

**Response to Law Commissions' second consultation on Automated Vehicles
(Law Commission Consultation Paper 245; Scottish Law Commission Discussion Paper 169)**

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Any personal email addresses and phone numbers have been excluded from this document.

Unanswered questions have been deleted from this document.

What is your name?

Dr Heather Bradshaw-Martin

What is the name of your organisation?

Humanity in Motion Ltd

(But I am currently employed by Perkins Engines who are part of Caterpillar, working on certification.)

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

[Respondents chose from the following options: Personal response; Response on behalf of your organisation; Other.]

Personal response

CHAPTER 3: OPERATOR LICENSING – A SINGLE NATIONAL SYSTEM

A single national scheme

Consultation Question 1 (Paragraph 3.82): Do you agree that Highly Automated Road Passenger Services (HARPS) should be subject to a single national system of operator licensing?

[Respondents chose from the following options: yes; no; other.]

Yes

As a consumer I want to know that the same standards apply wherever I use such a service.

Volume manufacturers will also find it easier to deal with a single set of standards.

I see no reason why the system should NOT be national.

Consultation Question 2 (Paragraph 3.86): Do you agree that there should be a national scheme of basic safety standards for operating a HARPS?

[Respondents chose from the following options: yes; no; other.]

Yes

As a consumer I want to know that the same standards apply wherever I use such a service. This would make me more likely to use such a service when travelling outside my home area.

Volume manufacturers will also find it easier to deal with a single set of standards.

I see no reason why the system should NOT be national.

CHAPTER 4: OPERATOR LICENSING –SCOPE AND CONTENT

Scope of the new scheme

Consultation Question 3 (Paragraph 4.33): Do you agree that a HARPS operator licence should be required by any business which: (1) carries passengers for hire or reward; (2) using highly automated vehicles; (3) on a road; (4) without a human driver or user-in-charge in the vehicle (or in line of sight of the vehicle)?

[Respondents chose from the following options: yes; no; other.]

Yes

Any HARPS on the public road, in my opinion, needs to be overseen by an operator (as operators are defined in the consultation document), whether the HARPS is used for business purposes, and/or for hire or reward, whether carrying passengers or goods.

In the context of peer to peer and sharing, the terminology "business" and "for hire or reward" may need to be reviewed. It may be possible to be offering something for hire or reward without being a business.

Consultation Question 4 (Paragraph 4.34): Is the concept of “carrying passengers for hire or reward” sufficiently clear?

Other

(1) While "carrying passengers for hire or reward" is clear, the use of the term "business" earlier in the definition may prove controversial in the peer-to-peer space. Most sharers and peer to peer participants would not see this business.

(2) There should be a similar level of supervision for ANY vehicle travelling on the public road without a user in charge - whatever its size, ownership structure or purpose. Whether it is there earning money, taking part in a peer to peer scheme or on the private matters of a single owner there needs to be supervision, control and a similar level of recourse for any member of the public encountering the vehicle.

Thus this concept is clear, but possibly too narrow for this purpose.

Exemptions

Consultation Question 5 (Paragraph 4.46): 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.

Absolutely NOT. As stated above, members of the public need to have the same level of recourse when they encounter ANY such vehicle, irrespective of its ownership or current activity.

Any HARPS on the public road should be under the same operating regime, albeit provided by different companies or organizations.

There may, in my opinion, be a justification for subsidizing or otherwise assisting charities or community services in paying for the provision of operator services, or getting operator licenses for themselves, at least initially - in the first decade of HARPS availability. It may also be that operators have imposed upon them the need to include a percentage of community work as part of their license conditions.

Consultation Question 6 (Paragraph 4.54): We seek views on whether there should be statutory provisions to enable the Secretary of State to exempt specified trials from the need for a HARPS operator licence (or to modify licence provisions for such trials).

Having worked as a tester for a (potential) manufacturer of such vehicles and thus having familiarity with the constraints and pressures of testing I considered this point carefully. I do NOT believe there should be an exemption for the need to hold an operator license, or to access the services of an existing operator) for trials even though this may impose a burden on manufacturers and developers (ADSEs).

I reasoned thus:

If the test is of the technology allowing the vehicle to navigate and control its behaviour then I would expect there to be some degree of risk that the system might not work, plus a need to log data, change parameters or test protocols and so on. While this can be done remotely I would expect there to be an engineer in the vehicle who is able to take control in case of untoward events-provoking them is what a test is about. For such technical systems tests I would expect there to be a user in charge. No HARPS operator license would be required.

If the test is of the technology for remote control, and of the operation of the communications technology with the control centre, and it is considered unnecessary or counterproductive (eg the software detects when the vehicle is empty and behaves differently to when it detects occupants) to have an engineer present in the vehicle, then the vehicle will be travelling empty and the public should have the same recourse when encountering the vehicle as when encountering any other HARPS. This level of recourse is provided by the operator licensing and compliance system. Further, in this case it is at least in part the control centre and operator system - including humans - behaviour which is being tested. So the system should be subject to the same licensing and compliance as it would be in the field.

Operator requirements

Consultation Question 7 (Paragraph 4.72): Do you agree that applicants for a HARPS operator licence should show that they: (1) are of good repute; (2) have appropriate financial standing; (3) have suitable premises, including a stable establishment in Great Britain; and (4) have a suitable transport manager to oversee operations?

[Respondents chose from the following options: yes; no; other.]

Yes

(1) are of good repute - a lack of offences indicates a suitably conservative attitude to risk and the absence of antisocial behaviours of the sort which might be amplified in the context of remotely controlling a fleet of potentially lethal machines.

(2) financial standing - accidents may be larger when they occur, even if the occurrence is less frequent, because the driving systems on such vehicles will not have the ability to interpret context in the way humans do. Maintenance needs may be complex and expensive.

(3) (i) have suitable premises - this may need to be split out into premises for the control of vehicles, premises for record keeping, premises for off road storage/waiting and premises for maintenance. Off road storage and maintenance are important and may be more onerous requirements than control or space for record keeping given that records may be easily kept on a laptop or, for logs off all data, will need to be kept 'in the cloud' anyway. In my opinion, off road storage for an operators' entire fleet needs to be a requirement to avoid congestion and kerb clutter. Recharging facilities at the premises may impose significant electricity supply, fire risk and other safety requirements.

3 (ii) whether the premises must be within Great Britain may need more consideration as both control and the storage of very large data logs is likely to be capable of being offshored, and in the case of data storage most likely to be off shore. If it really must be in Great Britain then this may require considerable investment.

4. The transport manager requirements sound rather like an attempt to control the market by unions. Nevertheless, a named individual with authority, whom the public can contact, is important in this context. Moreover, I suspect that the experience of those in this role will be very valuable to ADSEs and to operators.

Consultation Question 8 (Paragraph 4.73): How should a transport manager demonstrate professional competence in running an automated service?

In imagining how the automated nature of the vehicle might impose different competence requirements I have relied on my own experience of testing modern vehicles with some elements of advanced driver assistance. The skills and experience required to efficiently manage updates, unexpected incidents and to troubleshoot maintenance and damage issues are closer to those of an experienced auto electrician or a development engineer than to mechanical engineering skills or logistics expertise. It occurs to me that at least initially it will be very unlikely to find both sets of skills in one individual. Therefore initially operators might be required to have two individuals - one with the logistical qualifications and experience of a transport manager, and the other with the electrical engineering skills evidenced through an engineering degree, manufacturer development experience (quite a number of excellent developers are not degree qualified having worked up from a more practical role) or, possibly, in-field advanced auto electrician qualifications or experience. Military training may also be relevant.

Initially, therefore, perhaps operators could be required to demonstrate that personnel with both transport management qualification traditionally evidenced, plus electrical or electronic engineering skills, evidenced by degree or other technical qualifications, with an option for evidence from career experience.

Over the first 5-10 years of operations it would be necessary for these individuals to be brought together to try to develop a curriculum and examination procedure to see whether both skillsets can be combined into one qualification.

During this transition period traditional transport managers, or operators, might be required to demonstrate competence from statistics about incident rates, software update success rates, and other operational data as well as, perhaps, practical tests in diagnosis of complex software systems and security and update procedures.

Adequate arrangements for maintenance

Consultation Question 9 (Paragraph 4.89): Do you agree that HARPS operators should: (1) be under a legal obligation to ensure roadworthiness; and (2) demonstrate “adequate facilities or arrangements” for maintaining vehicles and operating systems “in a fit and serviceable condition”?

[Respondents chose from the following options: yes; no; other.]

Yes

Although HARPS may have more self-diagnostic capabilities than current vehicles, and more sensors, such as diagnostics for failed brake and indicator lamps, low tyre pressures, and, at a more complex level, sensor failures of various sorts, including for door closure and seat position sensors, they are not likely to be self-healing in the near future. Time for regular repair and removal of fault codes will be necessary and might be time consuming due to system complexity. Moreover, incidents such as bird or animal strikes, rubbish entering orifices and vandalism may create unexpected failure modes. A daily walkaround check combined with analysis of diagnostics data would be wise and this can best be achieved by operators, not ADSEs or passengers. If the vehicles are to be used with people with disabilities then there must not be any obligation of this kind on passengers.

Adequate facilities should include climate and light controlled (to test sensors) workshops with suitable supplies of 12v and high voltage (for electrical vehicles) power as well as facilities for charging and docking laptops for analysis or transmission of large - potentially very large - quantities of data. Fault finding may take some time and side of the road exposed to the elements working is not conducive to reliable work. Further, it may be necessary for operators to recover vehicles to their facilities. Electric vehicles may have towing speed restrictions, and safety and security features can fail so as to immobilise the vehicle. I have observed cars having to be loaded onto flatbed lorries using skids which are directionally unstable. Operators and rescue companies such as the RAC and AA will need to have agreed with the ADSEs what the worst case vehicle movement procedures and security needs are so that vehicles which are "bricked" unexpectedly, by failure or vandalism, can be promptly moved. This becomes more difficult the larger the vehicles. Operators may wish to contract out this recovery process.

Consultation Question 10 (Paragraph 4.90): Do you agree that legislation should be amended to clarify that HARPS operators are “users” for the purposes of insurance and roadworthiness offences?

[Respondents chose from the following options: yes; no; other.]

Yes

If they have regular daily access to the vehicles then they are the appropriate parties to ascertain roadworthiness.

I am not sure whether operators should be responsible for insurance or ADSEs. There may be advantages in ADSEs working with insurance companies in terms of design for safety being directly negotiated between insurers and designers. On the other hand this may cause unduly close working relationships.

Operators may find insurance difficult, at least initially, especially if insurers do not agree with the approaches to safety and accident prevention taken by ADSEs. I have seen differences in acceptable incidences of failures vary between sensor suppliers - 1/20000 and traditional experienced software suppliers - 1/6000000. Disputes of this nature can take a great deal of negotiation and engineering effort to resolve.

Compliance with the law

Consultation Question 11 (Paragraph 4.124): Do you agree that HARPS operators should have a legal duty to: (1) insure vehicles; (2) supervise vehicles; (3) report accidents; and (4) take reasonable steps to safeguard passengers from assault, abuse or harassment?

[Respondents chose from the following options: yes; no; other.]

Other

In principle I agree that duties regarding all of these are reasonable for operators however close thought indicates that there may need to be additional duties or involvement from other parties.

(1) insurance-see Q12 -it might be better for this to sit with ADSEs initially.

(2) supervision seems the key duty of the operator-awareness of vehicles' status and location at all times, and procedures and resources in place to respond quickly and appropriately to any incidents.

(3) on what basis should accidents be reported? Should it only be accidents or also near misses, as is usually required in health and safety contexts? It is likely that members of the public will need a quick and easy way to alert operators. This may be through controls on the outside of the vehicle or visible phone or other contact details. HARPS will no doubt have the usual emergency braking features and the activation of these will be clear from their software flags and from accelerometers. Audio and visual recordings may capture actual impacts too. Completely sensitized vehicle surfaces are not yet commercialized to my knowledge though. There may need to be work done with ADSEs and operators to ensure operators have access to sufficient data to detect and report accidents and other incidents promptly.

(4) Safeguarding also seems to require CCTV monitoring of the surroundings and inside of HARPS. But this raises issues of privacy and choice-if HARPS become the most common travel method what options are there for those who do not wish to be filmed? Consider the use of HARPS in an adverse political environment.

Consultation Question 12 (Paragraph 4.125): 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)?

[Respondents chose from the following options: yes; no; other.]

Yes

At least initially, close monitoring of all incidents and analysis of them at a national and city level seems appropriate. Although software can be updated over the air frequently the process of commissioning, developing, and thoroughly testing a new vehicle system takes about 4 years. Computing hardware tends to have a longer development cycle with processor capacities only changing significantly every 10 years or so in automotive fields. Thus such "initial" monitoring might need to continue for 20 years or so.

Such data will be very useful for improving facilities and regulation in the future.

Consultation Question 13 (Paragraph 4.128): Do you agree that the legislation should set out broad duties, with a power to issue statutory guidance to supplement these obligations?

[Respondents chose from the following options: yes; no; other.]

Yes

However it is important that the guidance be publicly available, and applicable to all companies rather than responsive to individual ADSE or operator's problems to ensure a fair playing field.

Consultation Question 14 (Paragraph 4.133): We invite views on whether the HARPS operator licensing agency should have powers to ensure that operators provide price information about their services. In particular, should the agency have powers to: (1) issue guidance about how to provide clear and comparable price information?

[Respondents chose from the following options: yes; no; other.]

Other

There is likely to be significant innovation in pricing structures and methods and the method of communication of prices may be integral to some of these. Nevertheless pricing needs to be accessible and understandable to all-those hailing a vehicle on the street and those prebooking using the internet or phone or other methods.

While initially the agency should have the power to issue guidance it might be wise to keep this very high level, or not use the power much until price structures become clearer.

That said, pricing and purchase need to be very, very simple to facilitate use by tourists as well as regular travellers and by those with a variety of disabilities. Some guidance about the need to display prices on the vehicles as well as through internet apps may be required from the outset.

And/or (2) withdraw the licence of an operator who failed to give price information?

[Respondents chose from the following options: yes; no; other.]

Yes

On the basis of complaints from the public or spot checks. It's a question of public trust.

Who should administer the system?

Consultation Question 15 (Paragraph 4.138): Who should administer the system of HARPS operator licensing?

I am inclined to say the Traffic Commissioners rather than the system licensing authority. But there are good arguments both ways.

TCs:

1. already have expertise in logistical and public safety matters
2. are less likely to be unduly influenced by manufactures/ADSEs as they are less likely to have a close relationship with them
3. are more likely to be used to thinking in terms of the public good
4. might be better calibrated for the types and frequency of incidents which happen currently.

The need to improve technical understanding for TCs could be addressed by (i) practical training and (ii) the employment of a small number of technical advisers at a suitable elevated authority level.

The system licensing authority would, I'd expect, be much more focussed on the engineering of the vehicles itself and its interaction with specific environmental stimuli.

In my opinion it would be easier to provide sufficient technical training to TCs than to provide the wealth of legal, public and logistical experience of TCs to the system licensing authority in which I would expect engineering knowledge to be central.

One caveat would be that an ADSE who also wanted to be an operator would have to deal with two bodies. However, there would be two rather different areas of expertise which would both have to be covered. There would need to be coordination to avoid the system licensing authority and the TCS being in dispute on points which can have only one engineering solution.

Freight Transport

Consultation Question 16 (Paragraph 4.140): We welcome observations on how far our provisional proposals may be relevant to transport of freight.

You will still need operators. There will be less safeguarding but there might need to be more security. There may also be more problems with loading and unloading. Boxes don't usually load themselves like most passengers do so more time and facilities may need to be available.

CHAPTER 5: PRIVATELY-OWNED PASSENGER-ONLY VEHICLES

Setting a boundary between HARPS and private leasing

Consultation Question 17 (Paragraph 5.12): 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?

[Respondents chose from the following options: yes; no; other.]

Other

I do not see what a time limit of 6 months does in this circumstance.

The lease company need not be the operator. But any HARPS on the public road, whether being used by one individual exclusively, or available for public use, must have a HARPS operator responsible for it on whom the public, or the vehicle's owner or users can call in case of any incident and who is able to arrange for removal or repair.

There will still be requirements for the vehicle to be inspected, preferably daily, and for any diagnosed faults to be monitored and rectified promptly.

The need for daily roadworthiness checks means that if the vehicle is out of the depot for more than 24 hours there needs to be some arrangement in place for such checks to be made, even if this is done by CCTV or other remote means, by a competent person. There should not be any discrimination between users with disabilities, who may not be able to do such checks themselves, and users who could do the checks themselves but might not do.

Therefore if there is to be a time limit it must be much shorter than 6 months.

The distinction between public use and private lease or ownership may need to be made on the basis of whether the vehicle is returned every 24 hours to the premises of a licensed operator, or not rather than the length of time of the agreement. Imposing exclusivity would impede private owners' ability to participate in peer to peer or other sharing arrangements.

Allocating responsibility for a privately-owned passenger-only vehicle: placing responsibilities on keepers

Consultation Question 18 (Paragraph 5.40): Do you agree that where a passenger-only vehicle is not operated as a HARPS, the person who keeps the vehicle should be responsible for: (1) insuring the vehicle; (2) keeping the vehicle roadworthy; (3) installing safety-critical updates; (4) reporting accidents; and (5) removing the vehicle if it causes an obstruction or is left in a prohibited place?

[Respondents chose from the following options: yes; no; other.]

Yes

Yes, the registered keeper should be responsible, but they should also be allowed to contract out parts of these responsibilities. For example, safety inspections of the vehicle, updates and removal of the vehicle. People with disabilities may have varying abilities to perform these tasks but if they are to have equal access to the independence provided by on demand travel from one's own home they will need a way of ensuring daily safety checks and vehicle removal are done, and they may also require assistance with accident reporting and updates depending on how far these can be automated and simplified by the ADSEs.

Consultation Question 19 (Paragraph 5.41): Do you agree that there should be a statutory presumption that the registered keeper is the person who keeps the vehicle?

No

If the registered keeper is the person whose contact details are easiest for the authorities to find, then there may be a case for this being the organization contracted to move the vehicle if it becomes an obstruction or otherwise causes trouble while unattended. The owner might choose to "keep" the vehicle at their own property, or they may choose to "keep" it at the

premises of an organization responsible for daily maintenance and other services, yet still have exclusive use of it, summoning it remotely when required and when its readiness is confirmed.

If the registered keeper remains the owner/main user and they are the first point of contact in case of emergency, then they will need to be contactable and be able to signpost the authorities on promptly to the removal company. If the alternative is used and the removal company are contacted first, then it may be necessary to have a requirement to also inform the owner.

It would also be possible to allow owners to chose whom the first contact should be.

"Keeps" is ambiguous in this environment and perhaps should be made more specific.

Consultation Question 20 (Paragraph 5.42): We seek views on whether: (1) a lessor should be responsible for the obligations listed in Question 18 unless they inform the lessee that the duties have been transferred?

I do NOT think the lease company should necessarily be responsible for insurance, roadworthiness, updates, accidents and removal but they might be a supplier of such services as well as a supplier of the vehicles under lease agreements. A lesee ought to be free to purchase these services wherever they prefer. But contracts for insurance, roadworthniess, updates, accident reporting and removal must be in place before the lease can be concluded. I think it's the lesee's responsibility to ensure these are in place, but that the lease company should not release the vehicle until they have evidence of the lesee's arrangements.

(2) a lessor who is registered as the keeper of a passenger-only vehicle should only be able to transfer the obligations to a lessee who is not a HARPS operator if the duties are clearly explained to the lessee and the lessee signs a statement accepting responsibility?

The lessor should not be able to transfer the vehicle to a less who is not a HARPS operator unless the lessor has copies of the contracts between lesee and suitable providers of the required services. So I think it should be rather more than just a statement accepting responsibility!

I understand some users might want to opt out of subcontracting some of these services - for example, some may want to do the updates themselves and some will be comfortable doing their own daily maintenance. It is important that those who CANNOT do these themselves are not penalised for this in the pricing of these services. But most lessees are not going to want to perform their own recoveries and all will need insurance.

Will consumers require technical help?

Consultation Question 21 (Paragraph 5.47): 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?

Yes

If the "registered keeper" is the person who will have exclusive use of the vehicle and who is not a HARPS operator or an ADSE test organization.

Peer-to-peer lending

Consultation Question 22 (Paragraph 5.53): We welcome views on whether peer-to-peer lending and group arrangements relating to passenger-only vehicles might create any loopholes in our proposed system of regulation.

Yes

Clarification might be required: "for hire or reward" would include peer to peer and sharing - the reward being the ability to benefit from such services oneself. This is what makes it more than usual "social kindness" - only other members of the peer to peer service can use it. But these are not really "businesses" and the term "business" also appears in the regulations. They are not even "side hustles" for many people. This might need to be removed.

Services which the owner or lesee contracts out for maintenance or vehicle removal will need to include use of the vehicle authorised by the owner or lesee.

Protecting consumers from high ongoing costs

Consultation Question 23 (Paragraph 5.60): 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.

Someone needs to have this duty and it needs to be properly funded. Whether it is more efficient to put the money into the trading standards organization, or to give it to the safety scheme seems very much an operational question. Initially it may be that the safety scheme is the better place as they are more likely to understand the technical implications of faults and maintenance and updating requirements.

CHAPTER 6: ACCESSIBILITY

What we want to achieve

Consultation Question 24 (Paragraph 6.11): 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.

1. It will necessary to coordinate finding the needs of people with disabilities nationally, and to work with those specifying equipment for them - doctors, wheelchair manufacturers etc - to gather better information about the technical specifications vehicles must meet than has been done in the past. Someone will have to make considerable effort to accomplish this difficult task. This responsibility may need to be allocated by regulation. The market is unlikely to do it due to the perceived lack of volume in the market.

2. The policy goal of equal transport access for those of common morphology and those with unusual morphologies requires much clearer enforcement. People with common morphologies already have access to private cars. Equality of mobility requires people with unusual morphologies to also have access to the benefits of private cars, NOT just for them to be pushed further towards mass transit! The benefits of private cars - instant access to exclusive use of a vehicle set up just for you which can be used with maximum privacy - does not necessarily mean owning such a vehicle and having it on your driveway. But if walking is a challenge then obviously having the vehicle as near the house as possible is one of the key advantages of private vehicles over mass transit. This is especially so for retaining the independence of older people who may be able to shop etc if they can go by car door to door,

but NOT if they have to walk to a bus stop. There may need to be ways of compensating people for extra costs of eg owning a more expensive vehicle.

3. Privacy-if CCTV becomes a necessary part of ensuring accident reporting and safeguarding in HARPS, all semblance of privacy of travel will be lost for these users. People with disabilities have the same right to privacy as others. They need to be able to choose more anonymous means of transport if they wish.

Core obligations under equality legislation

Consultation Question 25 (Paragraph 6.31): 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?

[Respondents chose from the following options: yes; no; other.]

Yes

Specific accessibility outcomes

Consultation Question 26 (Paragraph 6.106): 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:

(1) Ensuring passengers can board and alight vehicles?

[Respondents chose from the following options: yes; no; other.]

Yes

If maximum effort is to be made to avoid vehicles having to carry a human assistant then considerably more effort will need to be made to understand the specific needs of the full range of actual and potential users. For example, if any HARPS is to be considered as being of potentially more social benefit when used by a person of unusual morphology than a person of common morphology it might be necessary to specify to manufacturers that all such vehicles should be large enough to enter with a wheelchair whether the vehicles are destined for private ownership or not. But it may not be clear exactly what range of sizes, weights and gradient climbing ability wheelchairs have.

If there is to be some kind of standardization, which would be optimal for publicly available HARPS, then some way of developing and annually updating those standards will be needed. The standards will have to be specific enough to be used for engineering - they will have to give exact dimensions, weights, forces and clamp designs for example.

This will require much greater knowledge about the actual needs and equipment use by people of uncommon morphologies. One does not want to impose duties of participation in design exercises or information provision on such people that do not exist for other people, on the other hand, if we don't know we cannot engineer for it!

There will need to be some kind of data collection through the services specifying and supplying wheelchairs and other aids. For example, there may be EMF requirements around cochlear implants or colour requirements around various forms of vision impairment. But there may still need to be detailed data collection from a very large number of actual users. This will

likely need to feed in to working parties and co-design opportunities so that engineers in general can actually begin to understand the problems. There is very much ingenuity and skill available but it can only be harnessed with sufficient information about what people actually need. This must become a clear and central part of vehicle engineering and not merely a nuisance addition to ergonomics, to be ignored wherever possible due to the costs. (NB there are vehicle manufacturers who have recently designed new offices for their own staff which are considerably less accessible than the old offices despite there being vocal user groups within the company - so the level of acceptance of the idea of equality of access for those of unusual morphology is quite low in some of the companies who would like to be at the forefront of autonomous vehicle design.)

There might also need to be standardization of stopping locations, eg the building of ramps taking the pavement to a set height, markings on the pavement or road for lining up wheelchair access or even hoists or other equipment.

The main involvement of regulation needs to be the requirement for good data collection and the need for manufacturers to be actively and fully engaged with the task of designing for universal access rather than attempting to economise by "carryover" existing designs.

(2) Requiring reassurance when there is disruption and accessible information?

[Respondents chose from the following options: yes; no; other.]

Yes

Again, this could be addressed by having a human assistant present but then you might as well stick with a human driver in cost terms.

If this is to be done technologically then:

1. there should be a communication option which will always take one straight through to a human in the control centre - a button accessible to all passengers which advertises its presence in ways everyone can detect.
2. this communication function may need to be available within the vehicle for passengers, but also on the exterior for potential passengers having trouble entering or for any member of the public who has a concern about the vehicle.
3. Audio and video and perhaps even tactile readouts which allow the control centre to communicate traffic speed and accident information in real time would also be important.

(3) Expansion of support at designated points of departure and arrival?

[Respondents chose from the following options: yes; no; other.]

Yes

You can't really have a person at every front door or bus stop. But you could have more support available at known pressure points, for example, hospital arrival areas, doctors' surgeries, airports, railway and bus stations, and perhaps required to be supplied at supermarkets, and shopping centres, gyms and theatres for example.

There might also need to be ways of communicating with the control centre from points on the street - bus stops, or booths for this purpose to allow requests to be made for vehicles without apps on phones, and to discuss late arrivals and no-shows or accidents or near misses.

(Some visually impaired friends of mine years ago were able to make regular commuting use of train services from an unmanned 'halt' because there was an agricultural level crossing with a phone to a manned signal box . They were able to use this phone to request information about the late arrival of trains even though the visual information at the halt - paper timetables - was not accessible to them. But when the manned signal box was replaced by an automated one the train service became much less accessible for them.)

Developing national minimum accessibility standards for HARPS

Consultation Question 27 (Paragraph 6.109): We seek views on whether national minimum standards of accessibility for HARPS should be developed and what such standards should cover.

Yes, they should.

What they should cover needs to be developed by a comprehensive process for working with users, potential users, carers, doctors and equipment manufacturers.

Enforcement mechanisms and feedback loops

Consultation Question 28 (Paragraph 6.124): 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.

[Respondents chose from the following options: yes; no; other.]

No

It would be discriminating if ONLY older and disabled people were reported on!

It would be necessary to collect age, disability status and so on from everyone, perhaps during the booking process.

It might perhaps be preferable to do regular surveys at points of heavy use.

This sort of information would of course be very useful. But the utility of it does not justify singling out particular groups.

CHAPTER 7: REGULATORY TOOLS TO CONTROL CONGESTION AND CRUISING

Traffic regulation orders

Consultation Question 29 (Paragraph 7.23): We seek views on whether the law on traffic regulation orders needs specific changes to respond to the challenges of HARPS.

Clearly a central digitized database needs to be created! Does this technical problem require a law? Specific changes to the law to ensure actual TROs in place are logged on a usable database does seem an essential part of enabling safe operation of HARPS.

The database really only needs to record the results - the TROs which are live at any time.

The information about the progress of the consultation could be held separately.

It might be helpful to be able to more quickly impose temporary or trial TROs in order to experiment with traffic flow as HARPS are introduced.

There is some sense to retaining word based descriptions of locations as well as maps, based on the work of academics such as Oyvind Eide (Centre for Digital Humanities, University of Cologne), especially if a relational database is to be used to connect information.

Regulating use of the kerbside

Consultation Question 30 (Paragraph 7.59): We welcome views on possible barriers to adapting existing parking provisions and charges to deal with the introduction of HARPS.

In particular, should section 112 of the Road Traffic Regulation Act 1984 be amended to expressly allow traffic authorities to take account of a wider range of considerations when setting parking charges for HARPS vehicles?

[Respondents chose from the following options: yes; no; other.]

Yes

Although control of the volume of HARPS circulating by adjusting ratios of road and parking prices is covered, in my opinion, by the existing considerations the newly understood value of the kerbside does probably require revision of the relevant legislation to recognise that kerbside access ought to be more valuable to councils than the use of kerbs for parking and charging.

At present roads are very much designed, and used, with car traffic as the priority. If we genuinely want to move away from private vehicle ownership and use the prioritization system for traffic will need to change. In particular, the flow for bicycles (and mobility 'scooters') ought to be prioritized if these are to be the preferred forms of transport.

At present use of the kerbside for getting on and off HARPS, buses, taxis and cars as well as for unloading goods, never mind vehicle parking, fights with safe and efficient travel for bikes in many places. This is solved in Holland with separate cycle lanes but where space for these is not available more creative solutions may be needed. Bikes and even mobility scooters do NOT need to be at the kerbside - they do not stop and start frequently. But they DO need to be safely out of the way of the traffic. They could go overhead, on raised, covered ways, especially above busy routes.

Vehicle parking needs to be away from the valuable kerbside, but still near dwellings and destinations - much more effort to provide underground and rear of building parking ought to be made. It is very important for the continued independence of older people that they can get from armchair to car within a minimum number of steps-having to walk half a mile to a multistory clearly isn't feasible. But taking a lift (with a seat) to an underground car park might well be.

Many new build housing estates do not have anything like sufficient room for vehicle parking. This will make them very unsuitable for older people unfortunately especially as they often do not have good facilities for parking bikes or mobility scooters either.

While these significant changes to city infrastructure are not going to be enabled by parking charges alone, nor will they help the loss of revenue, they - or equally significant infrastructure changes - will be needed to make active travel and HARPS-type services more attractive to the majority of travelers than cars.

Road pricing

Consultation Question 31 (Paragraph 7.86): We seek views on the appropriate balance between road pricing and parking charges to ensure the successful deployment of HARPS.

There is unlikely to be a single ideal balance. The ratio will need to change dynamically to match traffic and demand conditions. It is easy to imagine a cost-based system which will interact with HARPS optimization software to move the HARPS fleet in a city between areas and functions - having more cruising on the streets late in the evening for example, and getting them to flow out to residential areas ready for the school run and commuting morning and evening, while perhaps sending large numbers back to park in depots (by raising both parking and road prices) at unusually busy traffic times-when traffic is snarled following an accident for example.

Such a system relies on distinctions between use of the road for driving, use of the road for parking, and use of the road for pick ups and drop offs and use of the road for necessary recharging.. There will need to be a robust and open for audit system by which HARPS and the authorities make these distinctions.

Also, care will need to be taken to allow HARPS to recharge or refuel as necessary. For example, a sudden change in parking pricing might cause vehicle to change plans and try to make a long run back to a depot when batteries are already depleted. This could result in an unusually large, and inconvenient, number of stranded vehicles.

BUT the software ASDEs develop to respond to pricing systems will very likely evolve quickly. Such cost-benefit function based behaviour is quite well understood. There may need to be careful thought put into establishing oversight systems to ensure that unexpected effects are not created, and that exploitation of loopholes is rapidly identified. For example, fares may rise if they too are allowed to be dynamic or there may be unexpected effects and interactions especially when charging needs are also involved.

It is likely to be possible to model the behaviour of such a complex system, because much of the behaviour will be controlled by mathematical algorithms. There may need to be requirements on ADSE's to openly share the software functions their vehicle will use in a format which can be plugged into a city-wide model, or which can be inspected (inspection is resource intensive) to understand principles of behaviour for modelling. Such models could be used to trial particular combinations of prices - such an approach, even before HARPS exist, might be a way to understand how they system might respond, and might need to be regulated, if such work is not already in progress.

Consultation Question 32 (Paragraph 7.87): Should transport authorities have new statutory powers to establish road pricing schemes specifically for HARPS?

If so, we welcome views on:

- (1) the procedure for establishing such schemes;
- (2) the permitted purposes of such schemes; and
- (3) what limits should be placed on how the funds are used.

[Respondents chose from the following options: yes; no; other.]

Other

Might not need to be HARPS specific, but instead specific to any type of vehicle capable of responding dynamically - for example, if human driven taxis were in some way able and compelled to respond in a similar way to HARPS they should be able to take advantage of lower prices too, if the prices were indeed lower.

(1) establishment - requirements and effects could be assessed using a model as described in my answer to Q31. Consultation with ADSEs, operators and of course other road users would be needed.

(2) permitted purposes - to control where HARPS are available, to control overall traffic volumes and ratios of HARPS to human-driven vehicles, - to free up kerbspace eg for specific known activities such as rubbish collection, school buses or construction work.

(3) It would seem counter productive to use this for revenue raising as it would be likely to have the effect of either raising fares, disproportionately affecting less well off groups, or reducing the availability of HARPS.

Quantity restrictions

Consultation Question 33 (Paragraph 7.97): 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 for an initial period? If so, how long should the period be?

[Respondents chose from the following options: yes; no; other.]

Yes

Although software can be updated relatively frequently and quickly, especially to fix specific issues, the time taken to develop and test new software concepts and designs is quite long - on the order of 2-4 years. Further, the time needed for the underlying hardware to be upgraded - ECU capacities, new network protocols etc - is presently more like 10 years. So it might actually be quite a long time - 10-20 years - before competition in the market plays out. Thus if such limits were to facilitate competition among ADSEs the limits might need to remain in place for a considerable time - 20 years or so!

The same might apply to operators given that control centres may be high cost and include much protocol based hardware and software that would be difficult to replace or significantly redesign.

Consultation Question 34 (Paragraph 7.120): Do you agree that there should be no powers to impose quality restrictions on the total number of HARPS operating in a given area?

[Respondents chose from the following options: yes; no; other.]

Other

Quality or quantity restrictions?

There may need to be dynamic restrictions on the total numbers operating at any one time.

But I do not see a need to set overall numbers by legislation when a pricing mechanism ought to be able to control this.

CHAPTER 8: INTEGRATING HARPS WITH PUBLIC TRANSPORT

The current system of bus regulation: HARPS as mass transit

Consultation Question 35 (Paragraph 8.92): Do you agree that a HARPS vehicle should only be subject to bus regulation if it:

(1) can transport more than eight passengers at a time and charges separate fares?

[Respondents chose from the following options: yes; no; other.]

Yes

These criteria are reasonable if the aim is to be consistent with existing legislation and business practices.

I am not clear why there has been a need to regulate buses differently to any other form of transport, in particular vehicle transport with fewer seats and different payment methods. London taxis for example are treated more like buses in terms of accessibility requirements. Might it not be that if there were many smaller HARPS in frequent use by the general public, however they were paid for, that requirements for safety, accessibility and reliability of service would become more like that of buses? In other words, the 8 persons distinction is arbitrary, but what are the non-arbitrary reasons why buses and private hire vehicles are treated separately? We should be using these to assess the status of HARPS.

Do they perhaps fall into two categories, internal factors-safety, accessibility, the ingress and egress of multiple people at different times conveniently - and external factors - ensuring reliable service and availability among multiple providers, provision in unprofitable places (profitability being different for large vehicles versus small ones), safety of other road users etc.

(2) does not fall within an exemption applying to group arrangements, school buses, rail replacement bus services, excursions or community groups?

[Respondents chose from the following options: yes; no; other.]

Yes

Consultation Question 36 (Paragraph 8.94): 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.

HAPRS might be more capable of following flexible routing than current buses (though no doubt the same route planning software could also be applied to human-driven vehicles). This could be quite a benefit for encouraging people to use the services. If it is beneficial in emissions and congestion terms then it might become necessary to review the legislation to ensure that such flexible services are also required to be accessible and meet the other criteria for bus services. It would be a problematic issue if bus regulation reduced the scope for flexible routing.

Consultation Question 37 (Paragraph 8.95): We welcome views on whether a HARPS vehicle should only be treated as a local bus service if it:

- (1) runs a route with at least two fixed points; and/or
- (2) runs with some degree of regularity.

Not necessarily-it depends again on what the non-arbitrary criteria are that underlie why bus regulation differs to private hire legislation. If, for example, one of the main criteria is ensuring that any passenger can board or alight conveniently at any stop, then the flexibility of the route and the regularity of the service would be irrelevant.

On the other hand, one of the great advantages of private car ownership and exclusive use is not needing to plan when a journey can start and not depending on others (congestion aside) for the duration of the journey. Mass transit with very high frequencies comes close to approaching this ideal for alleviating the planning task but the frequency and regularity are extremely important. If this level of service is what defines a bus and is also the level expected of HARPS, then the regularity of the intended service would be a criteria for deciding whether the HARPS should be subject to bus regulation-and penalties- controlling punctuality.

Understanding what the actual topics which need regulating are in this context, rather than merely whether existing legislation applies would be a useful next step.

Consultation Question 38 (Paragraph 8.109): 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.

Ticketing needs to be very, very simple for users if public transport rather than private vehicle ownership is to have sufficient penetration to reduce private vehicle ownership and use. Achieving this simplicity for users is likely to increase complexity for suppliers and regulators. But the importance of ticketing simplicity would seem to me to justify the ability to require companies to participate in ticketing schemes, thus reducing the direct influence of the market in setting prices.

Although low prices are important, it is the ease of observing how ticketing works and where to get one which can make the decision between mass transit and other travel forms, especially for visitors to a location and older people. Ticketing needs to be available in proximity to the vehicles as the vehicles are the visible part of the system: "That looks handy, I'll get on it," needs to NOT be interrupted by "But first I have to google where to buy a ticket...might as well call a cab,". On board and at stop machines are a good combination. For season ticket purchasers the system can be more complex. Achieving this simplicity while also extracting the benefits of flexible pricing will require high levels of coordination between transport authorities and HARPS operators. Therefore statutory schemes encouraging this are likely to be required and justified.

Consultation Question 39: Is there any other issue within our terms of reference which we should be considering in the course of this review?

You might want to consider whether some standardised way of making the vehicles safe for towing and removal is required.