when entering a potential AV peer-to-peer market. It is imperative that these problems are addressed, as regulatory uncertainties around liabilities in an AV peer-to-peer market may disincentivise individuals from pursuing peer-to-peer transactions.

SHEFFIELD STUDENTS 3: INTEGRATION OF HARPS WITH PUBLIC TRANSPORT

INTEGRATION OF HARPS WITH PUBLIC TRANSPORT

Introduction:

Public transport has existed and evolved over time to allow individuals to commute from one location to another. To cater for the ever-growing needs of transport in different societies, various means of transport have been developed, employing a wide range of technologies to efficiently transport individuals and goods to numerous destinations. Such means include; trains, busses, trams and aeroplanes. These means have subsequently been advanced considerably over time resulting in the implementation of structures to facilitate the advancements and utilization of different technologies in public transport. Most notably, ground transport with the buses as its prominent mode can be said to dominate the public transport sector. Thus, various systems have been put in place to ensure advancement of this mode.

In order to adapt to the developing environment of public transport in the last few decades, legislatures have endeavoured to impose regulations as an incentive for innovation, rather than a restriction in the path of development. Such regulations have thus been enacted to facilitate the development of various means of public transport, particularly buses in the UK. The complete automation of vehicles, has thus ushered in a new era in public transport, and the automobile industry in general. Such vehicles with fully automation capabilities are classified as Highly Automated Road Passenger Services("HARPS"), and various research and trials have been conducted as to their implementation in public transport. Implementation of HARPS vehicles has thus been examined by the UK Law Commission in the various consultation papers requiring a response in regards to this issue. This response paper shall therefore address the integration HARPS vehicles into the UK public transport sector and shall make proposals to ensure efficient integration. It shall firstly consider harps, as a distinct means of public transport and examine the existing modes of public transport. It shall then examine previous regulatory structures to comprehend the necessity for regulation of this distinct means of public transport and therefore make proposals to be adopted for efficient integration of HARPS in public transport. Consequently, it shall examine the potential impact of the implementation of HARPS in public transport under the proposed regulatory framework. For the purpose of this response, HARPS shall be referred to as APTVs, and this shall further be elaborated upon under the proposed regulatory outline.

HARPS as a means of public transport:

This response paper will consider HARPS (APTVs) as an entirely distinct system of public transport from the currently operated system encompassing Buses, Trains and Trams. Thus, various speculations shall be made as to how this system of transport would operate in the UK.

Exploring this system as a distinct means of public transport would therefore exclude it from the current transport regulation as APTVs would require new regulatory measures tailored specifically to them. It is further accepted that this is a new and developing area of technology, and while research as to its technical and mechanical feature might be widely available, very few exists as to its regulatory structure. Furthermore, confining this new and developing system to the current regulatory framework adopted for Buses could hinder innovation and prevent APTVs from efficiently advancing in the UK public transport sector, thus necessitating this response paper.

It is speculated that the consideration of APTVs as a separate category will allow for their most optimal use with the least number of negative externalities. In order to achieve this, it is proposed that APTVs be subdivided into further categories based on size and flexibility. We believe this will result in greater choice for consumers thus encouraging competition between different operators and decreasing the likelihood of a monopoly being formed in this sector. Furthermore we think that this will help to mitigate some of the possible negative externalities that may arise with the introduction of APTVs in public transport. One identifiable externality is the increased traffic and congestion as the introduction of APTVs will simply amount to an increase of total number of vehicles on the road. By having different categories of APTVs with different degrees of route flexibility, while providing the consumer with real time tracking of these vehicles as well as

their intersection points (this will be addressed in further detail) multi modal trips will be encouraged, which are likely to decrease congestion. In practice this will mean that the consumer will be able to reach his/her desired destination quicker and more effectively as different categories of APTVs will facilitate each other as well as other forms of public transport in helping the passenger reach the final destination.

One category of APTV could consist of vehicles with 5 - 7 seats, similar in size to a personal vehicle, however these APTV's will operate within the framework of public transport. These vehicles will offer a great degree of flexibility within their operating sector, meaning that passengers will be able to make a stop virtually anywhere within the vehicle's operating area. In practice this will look very similar to how uber pool currently operates except the APTV will have a limited area within which it will operate similar to a bus route. Another category could consist of vehicles with 10 - 15 seats, similar in size to a minibus. These APTVs will have a set route with some fixed points(stops), however they will offer some degree of route flexibility along the planned route. For example customers will be able to request a stop anywhere along the fixed route not just at the fixed stops. So in practice if such APTV runs on a suburban street with lots of houses passengers will be able to get out at their individual houses without having to walk form the fixed stop. A third category could consist of vehicles of 30 - 50 seats, similar in size to a bus. These APTV's will have a fixed route with fixed points and offer no route flexibility to its passengers due to its size.

In order to ensure the efficient adoption and operation of the proposed categories of APTVs possible and the service competitive in a sector that is so well established, as well as other important reasons that will be discussed further, we propose the adoption of a universal online platform for all APTV operators similar to the "mobility as a service" [Maas] approach. This platform would provide an opportunity for operators to communicate with customers and advertise services, after meeting certain basic requirements to operate this platform. These requirements would include established safety standards in terms of both operating software and hardware in the vehicles as well as other technical requirements. For example, vehicles will have to be able to provide accurate live tracking, to ensure the theory of multi modal trips described above will work in practice. A customer will be able to enter his/hers destination into the app and see which APTVs are available in the nearest proximity and if the said vehicle is able to reach the final destination or if the customer needs to change to another APTV and if so where the best intersection point is. In practice, this will look very similar to how route planning works in the ever so familiar Google Maps as the platform will be offered to consumers in the form of a user friendly mobile app. Furthermore accurate tracking will ensure customer safety, should anything go wrong with the vehicle or the passengers inside, appropriate help will be sent out automatically based on the APTVs location. A further technical requirement could be imposed as to the vehicle's ability to conduct software updates over air. Meaning that the latest software updates can be installed into the vehicle instantaneously without having to bring the vehicle in for servicing. This will bring servicing costs down and generally ensure efficiency. This is by no means a comprehensive list of all the technical requirements that would be required to ensure the efficient functioning of this platform, but rather some vital examples that come to mind in the early stages of planning.

Introduction of APTV and coexistence with other existing forms of public transport

It is claimed that the effective introduction and subsequent development of this technology in the public transport sector will depend primarily on companies and organisations with interests in this field, such as Uber, Volvo and the likes. Furthermore, the widespread deployment of fully automated vehicles in all areas of a city cannot be achieved instantaneously. There is presumed to be a focus on highly populated urban areas as the regional focus for the initial introduction and deployment of APTVs on roads. Thus, an efficient APTV system would be required to coexist along with already existing public transport systems. Such APTV would be deployed on transport routes and thus would provide greater choice for means and public transport. Furthermore, systems must be put in place to ensure this new technology would not affect or interfere with existing public transport systems during its initial stage of deployment.

These vehicles would drive alongside other existing means of public transport such as buses and trams and offer a similar service of transporting passengers without a driver present and more flexible route options. Some scholars advocate for similar APTV systems to be used primarily in conjunction with buses, trams and trains as an initial means of transport to bus stations and train stations. However, the presumption that passengers would be inclined to utilise this system only to alight and employ another means of transport is questionable, as most passengers would be more inclined to utilise this means of transport to their final destination point. Additionally, the different categories of APTVs could be employed, providing more flexible options for passenger transport and greater choice for passengers when embarking on journeys, adopting more favourable options and further encouraging a preference for APTVs as the primary means of public transport.

A balance must therefore be sought between APTVs and the currently operated means of public transport. This new system should not however hinder the operation of the existing means of public transport during its initial deployment, to ensure the consumers have adequate choice as to what service they would prefer to utilise and subsequently allow the market decide what system would remain and how such a system would be further developed. While such a balance can be said to be attained and maintained, it is predicted that the cost, ease of use and flexibility of APTV is likely to outclass those of the other existing systems of public transport leading to greater preference and use of this system for public transport.

Necessity for regulation

- Development of bus regulations

To effectively maintain the envisaged balance and ensure optimal operation of APTVs in UK public transport, adequate regulatory measure must be employed. This regulatory frame would therefore be aimed at ensuring optimal operation of APTVs while ensuring that the existing means of Transport would still be operational. As such, it is necessary to examine current regulatory frameworks, adopting and modifying relevant provisions and concepts to suit the operation of APTVs.

We shall begin by examining the development of bus regulations, and the underlying concepts that can be modified for efficient operation of APTVs.

Bus regulations have evolved over the last century, starting from the Transport Act 1930 then expanding into the Transport Act 1985 and then to the Bus Services Act 2017. However, it is important to acknowledge that these acts were developed to accommodate the ever-developing bus industry. As we move forward into an age of automated buses, there is a requirement for new regulations that can accommodate the advancements in the bus industry.

Transport Act of 1985 is an essential regulation when considering the development of bus regulations, as this act provides a foundation for the buses regulations. In particular, section 19 of the Transport Act 1985 provides a demonstration for the specifications of a bus, stating that a bus has to be able to accommodate a minimum number of eight passengers, implying that APTVs operated as buses would be required to have a minimum of eight passengers. However, this would be contrary to the needs of APTVs, due to the variations in size, as envisaged by the different possible categories. It can therefore be inferred that the requirements imposed by this act would not be compatible with the needs of the APTVs, further supporting the requirement of additional regulatory measures.

Moreover, Section 19 (4) of this act states that the traffic commissioner is in charge of giving out the permits, meaning that this act has kept the permit authority the same as the Road Traffic Act 1930. This would be incompatible with our proposed operation of APTVs. Thus, such powers would be vested in a new authority.

Furthermore, the Transport Act 1985 also states that any person driving a public service vehicle (PSV) is required to have a permit through Section 21(a) which leads to section 21 (b) that states that there is a requirement for fitness, followed by Section 21(d) which is also relevant as it classifies the documents, plates and marks to be carried by PSVs while it is operating under the permits. The proposed regulation will be contrary to the above stated requirements, yet some minimal standards would be incorporated. However, there will be slight changes considering the substantial difference between an average vehicle and an APTV. Due to this act, competition grew to an unimaginable level causing bus wars which lead to bus rivals antagonising each other by delaying rival services, preventing rivals from using bus stand and removing the timetables of a rival. An example can be seen in 1988 when Southern Vectis became the first operator to attract the interest of the regulators when the Office of Fair Trading forced it to allow competing operators access to Newport bus station. It was also reprimanded for operating extra services purely to stifle its competition. Later, 2000 Stagecoach Manchester was found to have been employing bus inspectors to usher passengers away from competitors' services and then in 2004/05 Cardiff Bus was found to have engaged in predatory behaviour to stifle competitor 2 Travel. In 2006/07 Stagecoach Manchester and UK North engaged in a bus war on route 192 and on the Wilmslow Road bus corridor that caused traffic chaos in Manchester. Due to this immense rivalry the bus industry had six companies that were ruling the market. To prevent similar instances in relation to APTVs, it is necessary to implement adequate regulatory measures to promote advancement of this system, ensure the achievement of the government's mobility goals and combat monopolisation.

Proposed Regulatory framework for the operation of HARPS(APTVs) in UK public transport

To complement the inferences provided, the integration of HARPS in public transport regulation poses a greater policing challenge to the current rules, as it brings forward a new classification of vehicles, falling short of the current Public Service Vehicle licensing scheme, posing a requirement to adapt the current regulation to the phenomenal change in the implementation of Automated Public Transport Vehicles ("APTV"). Therefore, this section shall propose a regulatory framework and authority, further elaborating on the responsibilities of this authority. First, it will examine the aims of the authority and its goals. Second, it will highlight the difference between the regulation required for buses and APTVs. Third, it will distinguish the powers that need to be vested in this authority. Fourth, it will elaborate further as to the necessity for adequate regulation of APTVs. Fifth, it will describe the licensing scheme proposed and its aims as a single nation-wide regulatory authority. Sixth, it will adapt the current operator licensing scheme with the needs of the APTVs, setting the duties of the operators and manufacturers, as well as the executive and regulatory powers of the authority.

- What is an automated vehicle and the authority:

In the Automated and Electric Vehicles Act 2018 , the parliament defined an automated vehicle in S1(a) as they are designed or adapted to be capable, in at least some circumstances or situations, of safely driving themselves. For the purposes of this act, it is clarified in s8(1)(a) the interpretation of a vehicle "driving itself" is presumed that it is operating in a mode in which it is not being controlled, and does not need to be seamlessly monitored, by an individual, omitting the requirement of a driver in control of the vehicle. It can thus be said that the parliament was intending to depart from the ordinary driver in a vehicle requirement in a sense that the Vienna convention on road traffic art 8 envisage that every moving vehicle shall have a steward, as well as the UNECE required autonomous vehicles to be designed such that the driver may, at any time and by deliberate action, override the automated driving functions (the position which ceased to exist in the UK statute contemporarily) . By implementing that statute, it could be said that parliament was intending to create a new class of vehicles, requiring a new set of requirements to be allowed to operate on the roads. Therefore, this response will propose a new regulatory approach to the sector of Automated Vehicles, by adapting the law on public service vehicle operator licensing to complement the demand for new regulations in this developing sector, through the formation of a new authority responsible for regulating APTVs .

It is beneficial to have a nation-wide governing authority to regulate APTVs in the public transport sector, as it creates a straightforward system with a single set of rules, to avoid issues of speculations and enforcement of minimum standards that operators shall be abide by . This authority shall exercise regulatory powers over the operators and enforce these regulations nationwide. It shall also be tasked with the responsibility of licence administration, setting fares for different regions based on acquired data and sanctioning operators in breach of established standards and regulations.

The main aim of implementing this authority is to set rules and regulations of APTVs market, with a focus on combating monopolies and maintaining minimum standards applicable to all operators for the efficient operation of APTVs in the public transport sector that applies to all operators. By implementing a dynamic regulatory system, the authority, could retain some regulatory powers and devolve some other powers to regional city councils and policing bodies. The powers devolved to regional institutions could include regulation and organisation of infrastructure and traffic law enforcement regionally.

However, the authority shall retain national powers in regards to matters of licensing of APTVs, registration of APTV operators and conduction of safety inspections to ensure certainty and consistency with the bare minimum requirements essential for licensing operations. Whereas the parliament has already enacted the Automated and Electric Vehicles Act 2018 in regard to issues of liability and insurance.

- Distinguishing between an automated vehicle and bus modes of transport:

The law shall distinguish APTVs from a normal public bus by which the current public transportation laws on buses do not match the requirements for APTVs to be in operation, in terms of journey, fares, accessibility, passenger capacity, contract initiation through the advertisements of journey and safety standards . In all those instances APTVs comparably disagree with the current regulations , posing a demand for new regulations as the technology adopted would need enhanced regulations to be able to operate, as the need for a human driver in the vehicle is diminished . Therefore, in the context of the proposed regulatory framework, at no point should APTVs be subject to bus regulations.

It is a requirement to set the size of APTVs that are going to be used for public transport services, it is set by the traffic commissioner, as a vehicle that is capable of carrying nine or more passengers is categorised as a Public service vehicle, requiring the operator to have a certain license . The operator is deemed to be the owner of the vehicles or the person whom the driver works for under a contract of employment. In the adaptive version, this requirement will cease to exist, as the size of an APTV would not matter to the competence of the driver as it is required on normal public transport vehicles, since the automation will lead the vehicle competently without the need of human interference, at least according to the parliament's analysed intention by the automated vehicles definition in the act mentioned previously .

Furthermore, in the united states and Europe, there exists different types of regulations as to HARPS and automated public transport vehicles, imposing various challenges as to the identification and speculation of vital needs of HARPS which would provide us with a better visualization of the future legislative framework that will set rules for automated vehicles and automated public transport vehicles in particular.

- Powers vested in the authority:

The proposed authority shall exercise powers such as regulation of operators, by which they shall be taxed by the responsibility of administering licensing, overseeing parking regulations and finally insuring roadworthiness of APTVs by operators . Furthermore, it is proposed that this authority shall be vested with the executive power of calculation and determination of fares of operators through the accumulation of data from operators and regions, facilitated by the unified network.

Moreover, this authority must ensure that the operators are well equipped and lead by a competent management, hiring employees based on expertise and knowledge in the field. Operators would be required to conduct regular checks on their APTVs regularly, by frequent hardware and software maintenance, to ensure maximum security and safety measures are taken .

- Administering Licensing:

With the exercise of this regulatory power, the authority shall administer licenses to potential APTV operators, and shall therefore set minimum standards to be adhered to by all individuals and organisations seeking to obtain a license. The established requirements for obtaining a Public transport licence for buses under Public Service Vehicle Operator Licensing Guide from the Law Commissioner could be adopted, and further modified to ensure compliance with the technical requirements of APTVs . Whilst maintaining specific standards for reputation, financial standing, effective establishment by placing monitoring officers for APTVs .

In the notion of operating centres for Public Service Vehicles, this authority carries equal importance for the essential requirement of providing adequate parking for the APTV's under operation . Bearing in mind the importance of green energy and sustainability prerequisites, through promotion of various routes in accordance with experiments where it will lead to providing transportation to the maximum number of passengers with minimal environmental damage . The operator licensing scheme in our proposed regulation scheme shall resume to be committed in meeting the standards of having a good repute, maintaining the appropriate financial standing, being capable of providing regular maintenance for the APTVs, and having adequate parking arranged for all APTVs and assurance of following the rules by the operator and the staff .

The good repute was previously based on convictions caused by an employee action or driver or manager, it is proposed that it shall be modified by the authority to be inclusive of software and manufacturer reputation, which may be coming into question as the vehicles are completely operating in accordance to their fabrication, since it is purely based on manufacturing, programming and building . Therefore, the manufacturers shall bear the reputation responsibility on software error. Moreover, licenses shall be reviewed termly as some automated vehicle systems may have some errors and failures. Accordingly, the manufacturers should be reputable, and this shall pass on them, giving them the responsibility to be adding their services to the APTVs.

The requirement of a financial standing is a standard requirement to ensure that there's enough capital to bare all costs for running of the operator, as well as providing regular maintenance contracts with a mechanical company or evidence to show that the operator himself has competent staff capable of pursuing the task, which is vital for maintaining a high standard of services and safety .

Furthermore, the unified framework application similar to the "Mobility as a service" system could be employed to facilitate licensing in that, operators would be required to remain active on this platform and communicate all relevant data to consumers and the regulatory authority by way of this application. This application could therefore constitute a fundamental aspect of licensing whereby all operators would show satisfactory contributions and activity to the application, in order to obtain and retain an APTV operator license. Consumers would then be able to obtain information as to various services offered by the different operators and their various costs, and the regulatory authority would be able to observe and monitor operators to ensure their activities are in line with established laws and regulations. In addition, operators would be able to advertise and communicate their various services to the consumers, improving flexibility and choice in public transport. It would also enable the authority to enforce sanctions on operators in violation of regulation as they could suspend the licenses of these operators over the application, until such defaulting operators have met the requirements.

- Parking prerequisite:

The provision and maintenance of parking hubs shall be the responsibility of operators and the regulatory authority shall oversee this responsibility . This can be adopted as a licensing requirement, requiring operators to obtain and adequately maintain parking infrastructure for all APTVs and failing this requirement, a licence could be refused or suspended. Furthermore, this could be used to tackle the prevalent issue of congestion, as operators would be restricted as to the total number of APTVs deployed to the total capacity of vehicles capable of being housed in a particular parking hub. This adopts the vehicle quantity restriction approach raised in the Consultation paper, and ensures that operators would not be able to deploy more vehicles than they can house and would therefore prefer parking of empty vehicles over random cruising due to the constant availability of parking. They would thus be required to provide evidence of parking infrastructure such as a contract or deed and obtain a licence fulfilling this requirement set above.

- Roadworthiness:

Operators shall be required to ensure roadworthiness of their vehicles and shall be subject to annual or quarterly inspection of their vehicles and infrastructure. Due to the APTVs being operated primarily by software, the operators would be required to perform regular software checks, and send data and records of these checks to the regulatory authority. Furthermore, the operators would be required to store and maintain records of data on these checks, to be presented to the regulatory authority when due, and ensure compliance with the software and technological requirements. Operators would therefore be liable to pay an inspection fee determinable by the regulatory authority to ensure the provision of adequate and competent inspectors, maintaining high standards for this service, and performing regular maintenance as a form of an MOT test but specially regulated for APTVs. Furthermore, operators would be required to maintain adequate and efficient operation centres to adequately monitor all harps vehicles on roads, and to ensure that all APTVs are running in accordance with safety measures and up to date with the latest technical specifications in order to maintain comply with the established standards by the unified framework application. This application technical aspects and benefits were explained previously in the specialization of APTVs.

Setting Fares:

In relation to the executive powers of setting fares, it is proposed that the authority shall retain the right to dispute any unfair increase in prices, and the power to set fares regionally, each based on the financial capabilities or the cost of living in the areas. This addresses the consultation question 14, but further proposes that the authority not only issue guidance on provision of price information, but subsequently set prices themselves. Having a dynamic price range in many places would encourage further use of APTVs in accordance with the local capability. Hypothetically, by saying an APTV working in London shall be earning as much as in Barnsley, this scale is insufficient as the cost of living and operation in Barnsley is way less than in London. However, this dynamic approach in the market could allow APTVs to have lower prices than other public transport means, as operators can remotely oversee the vehicles, they would be enabled to oversee the services.

As well as this authority shall have executive powers to set fares according to the regional economic capability, in accordance with the cost of living, which may vary between a city and another. Moreover, ensure there's a competition in the market by thwarting big operators to take the business opportunities of the starting up operators, by creating a regulation with a room for all business sizes, which shall be intending to create a competition which will lead to reduced prices in the entire nation, as it will be facing greater competitiveness in the market.

Since devolved regional governments and city councils are responsible for traffic law enforcement and infrastructure of the cities respectively, they are invited to continue maintaining their roles, by setting traffic laws, policing, and by building and maintaining roads, painting lanes adequately and keeping safety standards utmost in rehabilitation of roads as it is their duties and the authority shall not interfere in these regulations.

Implementation of APTV regulatory structure and its potential impacts in public transport.

The simple fact that literature regarding Autonomous vehicles is scarce and disperse has been widely acknowledged, as most of the existing literature tends to envelop the technical and mechanical features of such vehicles. Furthermore, Autonomous vehicles can be considered as developing technology requiring constant tests and analysis in various regions to ensure efficient implementation in roads. This thus makes it difficult to predict the impact and consequences of APTV in the market. Regardless of the scarcity of literature in this field of technology, various proposals and projects have been made by governments and organisations to introduce this technology in the public transport sector. An example of one such project was the CityMobil2 Automated Road Transport Systems (ARTS), with the main aim of testing the feasibility of such vehicles in providing an alternative public transport option to urban environments across Europe. The regulatory framework proposed thus provides an adequate structure to enable the implementation of APTV in the UK public transport system. By considering similar APTV systems implemented in different regions, this section shall analyse the implementation of APTV into the UK public transport, under the proposed regulatory structure and subsequently, the significant impacts of this implementation to the public transport sector under this framework.

- Consequences of the adoption of this framework of the proposed APTV framework.

Throughout the course of history and evolution, the implementation of new technology has always carried with its great impacts and consequences. Most of these impacts can be observed with the everyday use of such technology. However, this response shall constrain and focus on the potential impacts of APTVs only as to its regulation in public transport under this framework.

- Unemployment

A notable impact of this regulatory approach is the resulting unemployment of drivers in the currently existing means of public transport. The regulatory framework allows for ease of entry into the market thus encouraging various operators to engage in massive deployment of APTVs on roads over a designated time frame. The widespread deployment of APTV in public transport would lead to greater reliance on this system thus adopting automated vehicles as the preferred system of public transport and subsequently eliminating the role of drivers in public transport. This would result in the massive redundancy of bus drivers and similar roles in public transport and could contribute to the wider issue of unemployment in the UK. However, the requirement of control centres and management hubs for APTVs could be employed to mitigate this issue, by providing employment for redundant drivers in the management of APTV. Furthermore, such drivers could be hired to conduct driving simulations for APTVs thereby inputting their skill and knowledge to the APTV system, enabling it to overcome challenges such as extreme weather conditions and obstacles on roads. This would ensure greater development of APTV system with first-hand knowledge of drivers and subsequent software improvements, as well as providing employment opportunities for skilled drivers wishing to remain in the public transport sector.

- Congestion

The implementation of the proposed regulatory framework would enable the widespread deployment of APTVs thus increasing the number of public transport vehicles on roads in the UK. This can then be argued to contribute to the existing issue of congestion plaguing the UK. Furthermore, due to the high automation of these vehicles and absence of a driver, operators could decide to allow these vehicles to cruise around without passengers as driver wages and expenses are no longer issues associated with APTVs, and vehicles need not park and can keep cruising. This issue is however addressed by this regulatory approach, as it would require operators to have adequate and sufficient parking hubs to house and maintain APTVs. Furthermore, under this framework, deployment of APTVs on roads by operators, would be limited to the total quantity of vehicles capable of being housed in their parking hubs. This would encourage operators to return APTVs without passengers to its designated parking hub as opposed to cruising around, and the imposition of road charges would further deter operators from allowing such vehicles to cruise around without passengers.

- Monopolisation

The aim of the regulatory authority is to ensure efficient implementation of APTVs as a means of public transport and supervise the deployment of such APTVs in roads. Operators who then meet the requirement could enter the market and begin widespread deployment of APTVs. A notable concern is the monopolisation of

the market due to the fact that this is a recently developed technology in a growing field, thus inviting various organisations and institutions with from various fields to explore such technology into the public transport sector. Consequently, a single operator with sufficient funds can then dominate the market and limit ease of entry. Thus, driving away potential operators and effectively hindering competition. This regulatory approach seems to allow great freedom in the market for operators who have complied with the requirements and obtained a licence, however the principles of competition law or antitrust law in the US jurisdiction must still be recognised. This authority can also be said to embody such principles to promote efficient competition amongst operators in the public transport sector and ensure that no single APTV operator can dominate the sector. This would thus promote efficient competition amongst operators in the market, and benefit consumers by ensuring wider choice on public transport services amongst the various operators.

- Mobility in transport

The implementation of this regulatory framework would allow various operators enter the UK public transport sector and operate APTVs in accordance with the established standards and requirements. This would further be facilitated by the adoption and operation of the unified framework application which would ensure ease of communication between operators and consumers. It can thus be said that this would ensure availability of transport information such as fares, routes and schedules thus empowering customers and providing for greater choice in the market. The operation of APTVs alongside other means would public transport with the adoption of the Unified framework application would allow ease of access of the different means of public transport allowing customers make their preferences based on their personal factor and achieving the concept of mobility envisaged in the consultation paper.

SHEFFIELD STUDENTS 4: DISCRIMINATION AND PEOPLE WITH ADDITIONAL NEEDS

Introduction:

Our response to 'Automated Vehicles: Consultation Paper 2 on Passenger Services and Public Transport' aims to discuss the current accessibility issues that people with additional needs face and the potential discrimination that the introduction of highly autonomous road passenger services (HARPS) could cause. We have assessed the problematic accessibility of existing services, focussing particularly on taxis and private hire vehicles (PHVs). This section specifically considers Consultation Question 24 within the Consultation Paper.

The second section of this response examines the discriminatory effect artificially intelligent machines can have on the elderly and the disabled. This section will begin by exploring the cause of such discrimination. To which, it will be argued that biased data, results in machines behaving in a discriminatory manner. This response will also consider the ramifications this has on HARPS. Furthermore, two key proposals will be explored in response to the commission's recommendations relating to the accessibility of HARPS vehicles.

Finally, the last section explores the benefits that HARPS could have on the elderly and the disabled. We have developed recommendations that could improve the accessibility of HARPS and begin to eliminate much of the discrimination faced by people with disabilities (both visible and hidden) and the elderly.

Section One: Discriminatory Factors that Encourage the Implementation and Use of Autonomous Vehicles as Passenger Services to Increase and Sustain Independence of Disabled and Vulnerable People

A key factor that must be considered when implementing Highly Automated Road Passenger Services (HARPS), is the considerable gap in equality amongst passenger services such as taxis and private hire vehicles. The introduction of HARPS could be a positive step to reducing regular discrimination. HARPS have the potential to be successful amongst passengers that are subjected to discrimination by passenger service operators and drivers. An overwhelming majority of reported discrimination comes from other members of the public and whilst in many cases this is unavoidable, introducing passenger services with no human element could be an encouraging method of increasing the independence for the 13.9 million disabled people within the UK.

The introduction of the Equality Act 2010 is a fundamental piece of legislation that aims prohibits discrimination and ensure equality. The aim of this Act is to prohibit any form of discrimination or harassment with the view of reducing socio-economic inequalities. The 2010 Act consolidated a number of Acts that were considered to form an adequate foundation for anti-discrimination regulations.

S.165(4) outlines the duties imposed on drivers of taxis that have been hired by or for a disabled wheelchair user. Those duties include carrying the wheelchair user, not imposing any further charges for doing so, provide appropriate assistance to the passenger to ensure their reasonable comfort and safety and ensure that mobility assistance is available to the passenger as required. Additionally, the Equality Act aims to cater for passengers travelling with assistance dogs by imposing duties on taxi drivers that ensure the dog is carried within the taxi and is able to remain with the disabled person for the duration of the journey, without imposing further charges.

Moreover, s.166 delivers exemptions from such duties arising in previous sections. For any exemptions to be accepted and discharge taxi drivers from their extended duties they must carry a valid exemption certificate. Exemption certificates may be awarded on medical grounds or due to the physical condition of the driver making it unreasonable to impose such duties. Similarly, with duties regarding assistance dogs, exemption certificates may be awarded to drivers for a specified vehicle and for a specified duration.

Section 13 and Section 19 of the Equality Act collectively prohibit discrimination both directly and indirectly, seeking to ensure that rights of disabled people are upheld. Unfortunately, it is all too common that although adequate legislation is in place, there are still a significant number of reported discrimination incidents. The reported incidents of passengers being discriminated against have been substantial enough for the Government to issue consultation papers such as Accessibility Action Plan, resulting in the conclusion of the consultation paper being included in the Inclusive Transport Strategy.

Although the Government have attempted to capture a true picture of the current difficulties surrounding social inequalities, the research conducted by charities for disabled people has added depth and broadened the understanding of the discrimination faced on a daily basis for those with additional needs. Scope and Guide Dogs for the Blind UK have conducted overwhelming research that provides evidence to suggest that much of the discrimination faced by those with disabilities is due to the drivers that they come in to contact with upon requesting a passenger service from either PHVs or taxis.

Guide Dogs UK conducted a report entitled 'Access Denied Report', whereby they surveyed 421 assistance dog owners on their experiences using taxis and private hire vehicles (PHVs) within the past 12 months. The results of this survey are extremely significant in highlighting the negative experiences that those with

visual impairments face when using public transport, particularly taxis and PHVs. Of those surveyed, 62% of assistance dog owners have experienced access refusals from taxis and PHVs, making it the most common place that they have been turned away from. These refusals often occur on a weekly basis and are detrimental to the health and wellbeing of those facing such discrimination. These refusals came from drivers of vehicles that had been ordered in advance which is a clear disregard for their duties as licenced passenger service drivers.

One of the interviewed participants, an assistance dog owner from Winchester says "taxi and private hire vehicles are the biggest issue. Drivers can make you feel unwelcome in their vehicle" with a Cardiff North Constituent saying, "I avoid taxi's now which is why [my] last refusal [was] over a year ago" . From this, it could be argued that although the PHVs enable consumers to indicate any additional needs they may have, drivers still have great reluctance to adhere to the law. This suggests that even when taxi and PHV drivers are not breaking the law by refusing their service, they are still making their passengers with additional needs feel unwelcome and unequal. For the assistance dog owner from Winchester to state that both taxi's and PHV's have contributed to their feeling unwelcome, the introduction of HARPS could be said to bring the potential for more consistently positive experiences for those with special requirements through the elimination of the need for a human to be driving. HARPS operators could, and likely would, still integrate booking systems in their infrastructure which would align with the current booking systems that PHVs and taxis have, just without the result being that of a discriminative driver.

In many ways, having a guide dog is an extremely positive step for people with visual impairments however there are many difficulties that arise from being accompanied by a dog. Reportedly, guide dog owners are subjected to, what they feel, is a second-class service with 79% left feeling uncomfortable or unwelcome due to their dogs. A particularly negative statistic is that 33% of assistance dog owners were refused entry to a taxi or minicab due to allergies. Although the Equality Act does in fact consider medical exemptions, those that refused entry to the taxi and/or minicab failed to provide a valid medical exemption certificate, simply because they did not possess one.

In addition to visual impairments, many other conditions can also be supported by assistance dogs. Epilepsy and heart complications are amongst a vast range of conditions that qualify for help from assistance dogs. Despite the dogs having clear vests, harnesses and/or leads that state they are assistance dogs, due to the condition of their owner being an invisible condition, assistance dogs are often overlooked or considered in a different light to that of a guide dog. For many years, it was less common to hear of or even see assistance dogs which could be an explanation for services having less understanding of the law regarding them. Assistance dogs are able to aid owners with everyday tasks and aim to allow them to live as limitless as they wish. Largely due to a lack of understanding and awareness, assistance dogs are statistically more likely to have access refused than guide dogs, as well as ages 18-30 also being more likely to be disadvantaged .

Scope have also delivered a report entitled 'Travel Fair Report . This report is a culmination of research conducted between 2018 and 2019 and aimed to address the difficulties faced by disabled people when using public transport. Working alongside Opinium, they surveyed 2000 disabled people and made recommendations based on their findings and the action that urgently needs to be taken to ensure equality across public transport systems.

66% of disabled people described that they have suffered problems with transport over the past year with 30% stating that this has reduced their independence . Many of these issues stem from negative experiences from staff. Nasty looks and not providing assistance when needed have both been experienced by 33% of disabled people with 29% being completely ignored and 28% even questioned on why they require extra or any assistance .

80% of people involved in this survey expressed that they feel stressed and/or anxious when accessing public transport which has often resulted in not travelling to a certain place or not travelling at all. This exacerbates further anxiety with a likelihood of loneliness and lack of self-confidence which prevents independence being achieved. Unfortunately, this is not uncommon as 70% of owners with assistance dogs that were surveyed reported that the refusals had brought negative impacts on their wellbeing, alongside 55% reporting that their quality of life is being affected. Many people with visual impairments successfully receive guide dogs to enhance their independence and help them to remain able to attend social activities. Despite the excellent work that guide dogs do to help their owners, 72% of guide dog owners said that refusals have negatively impacted their ability to engage with recreational activities.

Throughout both the Access Denied and Travel Fair reports, there was persistent reiteration of the discrimination faced by disabled people on a daily basis when attempting to access taxis and private hire vehicles. Discrimination, either direct or indirect, is largely due to individual perceptions and opinions of disabilities. Misinformation and lack of awareness undoubtedly contribute towards the volume of people that make life that little bit more difficult for those with additional needs. Many issues faced by disabled people include the problematic nature of having a less visible disability. More of the negative reactions are made towards hidden disabilities and the ideology of what a 'well' and 'healthy' person should look like.

Because of this, introduction of autonomous vehicles could be a key factor in enhancing the experiences that disabled people have whilst travelling. The Inclusive Transport Strategy published by the Department for Transport aims to raise awareness of passengers' rights, improve availability of information on multiple formats, physical infrastructure and inclusive transport. Focussing on the element of inclusive transport, the Strategy also hopes to implement new technologies that can be developed either alongside disabled people or with disabled people in mind.

The Parliamentary Under Secretary of State for Transport acknowledged that the issue of discrimination on transport affects a large number of people within the UK. The Strategy explicitly states that one of the main objectives is adequately and correctly enforce current legislation. Although this is a positive, it also highlights the awareness of how the Equality Act is currently falling short of its responsibility to prohibit discrimination and impose sanctions on those that disregard the law.

Notably, the Department for Transport aim to establish future transport technologies alongside charities that can aid the progress of the developments and ensure that the future of transport is as equally accessibly for disabled people as it will be for those without a disability.

These technologies could be paramount in achieving a desired decrease in discrimination that prevents disabled people from accessing transport that ordinarily, would appear adequate. Much of the discrimination that disabled people face comes directly from staff of transport providers. In the Travel Fair survey, the statistics previously mentioned quantified the volume of negative experiences that disabled people were subjected to by staff.

Complimenting this theory, Scope's report found that 65% of disabled people use mobile applications and/or websites to plan their journeys already compared to 14% of people planning their journeys through staff, face to face. There are many reservations that technology would create further issues and barriers, however the number of people with visual impairments surveyed by Guide Dogs UK that use applications on mobiles to improve accessibility rose from 12% in 2009 to a

staggering 82% in 2014. This significant increase is an indication of the modern world adapting to more advanced technology and how this technology is inclusive.

The statistical evidence supporting the notion that disabled people are utilising online technology to increase their accessibility is incredibly positive for HARPS. There is additional evidence to suggest that HARPS have the "potential to benefit many disabled people" and the "innovation could unlock benefits for many". Although, it is clear that the upcoming technologies will benefit the disabled community and improve the accessibility that they have, the development of such innovation must involve working with disabled people in order for it to be successful in its aim.

There is also an increased desire for mid-journey updates, which was a highlighted factor in a peaceful journey. With automated vehicles, the limitless abilities of programming could incorporate this information and warn the passengers of these vehicles of potential delays. Existing transport applications such as Uber and Trainline have the ability to provide information such as delays, issues with transport (i.e. faults with lines, no onboard services), additional information on the next leg of their journey and even share their journey with a trusted person to increase their safety. As the statistics show that many disabled people prefer to plan ahead of their journey, the ability to do so could open potential benefits to wider society. The Department for Transport explain how the aim to have 1 million more disabled people in employment by 2027 could be achieved with help from the Inclusive Transport Strategy.

Digital resources appear to be a favourable option with disabled people as they are able to store and manage all of the information that they require in a concise way that reduces the need to carry numerous forms of information with them throughout their day. As automated vehicles will have a considerable amount of technology available both onboard and through their booking systems, there will be a great increase in available information. The access to this information will be of great benefit to disabled people as they will likely be able to manage a better social life, their independence and even their employment in a far more accessible and pleasant way. Enhancing the every-day life of disabled people will also have a significant impact on wider society such as employment and education sectors as access to them would be increased.

Contrasting, there are recommendations that involve developing the infrastructure already in place. The recommendations made by charities, as well as within the Inclusive Transport Strategy, commonly include implementing disability awareness training, both for visible and less visible disabilities and equality training. Complementing this, there is also a significant requirement to correctly enforce the current legislation. Licencing authorities currently have a duty to ensure that the licences that they award, are awarded following necessary inspections. If the authorities were subsequently expected to impose further training on their drivers, would this result in a significant expenditure, simply to ensure that current legislation is effective? Reflecting on those recommendations, it could be suggested that despite the law explicitly prohibiting discrimination, charities are still concerned by the alarming statistics proving that the law is currently falling short in its effectivity.

It could be said that as long as the training is carried out, it can be successful. However, removing the need for this extra spending by authorities and focussing on innovative technology that does not need any additional coaching to be more inclusive and non-discriminatory, it enables a 'start from scratch' approach whereby the experiences and opinions of those currently suffering from discrimination can be a basis for design and advancement, ultimately removing the potential for further discrimination.

Paulley v FirstGroup [2017] is a case that was heard in the Supreme Court and therefore sets great precedent on the assistance that can be expected from passengers. Mr Paulley, a wheelchair user, was denied access to a bus service due to a woman with a sleeping child in a pushchair taking up the wheelchair space. Mr Paulley suggested that he could collapse his wheelchair and occupy a regular seat, although this suggestion was refused due to the hazard that the wheelchair would cause. Initially, the case was taken to Leeds County Court by Mr Paulley, whom was successful in suing FirstGroup Plc for unlawful discrimination and was subsequently awarded damages amounting to £5,500.

FirstGroup Plc appealed this decision and the Court of Appeal rejected the County Court's decision, concluding that there was a lack of discretion available to the driver of the bus, leaving him with the only option being to remove the woman and child from the service. The case was eventually heard at the Supreme Court where Lord Neuberger, the President of the Supreme Court at that time, made a very significant ruling. The ruling consisted of ensuring that the with regard to non-wheelchair users refusing to vacate the wheelchair area, there must be additional measures in place to ensure that the wheelchair user is not simply unable to board the bus.

Moreover, there was particular importance placed on the level of policy and training involved in ensuring that there is no discrimination towards passengers that are wheelchair users. In this instance, it was suggested that even if policies were amended, there is still a demanding need for the law to be adapted to be more explicit in its terms regarding the responsibility of bus drivers and the companies that they work for.

Linking this case to the Consultation Paper, it is clear that the law is consistently failing disabled people due to a lack of understanding and awareness of the responsibilities that are held by drivers of passenger services. Disabled people have the right to be treated equally, as defined by the Equality Act 2010. Whilst the Act strives to be adequate in the enforcement of duties to ensure that there is no discrimination of disabilities, there is overwhelming evidence to prove that it is insufficient in doing so. By considering the shocking statistics, it is undeniable that discrimination is still extremely prevalent. When co-designing and developing software, technologies and automated vehicles for passenger services, there will be a higher sense of achievability in decreasing the difficulties faced by disabled people. This will provide people with disabilities with hope and reassurance that there are substantial investments going in to creating a more positive and independent ability to utilise transport links as easily as those without additional needs.

Should the introduction of HARPS be successful and decrease limited accessibility for disabled people, there will be evident benefits to wider society. It is estimated that by 2040, 13% of the UK population will be aged over 75. As disabilities are more prevalent in later life, it would be extremely useful to develop this technology for passenger services in the immediate future to ensure that the aging population has access to the technology in an earlier stage of their lives, helping them to better understand the value of having driverless cars to assist them and their independence as they get older.

The introduction of HARPS has the potential a forward-thinking approach to tackling current social issues that limit transport accessibility for many people. The Law Commission should consider the importance of a co-design approach and enable those that have insufficient access to transport currently, can implement the changes to transport methods that would directly alleviate discrimination. Whilst the recommendation of altering the law has been present in many of the sources I have relied upon, it would be an excellent step in the right direction to highlight the consideration of disabled people being taken when developing new passenger services. Introducing HARPS would decrease many of the opportunities for discrimination to be present by removing the people most likely to make

transport inaccessible, the staff.

The potential discrimination HARPS could produce on others, especially on the elderly and the disabled.

This part of the response will explore the ways in which artificially intelligent machines can discriminate against vulnerable groups in society, particularly focusing on the elderly and the disabled. This section begins by discussing the operations of such machines, before turning to the concerns that the HARPS must tackle. As previously mentioned, automated vehicles such as HARPS have the potential to alleviate transport discrimination experienced by vulnerable individuals. However, HARPS can only accomplish this by effectively addressing the concerns relating to artificially intelligent machines (AI).

The advancements in AI and machine learning technology have transformed the ways in which individuals engage with machines. Generally, machines have evolved to cater to societies greater needs. Machines now have a myriad of decision-making features such as visual perception, speech recognition and language translation. These features have enabled machines to perform human-like tasks, which have greatly benefited wider society. In particular, it has provided the elderly and the disabled with a greater sense of independence and assisted with their safety, mobility and connectivity. Nevertheless, a major concern relating to AI is their ability to behave in a discriminatory manner. This is not a widely recognised matter and there remains 'significant confusion over the precious mechanisms, which cause machines to discriminate'. For instance, the Equality Act prohibits all forms of discrimination against vulnerable groups in society. Section 13 of the act outlines various ways direct discrimination can occur, although these all necessitate a 'person discriminating against another...'. This insinuates that discrimination has a prominent human element. Nonetheless, empirical evidence discussed later in this section demonstrates that AI machines can discriminate against others. Therefore, HARPS must effectively examine the ramifications of this on vulnerable groups in society.

The operating system of an AI machine is both impressive and complex. Such machines commonly use a procedure called 'data mining'. This involves processing vast quantities of pre-existing datasets known as training data, in order to generate new information. Artificially intelligent machines utilise 'algorithms, which process data, to spot trends and anomalies'. Generally, this process necessitates the continual updating of data. Alternatively, machines can utilise machine learning technology, which implements a series of algorithms, enabling a machine to update itself with little intervention. Even though, machine learning technology is technically a subset of artificial intelligence, it does not require human assistance when updating its data. This is because this technology enables machines to learn from its own experiences adding to and developing its own dataset over time. Essentially, under both methods machines must process data, to behave in a 'human-like manner'. However, biased data 'can and often does find its way into AI platforms', causing the machines to behave in a discriminatory manner.

There are several ways that biased data can find its way into systems like HARPS. Barcos and Selbst assert that artificially intelligent machines discriminate against humans if they are programmed with 'discriminatory training data'. This is because machines use this data as a framework to base its behaviour on. Bloomberg explains that human behaviour makes up a large part of artificial intelligent research, which is inevitable as humans create and programme such machines. As humans are generally susceptible to bias, this would likely result in biased data. For instance, St George's Hospital Medical School developed a computer system to sort through applications based on its previous admissions. It was later discovered that such decisions were systematically discriminating against racial minorities and held gender preferences. In this case the program was not 'introducing new bias, but merely reflecting biases already present'. This demonstrates that biased data can easily be programmed into machines, without the knowledge of its creator.

A significant difficulty with overcoming 'biased data' is that its existence within the machine is often unknown. This occurs when preceding training data is programmed into a machine, without proper scrutiny. In such instances, engineers risk programming machines with pre-existing biases, which may happen completely without awareness or malicious intent. Ultimately, if 'data mining' is 'approached without care, it can reproduce patterns of discrimination, inherit the prejudice of prior decision markers or simply reflect the widespread biases that persist in society'. This is because machines use training data, with existing prejudice as valid examples to base its decisions on, which results in the reproduction of these prejudice. Similarly, machine learning technology may learn from a biased sample of the population. Any decisions based on these inferences may result in discrimination. To make matters worse, such biased data is only discovered when the machine behaves in an unfavoured manner. Ultimately, machines are incapable of determining whether the data it is processing is biased. Alternatively, discrimination could result from the lack of representation of vulnerable individuals within 'training data'. If certain groups in society are underrepresented, then this could skew the conclusions drawn from such data. This is a cause of serious concern as 'not all data is collected equally, there remains problems in data sets and shadows, where citizens are overlooked'. If a particular class is omitted from the dataset or lacks sufficient representation, then this could have a disproportionate effect. Ultimately, the lack of extensive data on vulnerable groups could cause machines to label such groups as an anomaly. Consequently, the machine would not recognise vulnerable individuals as being human, which would further marginalise such individuals and potentially risk their safety.

Recent isolated incidents involving 'self-driving' cars demonstrate the severity of this issue. There have been two instances where a 'self-driving vehicle' has been unable to detect pedestrians, causing the vehicle to drive into them. The issue extends beyond discrimination and relations to the safety of vulnerable individuals. Underrepresentation in datasets could have fatal consequences. As a result, HARPS must ensure that protected groups are included within the training data, so that they are not categorised as outliers and can be identified as pedestrians.

This directly affects disabled people as there is 'not enough individuals with a given type of disability included within existing datasets'. It has been reported that one in five individuals in the UK have a disability, therefore, this issue could have widespread consequences. It is vital that disabled people are well represented within the training data. Nonetheless, the pre-existing data on this protected group must be approached with precaution. This is because disabilities are inherently dynamic and nuance, to which the current data fails to demonstrate. Generally, impairments can vary in intensity and are vast in nature. Moreover, the United Nation's defines a disability, as being 'an evolving concept'. This acknowledges that disabilities can change overtime. Thus, HARPS ought to reflect this reality. This response recommends that the collection of 'training data' continues to improve the understanding of this vulnerable group. Engineers behind HARPS should make a conscious effort to scrutinise the data used for any existing biases. A conference organised by ACCESS advocates this, stating that experts and engineers should be held responsible for addressing the concerns relating to emerging technology. This response suggests taking this a step further, by ensuring that engineers work alongside experts in data collection as well as a number of organisations which tackle discrimination against vulnerable groups. This is to ensure that engineers are equipped with the means to effectively tackle this issue.

The removal of biased data can prove to be a complicated matter. This is because of the machine's 'black box' nature, which means that AI often offers few clues as to how they arrive at their conclusion'. The internal operations of AI are opaque and often perplexing. The issue at hand does not simply concern the data put into the machine, but also relates to the data picked up by the machine. As aforementioned, machine learning technology updates its own dataset with little intervention from humans. This technology opens a gate way of opportunity for the manipulation of such machines. For example, Microsoft created a social AI chat boy called 'Tay'. Tay was designed to converse with the public through Twitter to develop its own personality overtime. This project was shortly abandoned as the conversations contained statements causing Tay to manifest and produce bias views. In order to avoid this from reoccurring, HARPS must carefully consider the features included within its vehicle. If HARPS is created using machine learning technology and contains features enabling it to understand and respond to an individual. Then it is possible for biased data to be produced as a result of the discriminatory conversations passengers may have.

Admittedly, HARPS is a nascent concept, for which the ramifications are still unknown. Nonetheless, introducing HARPS without careful evaluation is inadvisable.

This is because HARPS could potentially cause 'direct' and 'indirect' discrimination to occur against the elderly and the disabled. HARPS could cause direct discrimination by refusing service to vulnerable individuals. This could stem from two key sources; HARPS may learn from a biased dataset or, such individuals may be categorised as an outlier. HARPS could tackle this issue by implementing the recommendation stated earlier in this section. If engineers are required to work closely with relevant organisations when collecting data and tackling biased data. Then this should effectively deal with such an issue.

However, the implementation of this alone is not enough, as HARPS must still tackle the discrimination, which currently exists within AI systems. For instance, if HARPS were to utilise an AI body recognition system to detect the arrival of passengers, this would marginalise vulnerable individuals. This is because such systems often fail to recognise individuals with disabilities characterised by a body shape or mobility differences. This is a typical example of how AI technology can discriminate against protected groups. Moreover, gesture recognition technology struggles to recognise individuals with differences in morphology. Both systems do not adequately deal with the inclusion of such groups. Thus, the danger with HARPS using this AI technology, is that will result in transport discrimination against vulnerable groups.

Similarly, voice-based systems are an emerging challenge, 'the use of speech as the primary method of interaction has made various devices less accessible'. Machines that rely on speech recognition do not function correctly for individuals with atypical speech. It has been reported that personal assistants such as 'Alexa' have failed in understanding individuals that have speech impairments. Individuals with stammer or other speech difficulties may find it extremely frustrating attempting to communicate with such machines. In relation to HARPS, such features may deter individuals from using the service all together. Furthermore, research suggests that emotional detection systems could misinterpret the behaviour of individuals with disabilities. There is evidence to suggest that machines misidentify the performance of sign language, as individuals being angry or frustrated. If HARPS were to use a similar system to detect the existence of difficult customary situations, this could result in the misinterpretation of characteristics relating to disabilities. This response recommends that HARPS carefully evaluates the features it includes within its vehicle. This is not to deter HARPS from exploring these features during the design process. As HARPS could overcome these issues by creating its own systems, or by developing the current systems, so that they work for vulnerable individuals.

Finally, an alternative way HARPS system could discriminate against vulnerable groups is through pricing. Admittedly, vulnerable individuals may require vehicles which are specifically accessible to them. From an economic point of view, it may seem reasonable to charge more. However, this could result in such groups feeling further marginalised. The Department for Transport and Centre for Connected and Autonomous vehicles have recently published a report analysing the public's attitudes towards 'self-driving vehicles'. In this report, participants assumed that such services would be expensive and unaffordable to those with low incomes. Our recommendation advocates the Law Commission's suggestion to ensure that vulnerable people do not pay more for HARPS services. This is because the high pricing of HARPS services could increase social inequality and results in the lack of accessibility for those individuals who would benefit the most.

Moreover, the Law Commission has suggested extending the application of the Equality Act to HARPS operators. This results in HARPS operators being held liable for any form of transport discrimination that may occur against vulnerable groups. Albeit, this suggestion has some advantages, nevertheless, it fails to effectively deal with the root of the issue. The Equality Act 2010 could act as an incentive to ensure that the discrimination discussed in this section does not occur. However, as previously mentioned, the act deals with discrimination caused by humans and not machines. HARPS must take an innovative approach in dealing with discrimination, as implementing the Equality Act 2010 is simply not enough. Our response suggests focussing on data collection and working closing with relevant organisations, rather than trying to extend current legislation that does not deal with such technology.