102200 GATEway

Trial 1: Deployment of a micro-transit vehicle in a real-world environment

K. Fernández-Medina, E. Delmonte, R. Jenkins, A. Holcombe, N. Kinnear

Report details

Report prepared for:	Innovate UK
Project/customer reference:	102200 GATEway
Copyright:	© TRL Limited
Report date:	27 April 2018
Report status/version:	1.0
Quality approval:	

Author	*Kristen Fernández-Medina*	Technical Reviewer	*Neale Kinnear*

Disclaimer

Contents amendment record

This report has been amended and issued as follows:

Version	Date	Description	Editor	Technical Reviewer
1.0	27/04/2018	Final report	KFM	NK

Document last saved on:	27/04/2018 17:06
Document last saved by:	Neale Kinnear

Table of Contents

Executive Summary

With the expected development towards increased vehicle automation, research is required to enable the effective deployment of automated vehicles (AVs). The GATEway public trials provided a unique opportunity for members of the public to engage with an open service-like trial in a real-world environment. Over four weeks, people were able to 'walk up' to take rides on one of four shared driverless vehicles and provide feedback of their experience. They were also able to engage more widely in the discussion surrounding the future deployment of such services and ownership models via online surveys. This report provides a detailed account of the trial activities and focuses on the results of a follow-up survey undertaken by TRL with passengers.

Method

A 15-20 minute survey was sent to pod passengers. The survey included questions relating primarily to passengers direct experience of the driverless pod, safety, willingness to pay and future ownership models.

Results

The findings suggest that most survey respondents felt safe and were satisfied with their driverless pod journey. There is evidence that participants would be willing to use this type of service and would be willing to pay an average of around £2 for the journey (comparable to a similar journey on current public transport).

The data also provided some evidence that there are key concerns regarding the technology readiness; this may be an indication that there is still some way to go to build public confidence in the technology's ability to deliver on the intended benefits.

Overall, the public trial activities showed that the public had willingness to engage with the research. This is important as it will be necessary to engage all segments of the population in the future deployment of driverless vehicles.

Implications of the findings

Overall, the public trial activities and the data from the survey undertaken with members of the public have highlighted some of the issues already being widely discussed by industry (e.g. safety). They have also started to build an evidence base to support more in-depth questions about the factors that may impact public perceptions and, ultimately, uptake. By placing the end-user at the centre of the development process, the GATEway project has contributed to the understanding of some key questions and emerging evidence can be used to reassure the public and enhance public acceptance. Although the evidence collected throughout the project's lifecycle indicates that acceptance (or at least openness to experience this technology) is already high, it will be important to design vehicles and services that fit in with people's lifestyles and travel needs.

1 Introduction

As we move toward increased vehicle automation, research is required to enable the effective deployment of automated vehicles (AVs). This deployment should occur within an environment built on robust safety standards, legislation and social acceptance. With a focus on the people who will use these vehicles (and the services the vehicles are likely to provide), GATEway provided a unique opportunity to engage members of the public in the early stages of the development and deployment of automated technology. This evidence collated will help to shape the national agenda for future transport and to provide the foundation for the development of new legislation, regulation and research.

1.1 An emerging technology

The last few years have seen increased interest in, and exposure to, AVs around the world. From standard 'family' vehicles, to multi-passenger services operating in public spaces and driverless delivery vehicles, countries around the world are embracing this emerging technology and supporting national industry in the development of new capabilities.

As well as boosting industry, driverless vehicles are expected to bring multiple social benefits. Among these, and perhaps the most widely accepted, is the potential to improve road safety and reduce the number of people killed and seriously injured on our roads. According to early work by Sabey and Taylor (1980), based on data from the USA and the UK, it was estimated that human error was at least partially to blame in over 90% of all collisions. Although data collection processes (particularly in relation to contributory factors in collisions) has changed greatly since 1980, it is still widely accepted that human error plays an important role in collision causation. Thus, it would be expected that by removing this source of error as a result of increased vehicle automation, an important safety benefit could be achieved.

There are many other potential benefits that the wide-spread adoption of AVs can deliver. From reducing the need to own a private vehicle in cities (as users move to more cost-effective options, such as shared vehicles or mobility services), reclaiming and redesigning public spaces, to improving mobility and accessibility, it is clear that AVs can bring economic, social and personal opportunities.

However, these benefits can only be realised if those who are expected to benefit from it choose to engage with the technology. When it comes to AVs, previous research suggests that public trust and acceptance may be important barriers to uptake. For example, research by Schoettle and Sivak (2014) with a sample of over 1,500 respondents from three countries (USA, UK and Australia) showed that although at least half of respondents from each country were positive about self-driving vehicles, they still reported high levels of concern about riding in self-driving vehicles, safety and security issues, as well as self-driving vehicles not performing as well as human-driven vehicles. Payre and colleagues undertook research with a sample of around 400 drivers in France and found that about 68% of respondents reported they would accept fully driverless vehicles; however, the intention to use AVs was linked to particular use cases. For example, participants were more likely to view fully driverless vehicles more positively in situations where driving was believed to be monotonous (highways) or stressful. Qualitative data (although based on a smaller sample) highlighted areas of concern such as the deployment of AVs in built-up areas (Payre, Cestac & Delhomme, 2014). It is important to note that both these research studies were based on descriptions of automated technology, rather than a direct experience.

One way to help support the introduction of driverless vehicles is by involving members of the public in early trials of these vehicles and the services they may offer. Not only does this provide an opportunity to design vehicles and systems that work for the end user, but it can also be a tool for building trust in the technology.

Increased vehicle automation needs to take into consideration the end user and work to create more efficient and reliable transport solutions that people will want to use. Involving members of the public in the development and deployment process will be crucial to achieving this.

1.2 The GATEway public trials

GATEway was an £8 million research and development project partly funded by government (Innovate UK) and industry. The project sought to develop multiple use cases for autonomy and facilitate opportunities for members of the public to engage with this technology.

As one of the first large-scale AV projects in the UK GATEway and, specifically the public trials, sought to:

- Involve members of the public in the development and deployment process of AVs in public spaces in order to gather feedback on their perceptions, experiences, hopes and fears relating to this emerging technology
- Further develop and refine the project safety case with real-world data and thus apply any learning to other, concurrent, vehicle trials
- Provide vehicle platform and autonomous control system (ACS)[1] providers with an opportunity to implement a service vehicle in a challenging, mixed-use environment, allowing project partners to learn and refine their systems and operations, and therefore improve their commercial offering
- Explore important questions relating to future deployment of last-mile[2] vehicle services, including willingness to pay, feasibility and public acceptance
- Build on previous research and develop evidence of perceived benefits and challenges of the deployment of AVs in cities

1.3 A team of experts

TRL has a long history of transport innovation and was therefore well placed to lead a consortium of industry and academy experts to deliver an industry-leading trial of AVs in a real-world environment.

The team comprised of experts, such as the University of Greenwich (UoG), Commonplace and TRL, seeking to develop innovative research into different aspects of AV use. The UoG focused on the impact of automated vehicles on pedestrian activity and perceptions in shared spaces, while

[1] Also known as the automated driving system (ADS) according to the SAE taxonomy. This is the overarching term used to describe the systems that perform all or part of the dynamic driving task.

[2] In this context, 'last-mile' refers to transport making connections at the start or end of a journey, for example between existing transport hubs and work or home.

Commonplace employed a social research platform ('sentiment mapping') to understand the importance of the urban context in people's perceptions of automated vehicles.

The vehicles were developed by Westfield Sportscars (WSC, vehicle integrators) and Fusion Processing (providers of CAVstar®, the autonomous control system used in the trial vehicles). The RSA insured the vehicles for trial, and worked alongside TRL risk experts to develop comprehensive guidance for the training and insurance of vehicle safety stewards (or 'test drivers', as per the DfT Code of Practice).

TRL has also developed an industry-leading safety case for the deployment of AV trials. The safety case provided a robust basis for the development of safety-critical materials, route selection, staff management and training, and for ensuring the safe delivery of vehicle trials in a public environment.

1.4 Greenwich as a centre for innovation

The Royal Borough of Greenwich is a global reference point for time and navigation and is pursuing an ambitious smart city agenda to apply advanced technologies, improving services for its residents, visitors and businesses. The Borough is seeing rapid expansion which is creating pressure on services and infrastructure and the progressive council is committed to smart city innovation and understanding how advances in technology and data analytics can be harnessed to support the Borough's objectives.

Greenwich also hosts the Smart Mobility Living Lab: London, a real-world urban test bed for the demonstration and evaluation of technical and business solutions for the development of smart mobility solutions.

1.5 This document

This document provides an overview of the GATEway public trials of shared, low-speed automated pods in a public space. The focus of the report is on the findings from a survey undertaken with pod passengers by TRL.

Research undertaken by other partners during the trial activities will be detailed elsewhere, and will be referred to within this document where relevant.

2 Method

2.1 Preparing for public trials

2.1.1 Developing passenger vehicles

The vehicle platform was provided by WSC, in consortium with Heathrow Enterprises Limited. The design of the vehicles is based on shuttles currently in service at Heathrow Terminal 5, which has been redeveloped to allow the vehicles to operate automatically at SAE Level 4[3], using an electronic mapping guidance system (Figure 1).

The autonomous control system (ACS) was designed by Fusion Processing Limited and forms part of the integrated vehicle. The system uses CAVStar® and comprises complimentary sensor technologies such as radar and camera.

Figure 1. Heathrow pod (left) and WSC pod (right)

A total of four trial pods were used throughout the trials. Each pod could carry a maximum of four adults (including the safety steward). For passengers travelling with children, up to three adults and two children were allowed on board at any one time. Passengers under the age of 18 had to be accompanied by an adult.

[3] The Society of Automotive Engineers (SAE) has developed recommended practice and taxonomy describing the full range of levels of driving automation for on-road vehicles. They have published a set of definitions for six levels of vehicle automation, from level '0' (No automation) to level '5' (full automation). These supersede the levels defined by the National Highway Traffic Safety Administration (NHTSA). Level 4 is where the vehicle's driving automation system is designed to function within an operational design domain (ODD); that is, the vehicle is capable of performing autonomously under certain conditions such as geographic, traffic and/or speed limitations.

The pods were fully accessible for wheelchair users and a ramp was placed at each pod stop to allow easy boarding and alighting for members of the public on wheelchairs.

The four trial pods covered around 2,299 miles of the Greenwich Peninsula during testing and the trial activities.

Further details about the trial vehicle development and deployment can be found in Appendix 6A.

2.1.2 Developing a framework for safety

Safety was the primary focus of the development of the trials. Throughout the GATEway project, TRL developed an industry-leading comprehensive safety case for the testing of automated vehicles (AVs[4]) in the UK. The safety procedures that were developed and implemented for the purpose of the public trials were based on evidence contained within the safety case; evidence from the testing of trial vehicles and lessons learned from trial days were also used to feed into the safety case and further TRL's knowledge and expertise in this area.

Further details of the development and deployment of the safety case can be found in Deliverable D2.2 (GATEway safety and insurance: insuring safety for autonomous vehicle trials).

2.1.3 Selecting an appropriate route

An important part of deploying trials in a real-world environment was to select a trial route that could provide a complex enough environment to enable knowledge acquisition by industry (e.g. vehicle platform and ACS system providers) and provide a context where last-mile type services could realistically be deployed.

The Thames Path on the Greenwich Peninsula was selected based on the route providing the following elements:

- A complex environment where interactions with pedestrians and cyclists could be explored
- The potential for sampling a wide range of different transport users including tourists, leisure users, students, business users and commuters
- The potential to connect existing transport hubs and align with the concept of 'connected cities', for example by linking the Clipper and tube service with residences and businesses in the Millennium Village
- Offer operational benefits, such as the availability of storage and charging facilities for shuttles at one site (i.e. the InterContinental Hotel O2)

The route included four designated pod stops featuring existing transport hubs in the local area (Figure 2).

[4] This is the general term used to refer to vehicles with driverless capabilities, generally SAE Levels 4 and 5.

Figure 2. Trial route map

2.1.4 Ethical considerations

As with any research involving human participants, the trials were subject to ethical approval by the TRL ethics panel. The panel is chaired by the Academy Director and is made up of experts in different subject areas with research ethics training. The aim of the panel is to consider the research in light of research ethics best practice, including discussion of any risks to members of the public from participation in the trials, as well as ensuring that the risks do not outweigh the benefits of carrying out the work proposed. Part of this is to ensure all possible mitigations have been implemented to reduce risk to safety and ensure data protection policies are upheld.

One of the main ethical considerations for trials involving automated technology relates to the safety of systems that use machine learning algorithms, such as those present in the ACS. This was an issue that was new to the GATEway project and a central question raised by the ethics committee.

All vehicles were subject to stringent safety testing, prior to being used on the route with members of the public. This process involved understanding the vehicle behaviours in detail, its safe operating boundaries (for example, stopping distances) and testing fail-safe systems to ensure appropriate functioning. The testing considered the pod performance over several days and runs to establish a specific set of expected behaviours and range of functionality.

An important consideration was whether the vehicles' machine learning algorithms would allow it to 'learn' new behaviours as trials progressed, thus significantly changing any of the boundaries tested and accepted. Consultation with Fusion Processing revealed that the vehicles would not be allowed to 'learn' any new behaviours outside of the pre-established boundaries of operation and expected behaviours.

The pods' behaviour was also consistently monitored throughout the project and any inconsistencies or deviations from what was expected were reported to the ACS provider, through the on-site trial manager. Safety was at all times overseen by the stewards and marshals, described further in section 2.2.

2.2 Running a large-scale public trial

2.2.1 Dedicated trial team

As part of the trial preparation activities, key roles and responsibilities for trials were identified and staff were trained to fulfil these roles.

On all trial days, the team consisted of at least ten members of staff fulfilling the following roles:

- Trial manager
- Safety stewards
- Pod stop marshals
- Roving marshal
- Vehicle support
- Systems support

The trial manager was the single point of contact for any emergency situation. The members of staff who fulfilled this role were all experienced trial managers, with an in-depth understanding of emergency procedures, scheduling and team management.

The safety stewards (or 'test drivers', as per the DfT Code of Practice) were responsible for operating the pods and were provided with additional training relating to the pod operation, safety, operating boundaries and manual operation.

Details of the training procedure can be found in Appendix 6B.

2.2.2 Daily safety checks

Among the daily tasks for staff were the vehicle and route checks. WSC, as the vehicle integrator, were responsible for managing the condition of vehicles and supporting TRL in undertaking vehicle checks.

On the day of the trials, safety stewards were assigned a pod on which to carry out a 26-point check on the vehicle functioning and record the vehicle condition. At the end of the day, stewards were also responsible for undertaking the same checks, prior to pods being stored. WSC took oversight of the vehicle checks.

A team member also undertook a daily route assessment. This was to ensure the route was clear from any major hazards, obstacles and/or to check the ongoing condition of route signage (including pod stops and lane markings). During cold weather conditions, the route assessment also allowed the identification of ice and slip hazards prior to pods being put on the route.

All checks were logged and submitted to the trial manager on shift.

2.2.3 Trial schedule

Up to four pods were available for use on trial days. The trial manager worked with WSC and Fusion Processing every morning to assess the number of pods that would be put into service, depending on bookings and availability of pods.

The trials team arrived at the Greenwich peninsula for a morning briefing at 9am; trial days ended with a 'wash-up' meeting to review the day's activities, log any lessons learned, and report the outcome of activities to the wider project team. Table 1 provides an overview of the basic daily schedule.

Table 1. Trials daily schedule

Pre 9:00	WSC arrival and initial vehicle checks
9:00	Trial staff arrival and morning briefing
9:30 – 10:15	Safety steward vehicle checks and trial route assessment
10:30 – 14:00	Up to 4x pods running at 15 – 30 minute intervals
14:00 – 15:15	Staff break
15:15 - 16:30	Up to 4x pods running at 15 minute intervals
16:30 – 17:30	Final runs, wrap up and closedown checks
17:30 – 18:15	Daily wash-up meeting

2.2.4 Involving members of the public

One of the main objectives of the GATEway public trials was to provide open service-like operations where members of the public would be free to 'walk up' to the pod stops and use the service. This ensured that the project was engaging different groups of users instead of being limited to only including groups with a particular interest in the technology.

The three main participant groups were as follows:

- Participants who signed up in advance to receive information about GATEway and to participate in shuttle trials
- 'Walk up' participants who were in the area and were interested in trying the shuttle as part of their journey
- Participants from the local area who saw publicity about the shuttles and wished to experience them

Participants who had signed up in advance were given special access by allowing bookable time slots. This allowed the project team to engage members of the public who had been following the GATEway project; it also helped ensure a constant footfall, regardless of weather conditions or other factors that could limit participation in the trials day-to-day.

At the end of the trials, around 320 members of the public had taken a ride in one of the GATEway driverless shuttles.

2.2.5 Experiencing the trial route

Figure 3 provides information about the pod stops and the links these provided to members of the public. A marshal was positioned at each of the four pod stops to provide information to passers-by and trial participants.

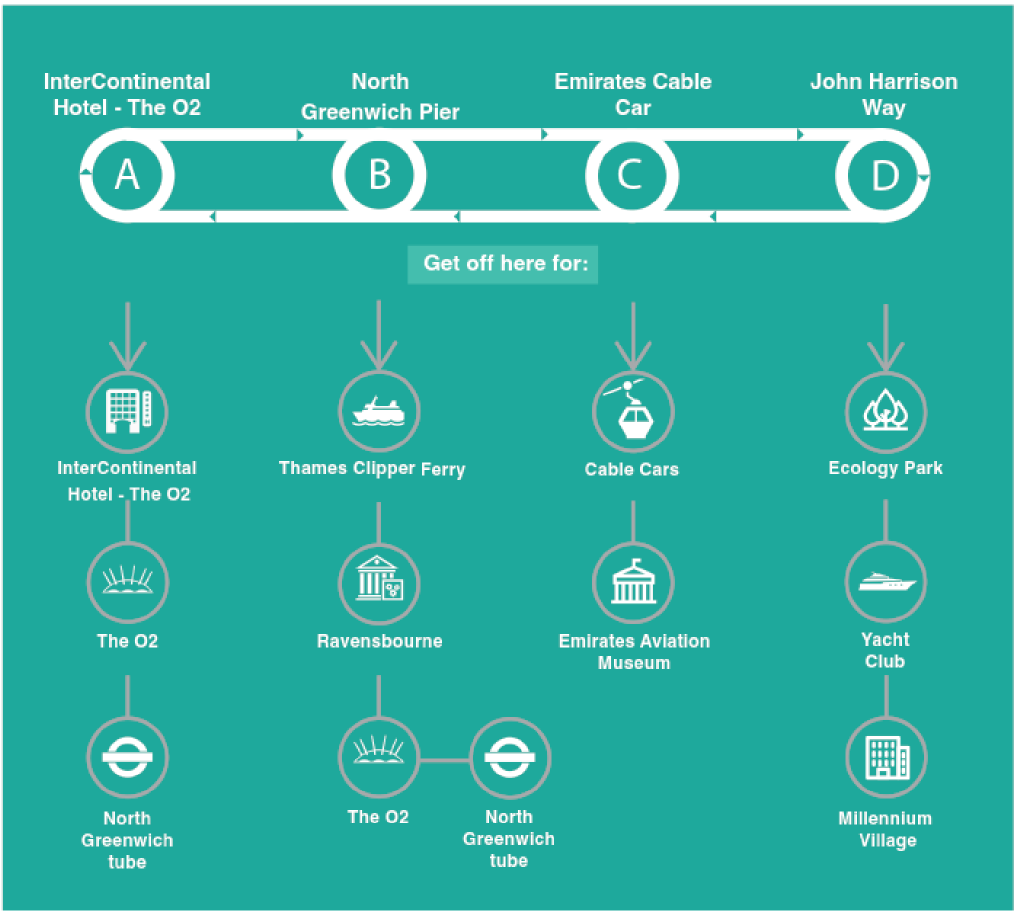

Figure 3. Route stop map

Completing a full loop of the route took approximately 40 minutes. Booked participants were always asked to arrive at the InterContinental Hotel (Stop A).

Participants were generally able to board and alight at any of the designated pod stops, though participants boarding at the ICH stop were encouraged to alight no later than John Harrison Way in order to allow access to other members of the public (and thus increase availability of pods).

Estimated journey times were as follows:

- From InterContinental hotel (Stop A) to North Greenwich Pier (Stop B) – 10 minutes
- From North Greenwich Pier (Stop B) to the Emirate cable car (Stop C) – 5 minutes
- From Emirates cable car (Stop C) to John Harrison Way (Stop D) – 7 minutes

The route would take slightly longer depending on whether participants desired to alight at any of the stops along the route.

2.3 Exploring public experiences and perceptions

The public trials provided the opportunity to engage with the participants using different research methods.

- Observation and survey of pedestrian interactions (UoG)
- Online mapping of public perceptions within the urban context (Commonplace)
- Survey of participant journey experience (TRL)

The focus of this document is on the survey research undertaken by TRL. A short summary of the research by the University of Greenwich (UoG) and Commonplace is provided below and is reported in full elsewhere. The pedestrian interactions research (UoG) is detailed in Deliverable D5.5 (Perceptions of, and behaviours around, driverless vehicles). More information about the sentiment mapping undertaken by Commonplace can be found in Deliverable D3.6 (Sentiment mapping analysis).

2.3.1 Observation and survey of pedestrian interactions (UoG)

UoG's research focused on pedestrians' perceptions of and interactions with AVs. The university was also interested in comparing perceptions and interactions of different groups, and as such some data was also collected from trial pod passengers.

During the trials, UoG collected data in two ways:

- An online questionnaire survey examining Trial 1 self-reported perceptions of and interactions with the pods
- An observational study of interactions with the pods

The survey was advertised via email and academic electronic notification systems to various groups, including a subset of pod passengers (Week 1 of trials), all UoG staff and students, several local businesses, and local special interest groups (e.g. cycling, jogging).

2.3.2 Online mapping of public perceptions within the urban context (Commonplace)

Commonplace has been collecting data using an online platform called 'sentiment mapping' (Figure 4). The data collection process has preceded the public trial activities and has helped to develop a baseline of responses throughout the lifecycle of the GATEway project.

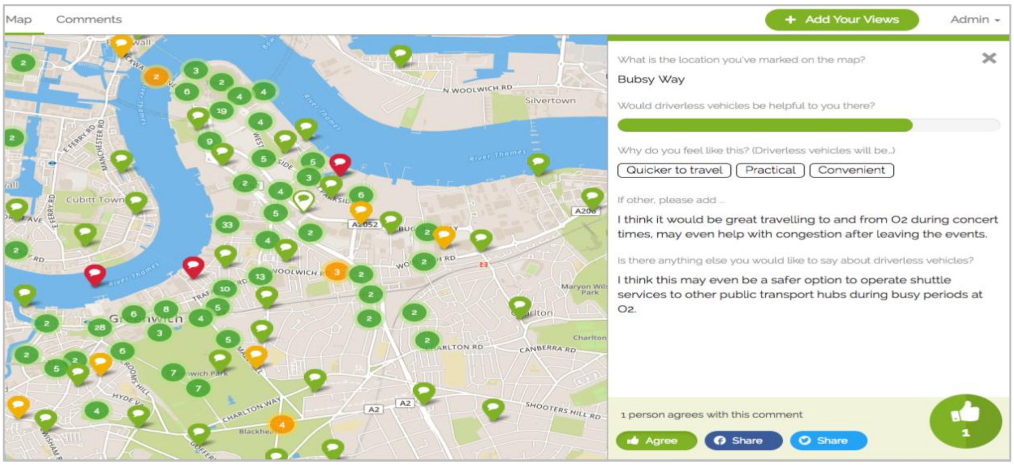

Figure 4. Sentiment mapping

During the public trials, Commonplace collected data in two ways:

- Through a QR code available on pods and pod stops linking trial participants and other path users to a short survey assessing their immediate experience of the pod
- Through the online sentiment map

2.3.3 Survey of participant journey experience (TRL)

TRL's research focused on the public perceptions relating to AVs from vehicle passengers. As such, a short survey was developed and deployed with trial vehicle passengers.

2.3.3.1 Aim

The aim of the survey was to gather evidence of the public's perceptions as passengers of a shared, last-mile service driverless vehicle (i.e. the GATEway trial).

The data collected sought to develop an evidence base to support the future deployment of AVs in an urban environment and to help further the understanding of how members of the public believe these vehicles (and the services they may provide) fit with their travel needs.

2.3.3.2 Materials

The survey was developed based on three key sources:

- Early consultation with research partners to understand overarching research questions
- Qualitative findings from the first public trials undertaken in April 2017 with the prototype vehicle, 'Harry'[5]
- Previous research looking into likely public acceptance and uptake, but caveated by the lack of a direct experience of the technology

[5] Results from this initial work can be found in Deliverable D3.7 (Public perceptions of a last-mile driverless shuttle)

The qualitative outputs from the first public trials provided the evidence-base to develop survey categories and responses that would help capture participants' experiences more concisely. The survey included questions relating to:

- Trial vehicle experience and immediate feelings of safety and journey satisfaction
- Future mobility and vehicle ownership models
- Safety and related factors
- Willingness to pay for the journey
- Participant demographics

The result was a 15-20 minute survey which was hosted on the online platform, SmartSurvey. The survey included a mix of questions with responses on Likert-type scales, multiple and single choice, and open text boxes.

The full survey can be found in Appendix 6C.

2.3.3.3 Procedure

Upon arrival, and before boarding one of the pods, participants were asked to provide their contact details (e.g. email address) to the pod stop marshal. The contact details were collected on a tablet during the trial and then later extracted from a shared MailChimp account, and transferred into an encrypted file. Participants who provided their email address were entered into a weekly prize draw for a £100 Amazon voucher. A random generator was used to select a winner.

In the first week of public trials, a survey from the University of Greenwich was distributed to passengers to capture views on interactions with path users (see section 2.3.1). For the remainder of the trial, passengers that gave their contact details were sent TRL's journey experience survey.

There was a weekly schedule for sending out the surveys to participants. Passengers that took a ride in the pods and gave their emails on a Monday, Tuesday or Wednesday would be sent the survey on the Wednesday afternoon, and then a reminder email on the Friday of that same week. Passengers that rode the pods and gave their emails on a Thursday or Friday would be sent the survey on a Friday afternoon, and a reminder the following Wednesday.

Four days before the survey closed, a final reminder was sent to all participants to provide a final opportunity to give feedback on their journey.

2.3.3.4 Analysis

Survey data was exported from SmartSurvey to Excel, where it was checked and cleaned prior to analysis. Data cleansing procedures included:

- Calculating the median time taken to complete a survey and removing any respondents who completed it in less than 30% of the median time (and therefore were not likely to have read or answered the questions appropriately)
- Removing any irrelevant qualitative responses
- Re-coding variables to be suitable for analysis

The quantitative data was then analysed using descriptive statistics. The open text responses have been analysed using a brief form of thematic analysis, which has identified key themes emerging from participants responses.

3 Results

3.1 Passengers

A total of 118 individuals took part in TRL's journey experience survey. This represents around a 35% response rate from the ~320 passengers who took a journey on the pods. This aligns with reports of average response rates for online surveys (Nulty, 2008).

A summary of the sample can be described as follows (see also Figure 5):

- More males than females responded to the survey; of the 117 respondents that specified their gender, 64% were male.
- The majority of respondents (47%) were aged between 25 and 44 years. No respondents were aged under 18 or over 75 years. Five percent of respondents were aged 24 years or under.
- The majority of respondents currently hold a driver's licence (88%) and of these, 78% currently own a car.
- Most respondents resided in London, although there were respondents from other parts of the UK.
- Around a quarter of respondents (24%) stated that they have a professional interest in driverless vehicles.
- Four respondents stated that they had a disability or additional travel need.

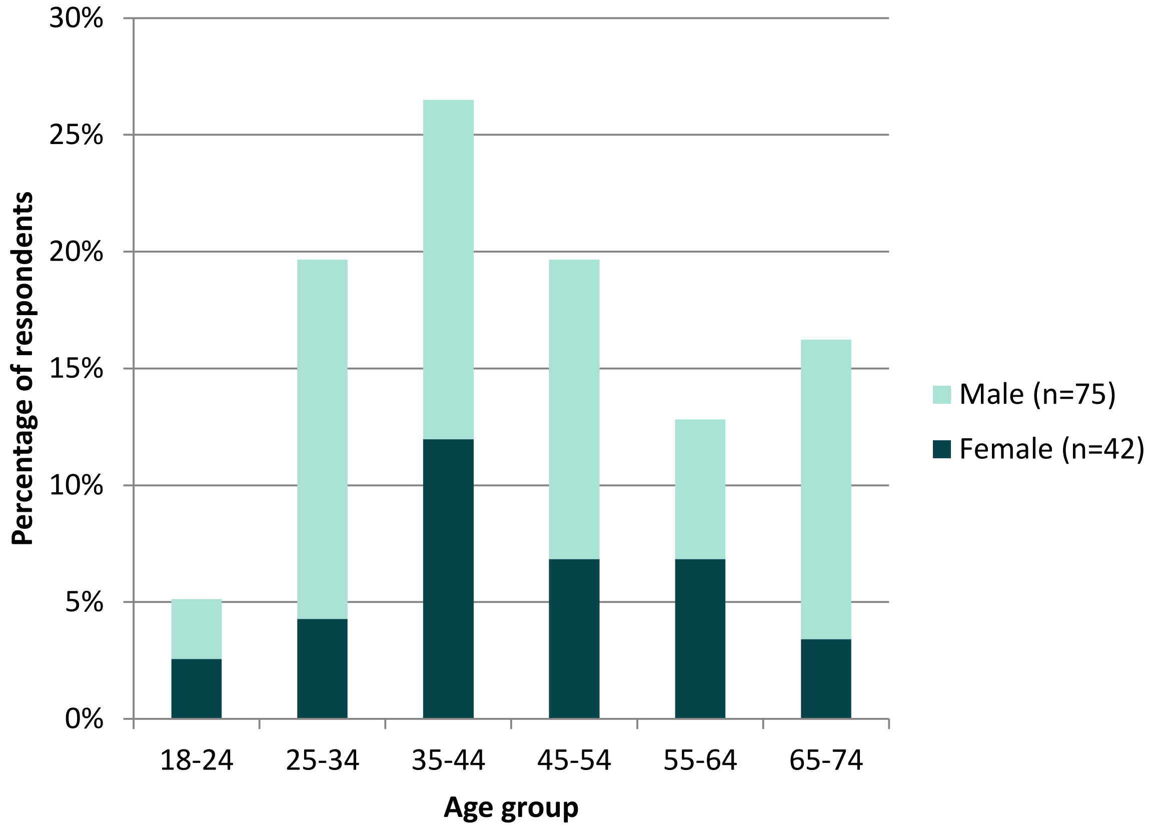

Figure 5. Age group and gender of respondents (n=117; 1 respondent did not specify gender)

3.2 How passengers accessed the pods

The majority of respondents (58%) stated that they 'just turned up' (this category includes both individuals passing by the pods, and those who knew about the trial ahead of time and came by intentionally but had not pre-booked online) while 31% pre-booked online. The remaining 11% were invited to take part by their organisation or an organisation they work with.

The majority of respondents (39%) were in North Greenwich for the sole purpose of taking part in the trial. Nineteen percent were tourists in the area, 20% were there for social or recreational reasons, 19% work there or were there for work/study purposes and 3% live there.

3.3 Passengers' experience on trial pods

Journeys took place on weekdays between 5th March and 29th March 2018. The majority of journeys (35%) took place on a Wednesday, followed by Thursday (23%), Friday (16%), Monday (14%) and Tuesday (12%).

The majority of respondents (58%) reported waiting for up to 6 minutes before starting their journey on the pod. Just over a quarter (26%) waited for 7-15 minutes and the remaining 15% waited for 16 minutes or more[6].

Most respondents boarded at stop A (64%) followed by stop C (15%), B (11%) and D (10%). Similarly, most respondents alighted at stop A (47%) followed by stop C (25%), stop B (21%) and D (6%).

The majority of respondents reported spending between 21 and 30 minutes on the pod (43%). Twenty-six percent stated their journey was between 6 and 10 minutes, and 22% between 11 and 20 minutes. The remaining 8% reported a journey length of less than five minutes.

Around a third (36%) of respondents did not travel with friends or family. Almost two-thirds (59%) travelled with one or more adults and no children, 4% travelled with one or more children or both adults and children.

All respondents bar one reported that it was daylight during their journey (one reported that it was twilight). Weather conditions were generally reported to be sunny/partly sunny (46%) or cloudy but dry (41%), 13% reported light rain and 1% reported heavy rain.

3.4 General perceptions of driverless vehicles

Overall, respondents reported currently feeling quite (42%) or very (32%) positive about driverless vehicles. A small percentage of respondents felt very (3%) or quite negative (8%) about them, and the remaining 14% felt neutral.

Respondents generally have some trust in current driverless technology. Three quarters reported having trust to some extent (31%) or a moderate extent (43%). Seven percent reported having no trust, 16% 'to a small extent' and 3% had complete trust.

---

[6] Please note that due to rounding not all proportions add to 100%

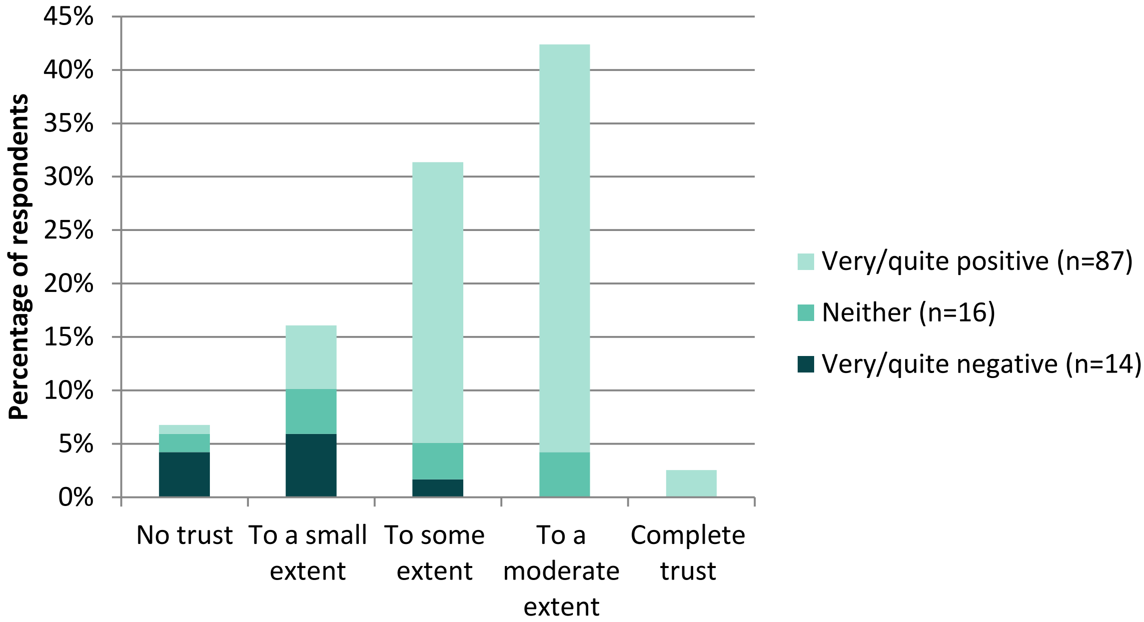

Figure 6. Trust in driverless technology and current feelings about driverless vehicles

As shown in Figure 6, respondents with a greater level of trust in driverless technology tended to have more positive feelings about driverless vehicles.

Trust in *future* technology was greater than trust in *current* technology, with over half (53%) stating that they have complete trust in the technology to be developed in the future. Fourteen percent had trust to a small or some extent, while 33% had trust in future technology to a moderate extent. None of the respondents stated that they had no trust in future driverless technology.

Comparing levels of trust in current and future technology, 81% of respondents had a greater level of trust in future technology than current technology (18% had the same level of trust, and one respondent (1%) reported having a lower level of trust in future technology than current technology).

3.5 Journey satisfaction

Around three quarters of respondents were quite (41%) or very (32%) satisfied with their overall journey experience on the driverless pod, as shown in Figure 7. One respondent (1%) was very dissatisfied and 8% were quite dissatisfied. The remaining 19% were neither satisfied nor dissatisfied.

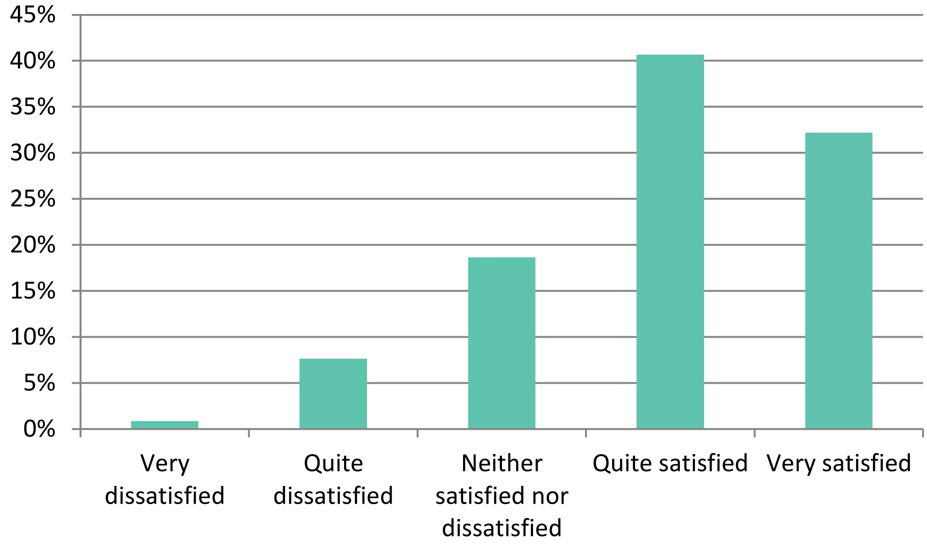

Figure 7. Satisfaction with overall journey experience (n=118)

Most respondents were quite (21%) or very (47%) satisfied with the waiting time before boarding the pod. Twenty five percent were neither satisfied nor dissatisfied, and the remainder were quite (4%) or very (3%) dissatisfied. Of those that were quite or very dissatisfied (n=8), two waited up to 6 minutes, two waited 7-15 minutes and four waited over 15 minutes.

3.6 Feelings of safety

3.6.1 Feelings of safety during the journey

The vast majority of respondents felt quite safe (45%) or very safe (41%) during their pod journey. Seven percent felt quite unsafe and one respondent (1%) felt very unsafe. The remaining 7% felt neither safe nor unsafe.

Respondents were asked to describe any features of their journey which influenced their feelings of safety. Features which either positively or negatively impacted on how safe they felt were identified, including:

- **Speed of the vehicle** – many respondents reported that the speed that the pod travelled at made them feel safe.

  "It's hard not to feel safe when you're only going a couple of metres per second." Male, 25-34

- **The presence of a safety steward** – respondents appeared to feel reassured that there was someone on-board who could manually control the pod if necessary.

  "There was a person at the controls in case anything went wrong." Male, 35-44

- **Confidence in the technology** – some respondents suggested that they felt safe because they trusted the technology. Particular features of the technology that were mentioned included the effectiveness of the sensors and the pod's ability to detect certain objects and avoid them or stop when necessary:

"The pod stopped appropriately when pedestrians and cyclists were in proximity." Male, 45-54

- **'Erratic' vehicle movements** – the feature of the pod most commonly cited as having a negative impact on respondents' feelings of safety was the movement of the pod. Several respondents described the pod as being erratic, jolting, and the experience feeling bumpy as a result of it braking and manoeuvring around obstacles.

  "The pod felt very erratic. It lurched left and right to avoid obstacles and the brakes were quite forceful, it wasn't a smooth ride at all." Male, 35-44

- **Near misses and incidents** – Several participants reported that during their pod experience, the pod either narrowly avoided making contact with, or scraped, street furniture (such as bollards or sign-posts) along the route.

  "There were a few moments when the pod went very close to a hedge, and a low brick wall." Female, 45-54

  Respondents also described a number of situations where the safety steward had to intervene in order to prevent an incident from arising.

  "The safety steward had to take control several times – not to avoid people but to avoid stationary objects…" Male, 35-44

  "The pod came head to head with another pod and neither would give way, one of the pods had to be manually manoeuvred." Male, 45-54

3.6.2 Effect of journey features on feelings of safety

Respondents were asked how important the following features would be in relation to feeling safe on board a vehicle like the one they experienced:

- an on-board attendant
- the presence of CCTV
- not sharing the vehicle with strangers
- having a registration process for booking a journey

The presence of CCTV was perceived to be the most important feature in relation to feelings of safety; 83% felt that this was quite (42%) or very (41%) important. The presence of an on-board attendant was perceived to be important by over half of respondents (39% 'quite important' and 14% 'very important'). Just under half of respondents felt that a registration process for booking a journey on a vehicle was quite (31%) or very (17%) important. Not sharing the ride/vehicle with strangers was perceived to be the least important feature, with 32% feeling this was quite (23%) or very (9%) important.

3.6.3 Confidence in collision avoidance ability

Respondents were generally quite or very confident in the ability of both driverless pods and a similar human-driven vehicle to avoid a collision with pedestrians/cyclists, with slightly more confidence placed in driverless vehicles (71% were quite/very confident for driverless pods compared with 63% for human-driven vehicles, as shown in Figure 8).

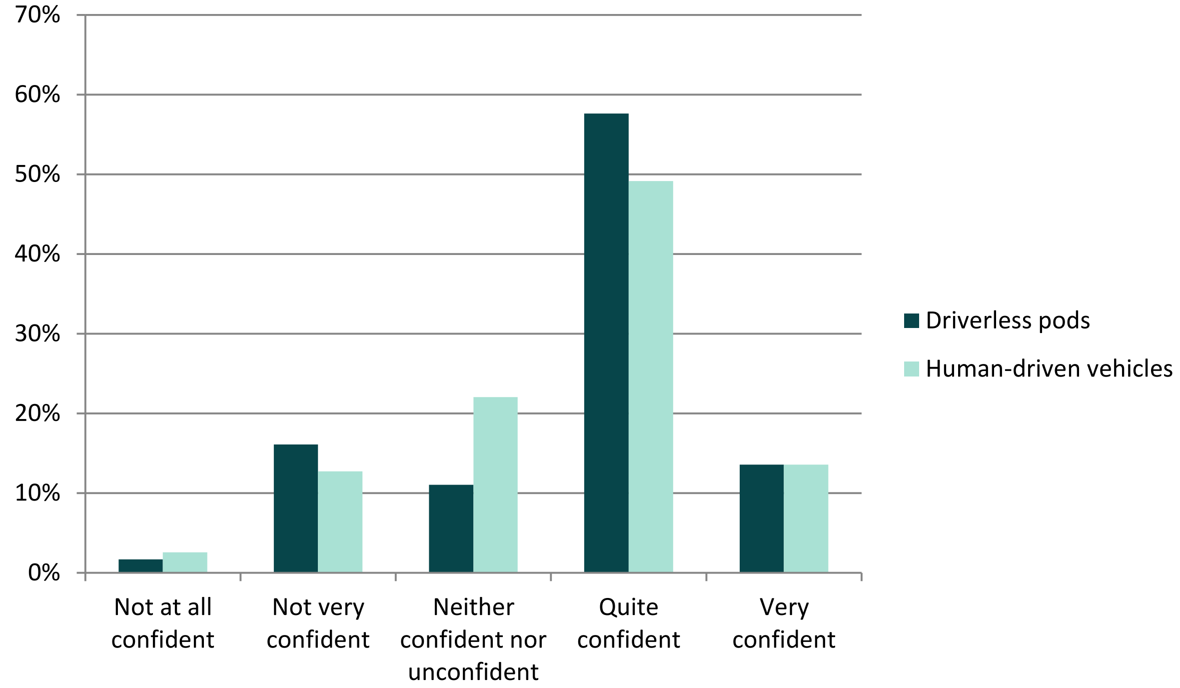

Figure 8. Confidence in the ability of driverless pods and similar human-driven vehicles to avoid a collision with a pedestrian/cyclist (n=118)

Comparing responses to the two items, around half of respondents (51%) felt equally confident in the ability of driverless vehicles and human-driven vehicles to avoid a collision. Twenty-eight percent felt more confident in the ability of driverless vehicles than human-driven vehicles to avoid a collision, and 21% felt more confident in human-driven vehicles.

3.6.4 Other safety considerations

Respondents were asked how safe they might feel taking a driverless pod journey during the day and at night, with and without an attendant. Respondents reported that they would feel safest taking a driverless pod journey with an attendant during the day (94% quite safe/very safe), followed by a journey with an attendant at night (89%), a journey without an attendant during the day (58%), and a journey without an attendant at night (39%).

There were some quite clear age and gender differences in terms of feelings of safety when no attendant was present. As shown in Figure 9 and Figure 10, females and older respondents were considerably less likely to state that they would feel quite safe or very safe when travelling in a pod without an attendant, both at day and (more so) at night.

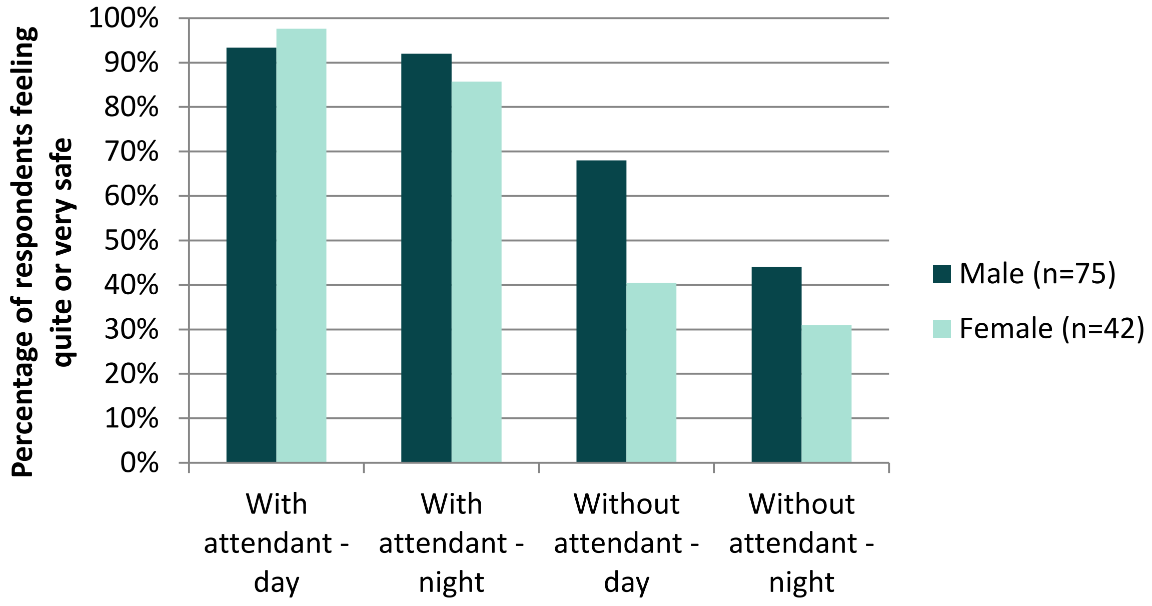

Figure 9. Percentage of respondents feeling 'quite safe' or 'very safe' by gender

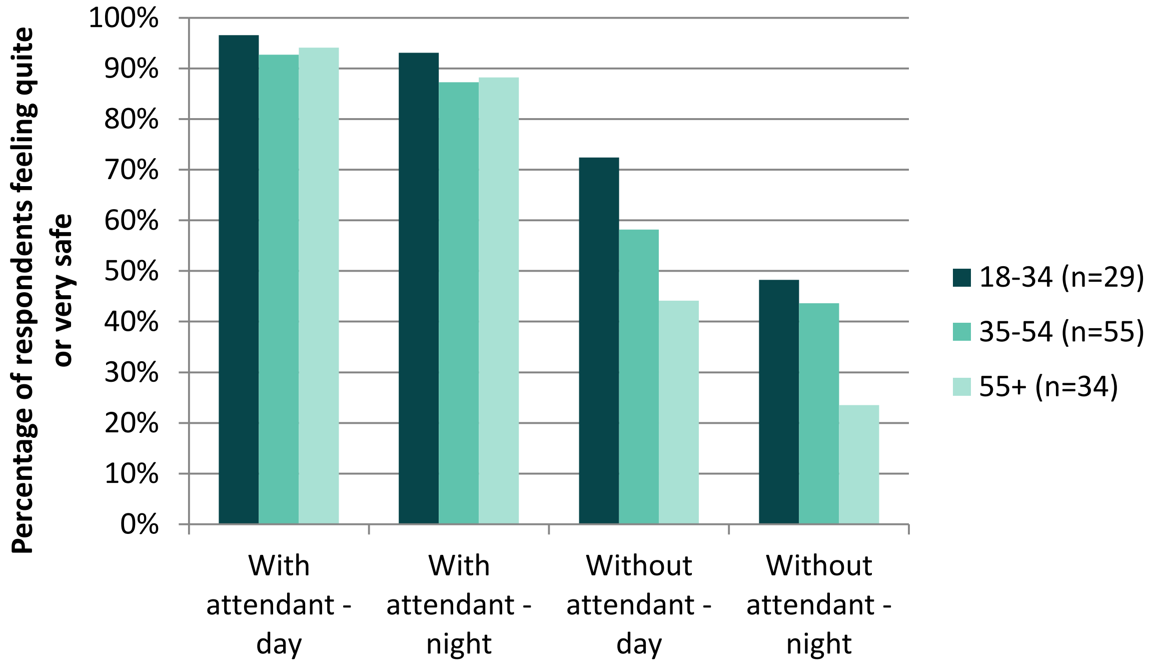

Figure 10. Percentage of respondents feeling 'quite safe' or 'very safe' by age

Respondents were asked to what extent they felt concerned with a number of factors in relation to driverless vehicles. Respondents reported having the greatest level of concern in relation to driverless vehicle interactions with human-driven vehicles (58% a little/very concerned), cyclists (53%) and pedestrians (50%). The reliability of the pod was also of concern to over half of respondents (51%), and pod safety in poor weather was of concern to 40%. Occupant safety and the speed of the pod were generally reported to be of less concern (25% and 23% respectively were not at all or not very concerned). Females were more likely to express concern than males for all factors, as shown in Figure 11.

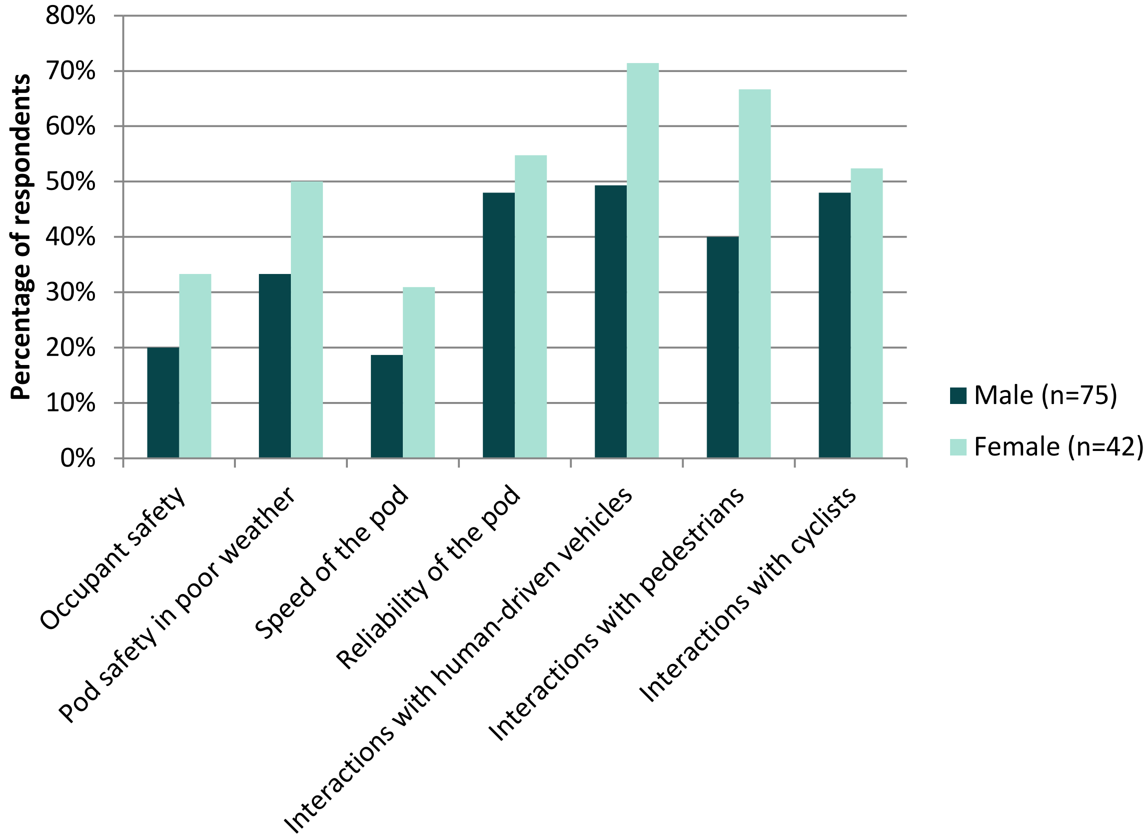

Figure 11. Respondents stating they are 'a little concerned' or 'very concerned' by gender

3.7 Journey cost

Respondents were asked how much they would expect to pay if the journey they experienced had been provided as a public transport service (from £0 to £10). The mean amount that respondents would be willing to pay was £2.06 (standard deviation £1.40). As shown in Figure 12, around a third of respondents (31%) stated that they would pay £2 for their journey. Eleven percent would not be willing to pay anything at all, around a quarter (26%) would pay £1, 18% would pay £3, and 14% would pay £4 or more. For comparison, the cost of a single short tube journey in London is £2.40.

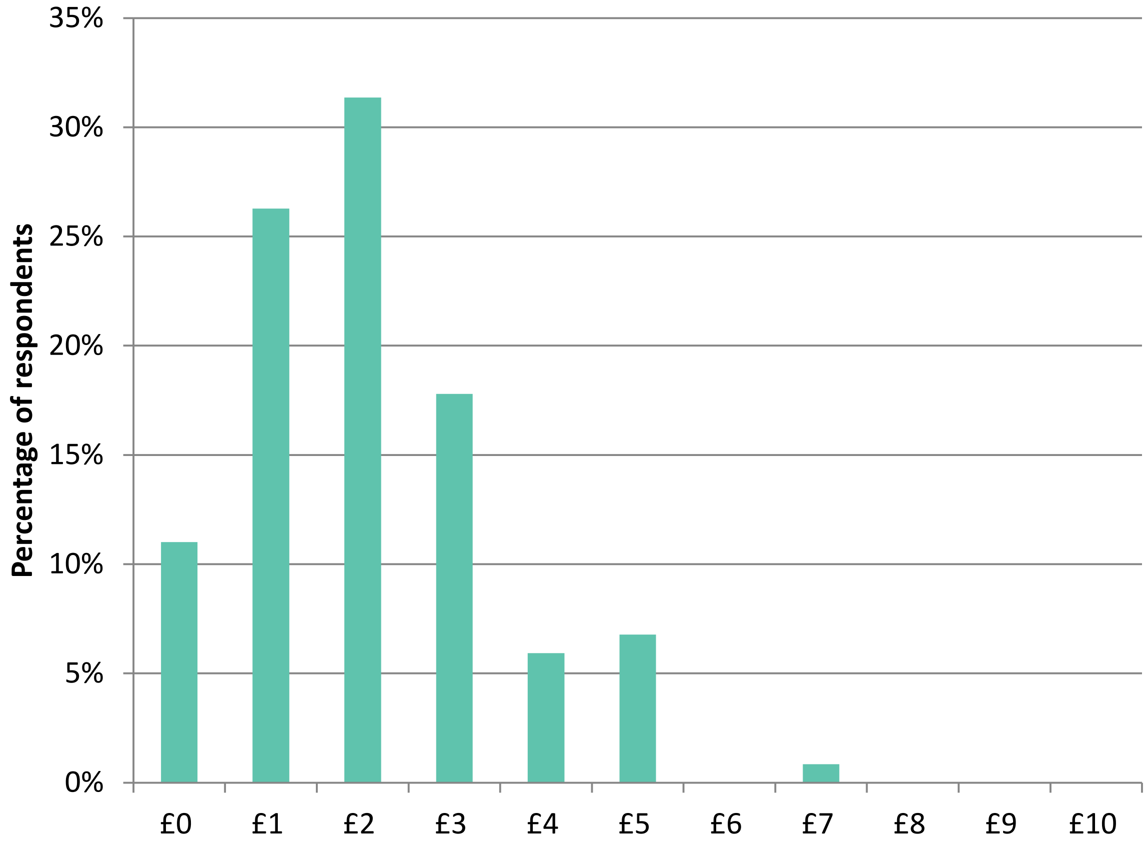

Figure 12. Amount that respondents would expect to pay for the journey they experienced (n=118)

3.8 Willingness to engage with new technology

In order to measure respondents' willingness to engage with new technology (both general technology and vehicle technology), they were asked to indicate which of five statements best describes their personal behaviour (see Figure 13). There was little difference in responses in relation to general technology and vehicle technology. The majority of respondents in both categories stated that they like to buy items with a proven technology (41% for general technology and 47% for vehicle technology). Respondents were less likely to buy the latest vehicle technology as soon as it is available (3%) than general technology (8%).

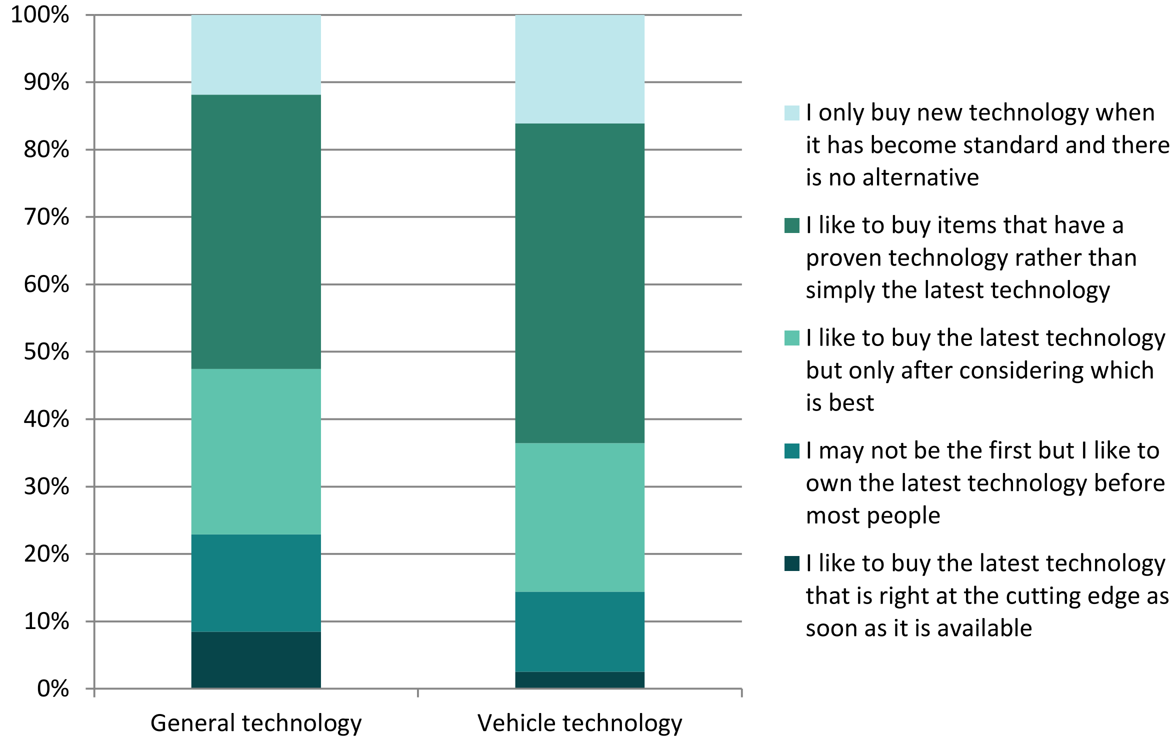

Figure 13. Willingness to engage with new technology, in general and in relation to vehicles (n=118)

3.9 Interest in driverless technology in the future

3.9.1 Interest in owning or leasing driverless vehicles

Respondents were asked how interested they would be in owning or leasing both a partially and fully driverless vehicle. There was little difference in reported levels of interest in owning/leasing a partially driverless vehicle compared to a fully driverless vehicle, as shown in Figure 14.

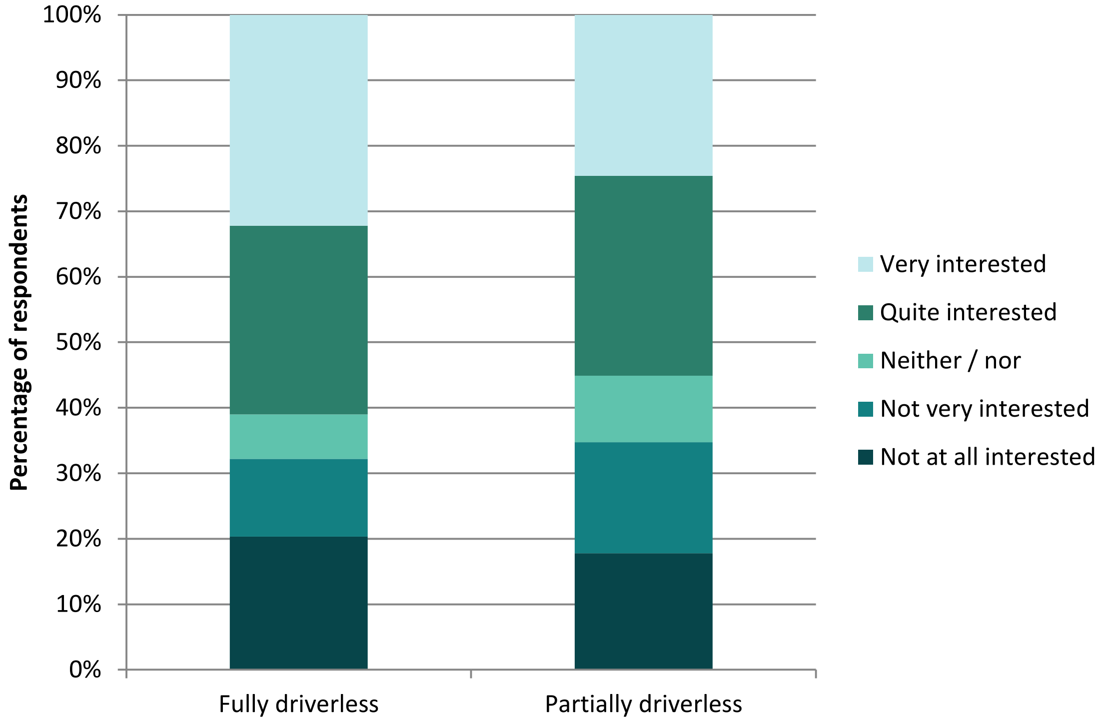

Figure 14. Level of interest in owning or leasing a driverless vehicle (n=118)

Examining individual responses, 57% had the same level of interest in owning/leasing a partially driverless vehicle compared to a fully driverless vehicle. Of those who had different levels of interest towards partially and fully driverless vehicles (n=51), 58% were more interested in owning a fully driverless vehicle than a partially driverless vehicle.

3.9.2 Factors influencing the adoption decision

Those respondents that indicated that they would be interested in purchasing or leasing a driverless vehicle (or provided a neutral response) were provided with a list of ten factors that may influence a vehicle adoption decision, and asked to indicate the top three factors that would influence their decision to purchase or lease both a partially and fully driverless vehicle. As shown in Figure 15, the factor that was most likely to be in respondents' top three was safety (70% for partially and 78% for fully driverless vehicles), followed by cost (65% and 66%). Confidence in the technology was also an important factor in influencing the purchase decision (49% for partially driverless vehicles and 55% for fully driverless), as was technology readiness (43% and 31%).

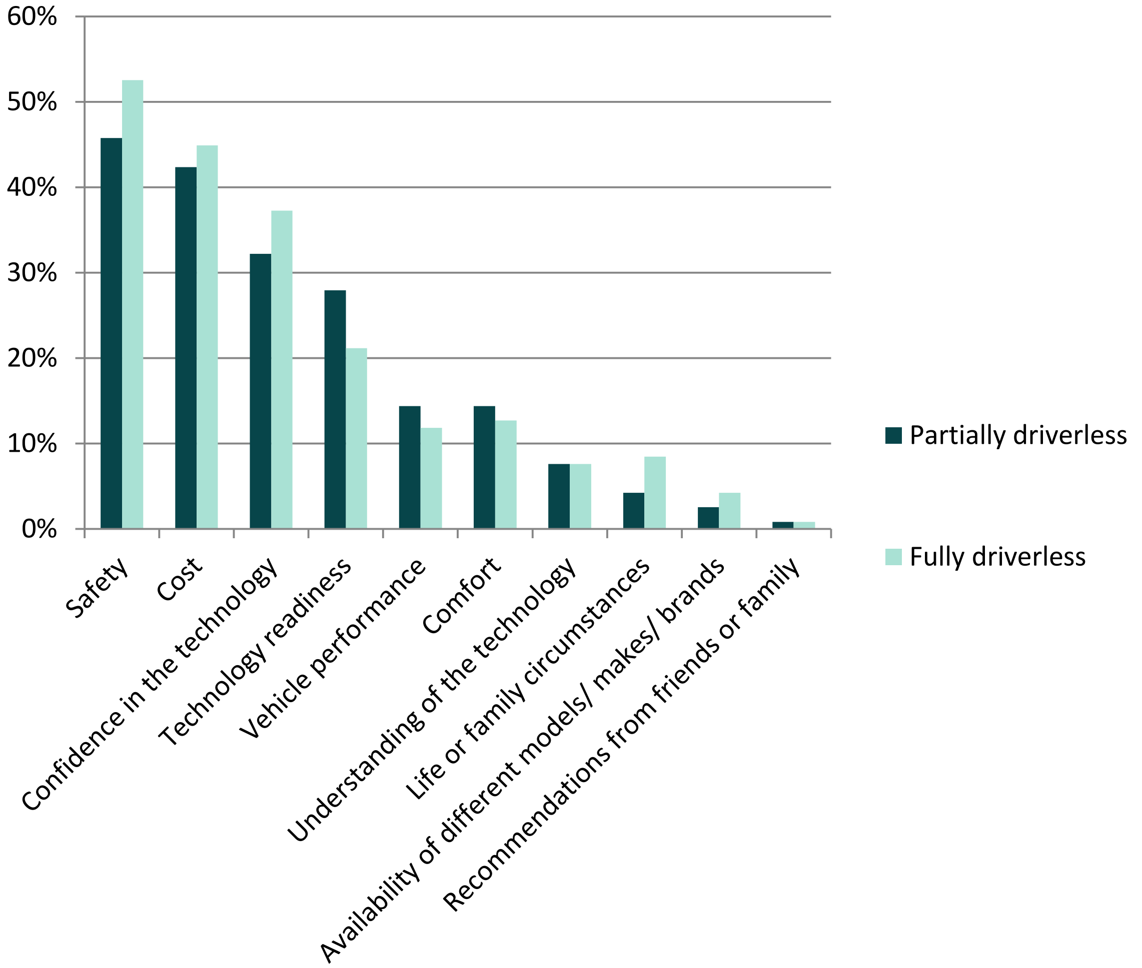

Figure 15. Respondents' top three factors influencing a vehicle purchase decision (n=118)

The main reasons respondents gave for not being interested in either partially or fully driverless vehicles tended to be the same for both vehicle types, and fell into four main categories:

- Driverless vehicles 'taking away the enjoyment' of driving – several respondents stated that they enjoy the driving experience and that driverless technology would detract from this.
  "I enjoy driving, in most cases I drive for enjoyment rather than a task that has to be completed." Female, 35-44

  "I like driving vehicles myself; it's a pleasure to drive." Male, 25-34

- Lack of confidence in the driverless technology (whether fully or partially driverless) – Respondents indicated that they would not be interested in owning or leasing a driverless vehicle because they had doubts about the technology at the time of experiencing the pod. A few people said that they might be more open to the technology in the future.

  "[The] technology is in its infancy, I might be more interested at a later date." Male, 65-74

  "I don't think that the technology is reliable enough yet, maybe in 20/30 years' time….also, I'd be worried that the behaviour of other road users is too unpredictable for a computer to get it right every time." Female, 45-54

Related to this was a concern over a lack of control, particularly in relation to the use of driverless technology on motorways or at higher speeds.

"On a motorway, going at high speeds, I would want to be in control of my vehicle. If another person in a driven car is coming towards me, I would want to be able to take control of the vehicle myself." Female 35-44

"I think that I would give up driving if I was unable to drive myself anymore." Female, 65-74

- Purchase cost of driverless technology – A few respondents suggested that the cost of driverless vehicles was a barrier to purchase/lease.

  "Running costs and maintenance costs will be expensive." Male, 25-34

  "The technology will be more expensive than the current vehicle." Male, 25-34

- The technology does not suit respondents' lifestyles – Several participants said that they were unable to see any circumstances in which driverless technology would fit their lifestyles.

  "I like walking and I can't imagine a partially driverless vehicle would be my choice for a lengthy (non-walkable) journey." Male, 25-34

  "While I can see clear benefits of driverless cars in certain conditions, a partially driverless vehicle would not meet my needs." Female, 35-44

3.10 Vehicle usage models

3.10.1 Ride sharing

When asked how interested respondents would be in having an alternative to owning or leasing a driverless vehicle (e.g. driverless ride sharing or hire car services) the majority of respondents were quite (32%) or very (32%) interested. Twelve percent were not very interested and 11% were not at all interested. The remaining 13% were neither interested nor uninterested.

Respondents were asked how likely or unlikely they would be to use a variety of different driverless and human-driven transport options if they were available (see Figure 16). Respondents were most likely to state that they would use a fully-automated, driverless bus-like service (74% were quite or very likely to use this). Respondents were generally quite open to most of the transport options, with more than 50% saying that they would be quite or very likely to use all except the human-driven taxi service and the human-driven shared vehicle service.

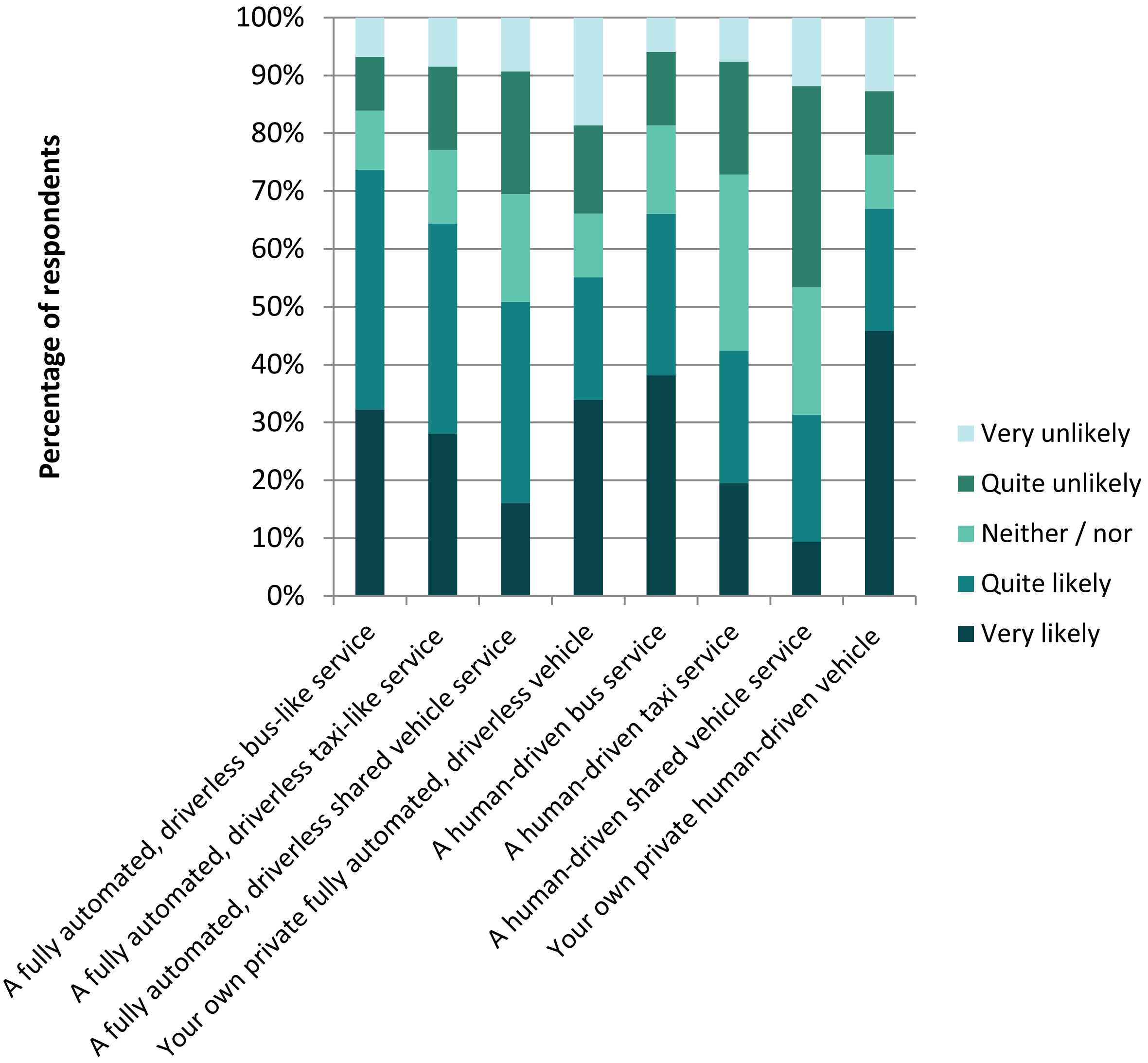

Figure 16. Likelihood of using different transport options (n=118)

Feelings of safety in relation to these transport options was also explored. As shown in Figure 17, respondents reported feeling the safest using a human-driven bus service (91% very or quite safe) or taxi service (83%), followed by their own private human-driven vehicle (79%). Respondents were least likely to feel safe using a fully automated, driverless shared vehicle service where you as the passenger can call out the vehicle but the vehicle could be shared with members of the public (57% very or quite safe), a human-driven shared vehicle service (63%) and a private fully automated, driverless vehicle (66%).

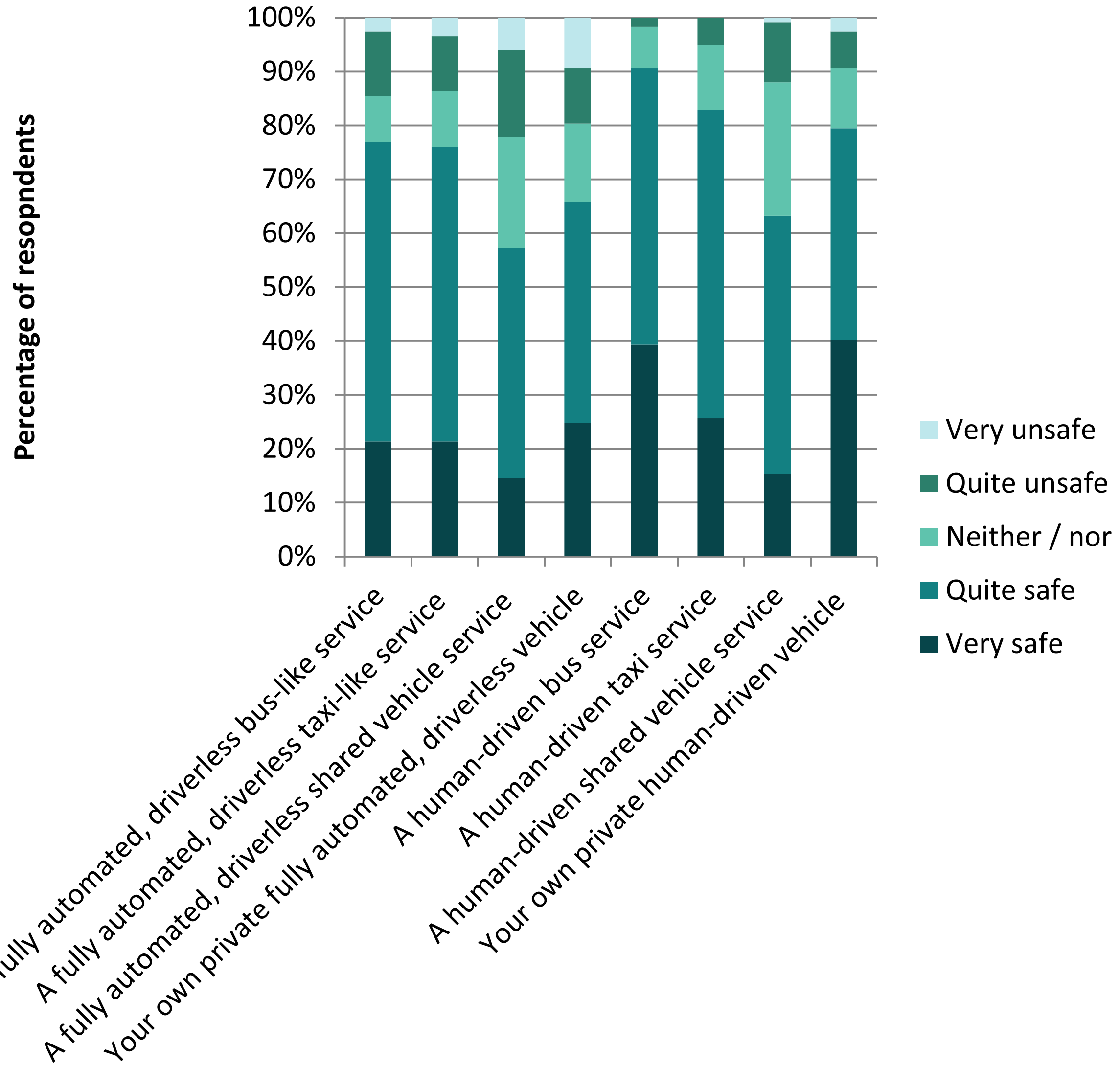

Figure 17. Feelings of safety associated with using different transport options (n=118)

3.10.2 Last-mile journeys

Respondents were asked how likely or unlikely they would be to use the type of pod they experienced for making short journeys at the start or end of their journey. Around two thirds of respondents (63%) reported they were very likely or quite likely to use a driverless pod to make last-mile journeys. Just under a quarter (23%) were quite or very unlikely to do so.

3.10.3 Impact on mobility

The majority of respondents felt that the introduction of this type of service would have a very (22%) or quite (35%) positive effect on their mobility. Forty-one percent did not feel that the introduction of this type of service would have any effect on their mobility.

3.10.4 Ownership model

When asked about their preferred driverless vehicle ownership model (if fully driverless vehicles were widely available), over half of respondents (56%) stated that they would like to be able to rent or share driverless cars when required. Around a fifth (18%) would like to own a personal driverless vehicle, and 10% would like to lease one. Fourteen percent stated that they would not use a driverless vehicle and the remaining 2% stated that they would consider sharing or renting if it made some journeys more direct or if they lived in a busy city.

3.10.5 Replacing current journey

When asked about current weekly journeys using different modes of transport, the most common form of transport was walking (average of 9.9 journeys per week) followed by car (7.1 journeys), tube (4.4 journeys) and bus (3.0 journeys). The other transport options (taxi, motorbike, cycle) had an average of less than one reported journey per week.

Respondents were asked to indicate the percentage of their weekly journeys that they would be willing to make by driverless pod, if the pods were available as part of the transport network in their local area. On average, respondents would be willing to replace a third (33%) of journeys with driverless pods. When asked to explain their responses, respondents reported that the percentage of weekly journeys that they would be willing to replace with driverless pods was dependent on a number of factors including the frequency, cost and availability of the pods.

> *"[I would be willing to make 50% of my weekly journeys by driverless pod] Depending on the frequency, speed and cost of such a service." Male, 65-74*

> *"[I would be willing to make 100% of my weekly journeys by driverless pod] No reason not to use driverless pods providing cost was competitive to other transport options." Male, 65-74*

Reasons for replacing existing weekly journeys with driverless pod journeys included:

- Giving respondents more time

> *"[I would be willing to make 100% of my weekly journeys by driverless pod] so I could make best use of my limited time." Male, 35-44*

> *"[I would be willing to make 100% of my weekly journeys by driverless pod] If I could get the car to drive itself, I'd let it drive every time. Every minute spent controlling a vehicle is a minute I could be using doing something interesting or more useful - such as resting." Male, 35-44*

- Replacement of journeys undertaken by buses, taxis and, in some cases, tubes (but not trains)

> *"[I would be willing to make 25% of my weekly journeys by driverless pod] I believe this would replace my use of Uber or similar taxi services or act as a replacement for short bus trips - I do not think this would replace my rail commute." Male, 25-34*

> *"[I would be willing to make 60% of my weekly journeys by driverless pod] they could easily replace the bus/taxi journeys I make (if they moved at an appropriate speed)." Male, 45-54*

The most commonly cited reason for not replacing existing journeys with driverless pods was that respondents simply enjoyed walking.

> *"[I would be willing to make 30% of my weekly journeys by driverless pod] I like walking, it's good exercise, but I wouldn't mind using a driverless vehicle occasionally." Male, 25-34*

> *"[I would be willing to make 5% of my weekly journeys by driverless pod] I enjoy walking so I tend to walk when I'm not going too far and I am not in a hurry." Male, 35-44*

However, they felt that they may use driverless pods for short journeys in bad weather.

> *"[I would be willing to make 10% of my weekly journeys by driverless pod] I usually walk short distances in my commute (up to 1 mile) so I am not sure where the pod would come in to my daily commute. Maybe in bad weather." Age and gender not provided*

> *"[I would be willing to make 10% of my weekly journeys by driverless pod]. I would like to ride a driverless pod if the weather conditions are bad. However, if the weather is nice, I would rather walk." Female, 18-24*

Other reasons for not using the driverless pods to replace existing journeys included:

- Lack of confidence in technology at the moment

  "The trial pod definitely isn't ready for live usage. It was far too sensitive to the weather and even crawled past every lamppost. Once working fully then would be much more likely to use [could replace 75% of journeys]." Age and gender not provided

- Deeming the pods as not appropriate for typical journeys

  "[I would be willing to make 15% of my weekly journeys by driverless pod]. I tend to travel long distances and so would prefer to travel via car as this would be quicker." Age and gender not provided

  "[I would be willing to make 0% of my weekly journeys by driverless pod] because they are too small to deal with a grocery shopping trip and unsuitable for commute to work." Female, 45-54

4 Summary of findings

The aim of the survey was to gather evidence of members of the public's perceptions as passengers of a shared, last-mile service, driverless vehicle. The data collected from 118 trial participants has provided the following overarching findings:

- The majority of pod passengers who responded to the survey reported feeling safe, and that they were satisfied with their overall journey experience on a driverless pod
- When considering safety, CCTV was reportedly the most important factor for improving feelings of safety (based on a discrete list of options), followed by the presence of an on-board attendant (e.g. safety steward)
- Not sharing a vehicle with strangers was perceived to be the least important feature relating to safety; however, this may have been related to the fact that 59% of respondents reported having travelled with friends/family
- Some indication of gender differences were identified in terms of feelings of safety at night, as females in the sample were less likely to state that they would feel quite safe or very safe when travelling in a pod without an attendant, both during the day and (more so) at night
- Participants showed greater confidence in driverless vehicles being able to avoid collisions compared to human-driven vehicles; however, the interaction between human-driven and driverless vehicles was one of the biggest concerns in relation to driverless vehicles
- Survey respondents reported a higher trust in future technology, than in AV technology as it is currently
- Slightly more interest in owning/leasing fully driverless than partially; however, when asked specifically to consider alternatives to private ownership, only 8% reported they were not at all interested in considering alternatives

The data collected through the public trials suggest that most survey participants felt safe and were satisfied with their driverless pod journey. The responses suggest that participants would be willing to use, and pay, for this type of service; participants valued the service similarly to other transport offerings.

The data also provide some evidence that there are some key concerns regarding the technology readiness at this point; this may be an indication that there is still a way to go to build the public's confidence in the technology's ability to deliver on the intended benefits.

Overall, however, the engagement achieved through the public trial activities showed a willingness to engage with the research. This is important as, regardless of current opinions, it will be necessary to engage the public as users and consumers in the future development and deployment of AVs in cities.

5 Discussion

One of the key aims of the public trial activities (Trial 1) was to provide members of the public with a direct experience of an automated vehicle service and to gather feedback on public perceptions and acceptance of the technology. Prior to this work, much of the evidence was based on limited, or no, experience of automated technologies. The GATEway project has allowed the research team to explore these topics in more depth and start building evidence that can support future deployment of vehicles and services.

5.1 Testing in a real-world environment

The research undertaken during the trial activities (by TRL, UoG and Commonplace) covered a range of experiences, from pedestrian interactions along the trial route to the direct experience of people taking rides as passengers. The data showed that the goal to run the trials as a service-like experience was achieved as over half of respondents surveyed (58%) reported they had 'just turned up' to a pod stop on an ad hoc basis. This is important as members of the public were able to engage with the vehicles in a real-world environment and, to some degree, an environment where journeys could serve a purpose (e.g. getting from home to the tube station). Delivering vehicle trials in a real-world environment was a challenge, but vital to the development of AV technologies and learning. The trial route selected provided opportunities for increased learning of the autonomous control system (ACS) operation and safe operating boundaries. By providing exposure to mixed (and often, busy) user interactions, the vehicle integrator and ACS provider were able to fine-tune the performance of the vehicles and monitor progress.

The test environment also allowed researchers to study the public's interactions with the pods in a 'natural' setting, where footfall was not controlled or limited in any way. This also allowed shuttle passengers to experience the technology and its interactions with obstacles and other path users. Not only did this have an impact on the quality of the data collected throughout the trials, but it proved to be important to passengers' experience. The qualitative data collected showed that witnessing the vehicle respond appropriately to other path users (such as pedestrians and cyclists) was a factor that influenced feelings of safety for some participants. This experience was likely to have been facilitated by the time passengers were able to spend on board a driverless pod. Around 43% of respondents reported spending between 21-30 minutes on the pod; again, this amount of time would have facilitated increased exposure to the pod's behaviour and interactions along the trial route.

5.2 A direct experience of a last-mile driverless service

In considering the direct pod experience, around three quarters of respondents reported being satisfied with their overall journey experience. Importantly, a large majority of passengers reported feeling safe during their journey. Both the low speed of the vehicle and the presence of a safety steward seemed to play a role in passengers feeling of safety. The presence of a safety steward (or 'test driver', according to the DfT Code of Practice) was perceived to be important in relation to feelings of safety by just over half of respondents. Most survey respondents reported that they would feel safe taking a driverless pod journey with an attendant during the day. Conversely, only 39%

reported they would feel safe on a journey without an attendant at night. The role of the attendant in a driverless vehicle has been widely discussed, and while new regulation is exploring the removal of this requirement for the testing of AVs, consideration will need to be given to the role of the attendant in feelings of safety and the potential impact on uptake (even in a trial environment). However, evidence from the survey provides some indication that other features, such as CCTV, could also help increase feelings of safety while riding driverless vehicles.

When asked to consider the benefits of last-mile journeys, around two-thirds of participants reported that they would be likely to use a driverless pod to make this type of journey. However, the data also showed that end users may not be convinced of the need for such a service and 41% of respondents reported they did not believe the introduction of this type of service would have any effect on their mobility. It is important to note that the sample did not include a representative sample of users with limited or impaired mobility; this group of road users is expected to see the largest benefits from this type of connective services and future research will need to explore their transport needs and opportunities for last-mile services. Other than identifying if there is a true need for these types of services within cities, the introduction of such services will also need to be balanced with efforts to increase active travel.

5.3 Future vehicle ownership models and MaaS

Future ownership models have been actively discussed in the transport industry as mobility as a service (MaaS) expands. Although many participants expressed an interest in owning or leasing a driverless vehicle, when asked specifically to consider alternatives, two-thirds of passengers who responded to the survey were interested in an alternative to owning or leasing a driverless vehicle. When asked what their "preferred driverless vehicle ownership model" would be, over half of respondents would like to be able to rent or share driverless cars when required, while one-fifth reported they would like to own a personal driverless vehicle. This aligns with findings from the earlier (more limited) GATEway trials (reported in Deliverable D3.7), where participants seemed keen to embrace new ownership models that could result in a cost saving and increased convenience.

Cost also emerged as an important topic when considering future ownership and/or uptake of services, along with safety and trust in the technology. In terms of cost, and thinking about a last-mile service such as the one experienced in the public trials, three quarters of respondents reported that they would be willing to pay between £1 - £3 for a similar journey. This could be related to a number of factors, for example the length of the journey (about half of passengers surveyed reported having taking a ride of 21-30 minutes) and equivalent standard fares (e.g. a single tube journey costs £2.40). Interestingly, the data from the driverless delivery trials (reported in Deliverable D5.3, Bridging the final metres: public feedback on a last mile driverless delivery service) showed that most participants would expect a driverless delivery service to be cost-neutral (or even provide a cost savings). One research question was whether this was related to the technology (e.g. considering reductions in cost of operations, for example, as a result of removing the driver) or the service provided. The findings from the public trials may indicate that willingness to pay may relate more closely to the service being provided, rather than being applied to all driverless services across the board.

5.4 Conclusion

Overall, the public trial activities have generated evidence to support the development and deployment of AVs in an urban environment. The survey undertaken with members of the public who have experienced this technology as a passenger has helped to illuminate some of the issues already being widely discussed by industry (e.g. safety) but has also started to build an evidence-base to support more in-depth questions about the factors that may impact public perceptions and, ultimately, uptake. By placing the end-user at the centre of the development process, the GATEway project has contributed to the understanding of some key questions and how emerging evidence can be used to reassure the public and enhance public acceptance. Although the evidence collected throughout the project's lifecycle indicates that acceptance (or at least openness to experience this technology) is already high, it will be important to design vehicles and services that fit with people's lifestyles and travel needs.

The research also highlights that public demonstration trials can be an important tool for building trust in an emerging technology.

5.5 Future research questions

The research undertaken as part of the GATEway project provided valuable insight into how members of the public view automated vehicle technologies, how they see the services these vehicles may provide fitting into their lifestyles, and how safety, cost and trust seem to be at the core of people's willingness to use driverless vehicles.

Such is the exploratory nature of the GATEway project that it raises additional questions that will need to be explored in order to obtain a more comprehensive picture of the characteristics and factors that influence people's decision-making when it comes to new technologies. Future research can aim to exploit the data gathered through the GATEway project by assessing some key research questions, such as:

- What is the impact of demographic characteristics on the public's attitude toward driverless vehicles and feelings of safety? Are some segments of the population more or less likely to use and/or feel safe about automated technology?
- How do the journey and environmental characteristics (e.g. length, purpose, weather) relate to journey satisfaction?
- What factors have an impact on openness to journey sharing and perceptions of MaaS?

Understanding the answers to questions such as these will help to inform future developments in automated vehicle technology and the legislation to govern the deployment of these vehicles on public roads. While the technological developments have acquired significant attention and funding over the last few years, little has been done to directly involve the people who these vehicles and services are being designed for. Technology, particularly when it has the potential to create large-scale social change, needs to be able to enhance people's lives and generate positive social changes; in this case, to improve safety and accessibility, and to help create smarter, people-centric city landscapes.

5.6 Caveats of the research

As with any research, there were a number of caveats that should be kept in mind when interpreting the results of this survey.

Firstly, as a developing technology, the trial vehicles experienced some issues which resulted in some shorter or less efficient journeys for some participants. While three quarters of respondents reported they felt satisfied with their journey experience, this may have had an impact on participants' perceptions of the vehicles and/or the technology. In fact, only 3% of respondents reported having 'complete trust' in driverless vehicles as they are currently, while over half of respondents (53%) reported having complete trust in technology to be developed in the future, which would indicate there is some way to go to achieve full trust in driverless vehicle technology.

In addition to the above, the media attention surrounding the unfortunate Uber incident in the United States may have also had an impact on passengers' perceptions of the vehicles and the trials; the events may have also impacted on the type and/ or number of passengers willing to take part in the trials. The incident, which is believe to be the first reported fatal collision involving a self-driving vehicle and a pedestrian in the USA, may have heightened concerns about safety among participants; this may have contributed to safety having been widely considered when responding to the trial service. That said, and in light of findings that indicated most participants reported feeling safe on board the GATEway pods, there is no quantifiable evidence that the events in Arizona had a direct impact on the trial experience.

Although the survey sample included a good range of respondents in terms of gender, the age ranges were not representative of the UK population. Moreover, there was little representation of important groups such as people with mobility impairments or those with additional transport needs. While trial management did implement provisions to facilitate bookings for anyone requiring additional assistance, it is possible that due to the relatively short duration of the trials (one month) not enough promotion was given to ensure better representation of different transport user groups. In future, trial duration may be an important consideration in achieving more representative passenger quotas.

Another limitation of the research is the focus on the urban environment. While the survey findings suggest high levels of engagement and positivity toward driverless vehicles, the research did not assess the impact of the context in survey responses. As a transport rich environment, where trial participants already have access to multiple transport options, London provides a different experience than would be expected in rural locations. Future research should focus specifically on the perceptions of people living outside of major cities and seek evidence that can help understand the specific needs of those living in rural settings where transport options (and access to amenities) may be limited.

Despite the caveats, the research delivered by TRL (and in combination with findings from GATEway partner organisations) has provided valuable evidence that can be used as the basis for developing more in-depth research that can explore perceptions in a wider context.

6 References

Department for Transport (2015, July). The pathway to driverless cars: A code of practice for testing. London, UK.

Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: what can be done?. *Assessment & evaluation in higher education*, 33(3), 301-314.

Payre, W., Cestac, J., & Delhomme, P. (2014). Intention to use a fully automated car: Attitudes and a priori acceptability. *Transportation research part F: traffic psychology and behaviour*, 27, 252-263.

Sabey, B. E., & Taylor, H. (1980). The known risks we run: the highway. In Societal risk assessment (pp. 43-70). Springer, Boston, MA.

SAE International (2016, September). Taxonomy and definitions for terms related to driving automation systems for on-road motor vehicles.

Schoettle, B., & Sivak, M. (2014). A survey of public opinion about autonomous and self-driving vehicles in the US, the UK, and Australia. University of Michigan Transportation Research Institute, Ann Arbor, MI.

A The trial vehicle

A.1 *In-vehicle controls*

The safety steward is one of the key vehicle risk mitigations for the public trial activities. The safety steward allowed TRL and the GATEway team to remain compliant with the Code of practice, as this still requires an operator to be present in the vehicle to take control in case of an emergency.

The role of the stewards was to monitor the advance of the PODs throughout the route and to intervene when/if required. Interventions generally required stewards to re-set the automated system or manually operate the vehicle in the case of localisation issues and any errors in the ACS system. The steward training will provide details on how to intervene, depending on the type of situation and when it might be required to evacuate any vehicle passengers.

In order to aid in the monitoring role, the safety stewards had a GUI and frontal camera view (via a GoPro) (Figure 18).

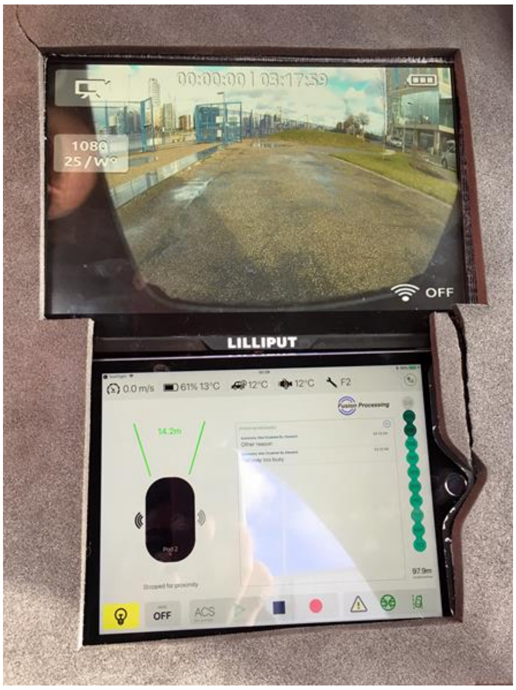

Figure 18. Safety steward in-vehicle GUI and forward-facing camera view

The forward facing camera provided medium to long range view of the path and any obstacles the vehicle may come across. The camera provided the safety stewards with information necessary to evaluate any emerging hazards and take the best course of action. The camera used was a standard GoPro.

A.2 Insurance

All safety stewards were required to provide a copy of their UK driving licence and fulfil the following requirements:

- To have no points on their licence
- At least 2 years of experience driving a standard class vehicle

- Were subject to passing a vision test
- Completed and submitted a driver declaration form

The trial vehicles were insured by the Royal Sun Alliance (RSA).

A.3 Vehicle safety and acceptance testing

Prior to accepting the pods for public use along the trial route, TRL undertook detailed safety testing to ensure and document the appropriate and safety functioning of the vehicle platform and ACS system.

The tests were divided into several categories, including:

- Pod functionality – including elements such as lights, horn, doors, joystick control and battery charging
- Autonomy functionality – including testing of system safeguard to prevent autonomy being engaged if it is unsafe to do so (e.g. as a result of compromised or limited sensor operation)
- Sensor verification – testing and monitoring the appropriate detection of objects on both stationary and automated mode
- Safe operating boundaries – testing the parameters defined for each sensor and understanding any limitations and/or 'blind spots' in the system. This was integrated into the safety steward training.

The results of the tests were recorded and an acceptance was granted when all key conditions were met. On occasion, a conditional acceptance was granted when minor functionality issues were found (e.g. wipers not operational) and full acceptance was granted once the issue was rectified.

B Staff requirements and training

B.1 Trial staff

Table 2 provides details of the required roles and responsibilities.

Table 2. Trials roles and responsibilities

Role	Responsibilities
Trials manager (TM)	To oversee trial operations on the ground and act as a point of escalation should any issues or incidents arise. The TM was also responsible for implementing and managing the emergency response plan.
Safety steward (SS)	To safely and effectively operate the driverless pods along the designated route. The SS was also responsible, in conjunction with the TM and WSC, for conducting the appropriate vehicle checks and securing these once the trial day was over. In the case of an incident, SS was required to act as first responders.
Pod stop marshal	To engage members of the public in the trials and manage booked participants. Marshals were responsible for collecting participant's details and supporting the TM and SS in performing checks and generally ensuring the safety of all involved.
Roving marshal	To ride along the trial route on a bicycle to provide support to marshals and safety stewards.
Vehicle support	To provide support to the trials team, particularly in relation to vehicle malfunctions or queries.
ACS support	To provide support to the trials team, particularly in relation to queries or issues relating to the vehicle ACS and fleet management system.

B.2 Training

Trial staff were required to undergo specialised training for the specific roles they were to perform during the trial. As such, all staff underwent a day of classroom-based training, which included a brief introduction to the project (some staff had no previous involvement with the GATEway programme) and trial objectives, roles and responsibilities, the emergency response plan, vehicle design and the DfT Code of practice.

Further to this, safety stewards took part in additional training activities which included manual operation (joy stick, Figure 19), on-task training (e.g. in vehicle journey experience and supervised training) as well as more in-depth training and exposure to in-vehicle tools (such as the steward GUI).

Figure 19: Safety steward training (manual operation) at the InterContinental hotel

The process for becoming a safety steward was standardised and followed the steps detailed in Figure 20.

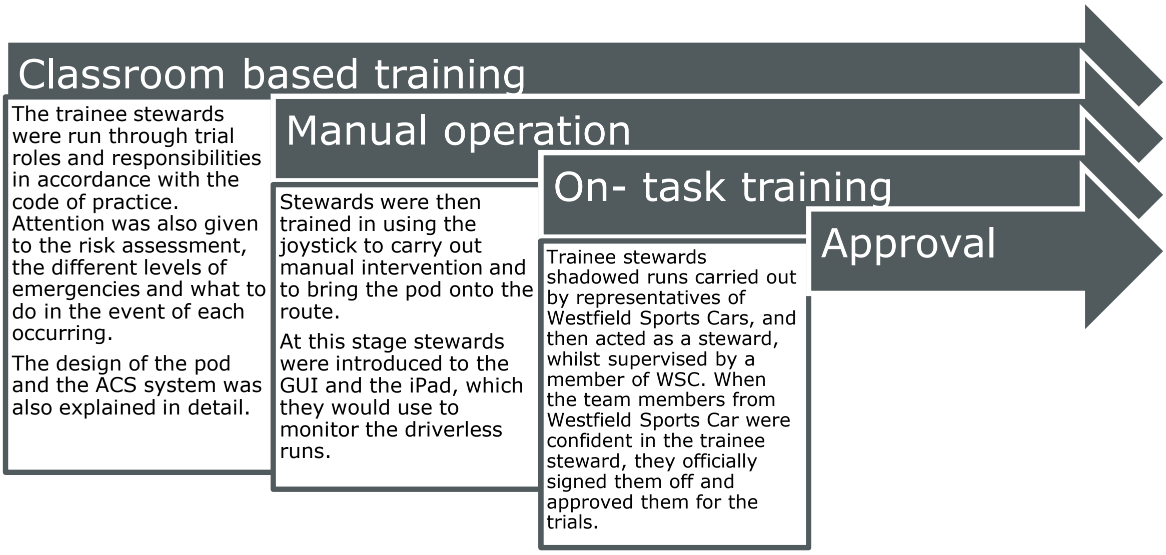

Figure 20. Steward training and approval

WSC as the vehicle integrators, and holders of liability, undertook the in-vehicle training for safety stewards with support from the ACS providers – Fusion Processing.

C Survey

What is the aim of this survey?

The purpose of this short survey is to get some feedback on your recent experience of our driverless pod. This research is exploring people's perceptions of driverless vehicles and their role in the future of transportation.

The driverless pods that you have seen or taken a journey on are prototype vehicles - the first of their kind to operate in an urban environment. It is possible that you witnessed some technical challenges with the pods. If you did encounter any technical challenges, please try not to focus on these when responding to the survey questions.

How long will it take?

The survey should take approximately 15 minutes of your time to complete.

How will my data be used?

All data will be completely anonymous.
By completing the survey, you agree to the use of your data by the project team. This data will only be used for the purpose of the GATEway project. In order to protect your data we will:

- Not share your data with third parties
- Not use your details for marketing purposes and/ or for the provision of news updates (unless you have previously agreed to this through the Commonplace website)
- Store your data securely on our protected server

What if I would like more information?

The GATEway website is here: https://gateway-project.org.uk/
If you experience any difficulties completing the survey, please contact gateway@trl.co.uk

I confirm that I have read and understood the information above and know where to find further information.

- ☐ Yes
- ☐ No

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason.

- ☐ Yes
- ☐ No

I agree to answer this survey.

- ☐ Yes
- ☐ No

I agree to the use of anonymous quotes in publications.

- ☐ Yes
- ☐ No

Describe your interaction with the vehicle below (If applicable, please answer based on your experience riding the pod even if you have interacted in multiple ways).

- ☐ I took a passenger ride in it
- ☐ I attempted to take a ride in it, but was unable to
- ☐ I saw the vehicle but did not attempt to board or take a ride in it
- ☐ I have never seen this vehicle before
- ☐ Other (please specify):

Is this the first time you have taken a ride on the pod?

- ☐ Yes - I have only ridden on the pod once
- ☐ No - I have ridden on it twice (please answer the following questions thinking about your most recent journey)
- ☐ No - I have ridden on it three or more times (please answer the following questions thinking about your most recent journey)
- ☐ Other (please specify):

How did you come to take part in the trial?

- ☐ I pre-booked online as a member of the public
- ☐ I just turned up
- ☐ I was invited to take part by my organisation or an organisation I work with
- ☐ Other (please specify):

Do you have a professional interest in driverless vehicles?

- ☐ Yes
- ☐ No

When did you take a journey on the driverless vehicle pod?

[Select date from 5th March to 29th March, or ‘can’t remember’]

Why were you in North Greenwich on the day you took part in the trial?

- ☐ I was only there to take part in the trial
- ☐ I was commuting to/from work or place of study
- ☐ I work there
- ☐ I was a tourist in the area
- ☐ Social/recreational reasons
- ☐ Other (please specify):

What were the light conditions like during your journey on the vehicle?

- ☐ Daylight
- ☐ Twilight
- ☐ Night time / after dark
- ☐ Don't know / can't remember

What were the weather conditions like during your journey on the vehicle?

- ☐ Light rain
- ☐ Heavy rain
- ☐ Sunny / partly sunny
- ☐ Cloudy but dry
- ☐ Don't know / can't remember

How long was your journey on the driverless pod?

- ☐ Up to 5 minutes
- ☐ Between 6-10 minutes
- ☐ Between 11-20 minutes
- ☐ Between 21-30 minutes

Did you travel on the pod with any friends or family?

- ☐ No, I did not travel with any friends or family
- ☐ Yes - I travelled with one or more adults
- ☐ Yes - I travelled with one or more children aged under 5
- ☐ Yes - I travelled with one or more children aged 5-11
- ☐ Yes - I travelled with one or more children aged 12-17

Where did you board the driverless pod for your journey experience?

- ☐ Stop A - InterContinental Hotel, London (The O2)
- ☐ Stop B - North Greenwich Pier (Thames Clipper, Ravensbourne College)
- ☐ Stop C - Emirates Air Line (Cable cars)
- ☐ Stop D - John Harrison Way (Ecology Park)

Where did you get off the driverless pod after your journey experience?

- ☐ Stop A - InterContinental Hotel, London (The O2)
- ☐ Stop B - North Greenwich Pier (Thames Clipper, Ravensbourne College)
- ☐ Stop C - Emirates Air Line (Cable cars)
- ☐ Stop D - John Harrison Way (Ecology Park)

How long did you wait at the pod stop before starting your journey on the pod?

- ☐ Less than 1 minute
- ☐ 1-2 minutes
- ☐ 3-4 minutes
- ☐ 5-6 minutes
- ☐ 7-8 minutes
- ☐ 9-10 minutes
- ☐ 11-15 minutes
- ☐ 16-20 minutes
- ☐ 21 or more minutes

How satisfied or dissatisfied were you with...

	Very dissatisfied	Quite dissatisfied	Neither satisfied nor dissatisfied	Quite satisfied	Very satisfied
...your overall journey experience on the driverless pod?	☐	☐	☐	☐	☐
...your waiting time before you boarded the driverless pod?	☐	☐	☐	☐	☐

How safe or unsafe did you feel during your journey on the driverless pod?

Very unsafe	Quite unsafe	Neither safe nor unsafe	Quite safe	Very safe
☐	☐	☐	☐	☐

Please describe any features of the journey that influenced your feelings of safety.

Thinking about the journey that you took in the driverless pod, how much would you expect to pay if this was a public transport service? Please use the sliding scale to select your response, from £0 to £10.

£0

Thinking about your journey on a driverless pod...How likely or unlikely would you be to use this type of transport for making short journeys at the start or end of your journey? For example connections between existing transport hubs (such as tube stations and bus stops) and your work or home.

Very unlikely	Quite unlikely	Neither likely nor unlikely	Quite likely	Very likely
☐	☐	☐	☐	☐

What impact do you believe the introduction of this type of service would have on your mobility?

Very negative	Quite negative	Neither negative nor positive	Quite positive	Very positive
☐	☐	☐	☐	☐

Please think about how you might feel taking the following types of journey, based on your journey experience in the driverless pod:

	Very unsafe	Quite unsafe	Neither safe nor unsafe	Quite safe	Very safe
Driverless pod with attendant during the day	☐	☐	☐	☐	☐
Driverless pod with attendant during the night	☐	☐	☐	☐	☐
Driverless pod WITHOUT attendant during the day	☐	☐	☐	☐	☐
Driverless pod WITHOUT attendant during the night	☐	☐	☐	☐	☐

To what extent do you feel concerned about the following in relation to driverless vehicles like the pod you have experienced on these trials?

	Not at all concerned	Not very concerned	Neither concerned nor unconcerned	A little concerned	Very concerned
Occupant safety	☐	☐	☐	☐	☐
Pod safety in poor weather	☐	☐	☐	☐	☐
Speed of the pod	☐	☐	☐	☐	☐
Reliability of the pod	☐	☐	☐	☐	☐
Interactions with human-driven vehicles	☐	☐	☐	☐	☐
Interactions with pedestrians	☐	☐	☐	☐	☐
Interactions with cyclists	☐	☐	☐	☐	☐

How important are the following in relation to your feelings of safety on board a driverless vehicle like the one you experienced?

	Not at all important	Not very important	Neither important nor unimportant	Quite important	Very important
On-board attendant (e.g. safety steward who is there to monitor the performance of the vehicle and intervene in an emergency. The safety steward does NOT drive the vehicle).	☐	☐	☐	☐	☐
CCTV	☐	☐	☐	☐	☐
Ride/vehicle not shared with strangers	☐	☐	☐	☐	☐
Registration process for booking a journey on a vehicle	☐	☐	☐	☐	☐

How confident are you in the ability of...

	Not at all confident	Not very confident	Neither confident nor unconfident	Quite confident	Very confident
...driverless pods to avoid a collision with pedestrians and/or cyclists?	☐	☐	☐	☐	☐
...a similar human-driven vehicle to avoid a collision with pedestrians and/or cyclists?	☐	☐	☐	☐	☐

This question is about PARTIALLY DRIVERLESS vehicles - these are vehicles that could self-drive on motorways but where driver input would be required on other roads - e.g. rural roads and B roads. How interested would you be in owning or leasing a PARTIALLY driverless vehicle?

Not at all interested	Not very interested	Neither interested nor uninterested	Quite interested	Very interested
☐	☐	☐	☐	☐

What are the top three factors that would influence your decision to purchase or lease a PARTIALLY driverless vehicle? This is a vehicle that could self-drive on motorways but where driver input would be required on other roads - e.g. rural roads, B roads and trunk roads Please select three factors.

- ☐ Comfort
- ☐ Cost
- ☐ Safety
- ☐ Availability of different models/ makes/ brands
- ☐ Technology readiness
- ☐ Understanding of the technology
- ☐ Confidence in the technology
- ☐ Life or family circumstances
- ☐ Vehicle performance
- ☐ Recommendations from friends or family
- ☐ Other (please specify):

Please provide your reasons for not being interested in owning or leasing a partially driverless vehicle.

This question is about FULLY DRIVERLESS vehicles - these are vehicles that could self-drive on all types of roads without requiring human intervention. How interested would you be in owning or leasing a FULLY driverless vehicle?

Not at all interested	Not very interested	Neither interested nor uninterested	Quite interested	Very interested
☐	☐	☐	☐	☐

What three factors would most influence your decision to purchase or lease a FULLY driverless vehicle? This is, a vehicle that could self-drive on all types of roads without requiring human intervention. Please select three factors.

- ☐ Comfort
- ☐ Cost
- ☐ Safety
- ☐ Availability of different models/ makes/ brands
- ☐ Technology readiness
- ☐ Understanding of the technology
- ☐ Confidence in the technology
- ☐ Life or family circumstances
- ☐ Vehicle performance
- ☐ Recommendations from friends or family
- ☐ Other (please specify):

Please provide your reasons for not being interested in owning or leasing a fully driverless vehicle.

Thinking about driverless vehicles in general... How interested would you be in having an alternative to owning or leasing a driverless vehicle, for example driverless ride sharing or hire car services? (*A ride sharing service can be defined as a vehicle where you as the passenger can call out the vehicle. The vehicle could be shared with other members of the public and could stop at destinations other than the one you have selected)

Not at all interested	Not very interested	Neither interested nor uninterested	Quite interested	Very interested
☐	☐	☐	☐	☐

Thinking about your current transport needs, and if fully driverless vehicles were widely available, what would be your preferred driverless vehicle ownership model?

- ☐ I would like to own a personal driverless vehicle
- ☐ I would like to lease a personal driverless vehicle
- ☐ I would like to be able to rent or share driverless cars when required
- ☐ I would not use a driverless vehicle
- ☐ Other (please specify):

How many journeys a week do you generally undertake using each of the following modes of transport: Note that for the purposes of this survey 'a journey' constitutes a one way single trip. For example, a return journey by bus to/from your place of work would be 2 separate journeys and your response in the corresponding box would be '2' If you don't generally use any of the modes of transport below, please write '0' in the space provided. *

	Number of journeys
Bus	
Taxi	
Walking	
Motorcycling	
Cycling	
Tube/Train	
Car	

Other - If you regularly use a form of transport not mentioned above, please specify what it is and how many times a week you use it

If driverless pods were available as part of the transport network in your local area, approximately what percentage of your weekly journeys would you be willing to make by driverless pod (such as the one you experienced in the trials)? Please use the sliding scale to select a percentage.

0%

Please provide a brief explanation for your response

If all of the following transport options were available to you, how likely or unlikely would you be to use them?

	Very unlikely	Quite unlikely	Neither likely nor unlikely	Quite likely	Very likely
A fully automated, driverless bus-like service	☐	☐	☐	☐	☐
A human-driven bus service	☐	☐	☐	☐	☐
A fully automated, driverless taxi-like service where you can call out the vehicle and you as the passenger set the destination	☐	☐	☐	☐	☐
A human-driven taxi service	☐	☐	☐	☐	☐
A fully automated, driverless shared vehicle service where you as the passenger can call out the vehicle but the vehicle could be shared with members of the public	☐	☐	☐	☐	☐
A human-driven shared vehicle service	☐	☐	☐	☐	☐
Your own private human-driven vehicle (e.g. a private car)	☐	☐	☐	☐	☐
Your own private fully automated, driverless vehicle	☐	☐	☐	☐	☐

If all of the following transport options were available to you, how safe or unsafe would you feel using them?

	Very unsafe	Quite unsafe	Neither safe nor unsafe	Quite safe	Very safe
A fully automated, driverless bus-like service	☐	☐	☐	☐	☐
A human-driven bus service	☐	☐	☐	☐	☐
A fully automated, driverless taxi-like service where you can call out the vehicle and you as the passenger set the destination	☐	☐	☐	☐	☐
A human-driven taxi service	☐	☐	☐	☐	☐
A fully automated, driverless shared vehicle service where you as the passenger can call out the vehicle but the vehicle could be shared with members of the public	☐	☐	☐	☐	☐
A human-driven shared vehicle service	☐	☐	☐	☐	☐
Your own private human-driven vehicle (e.g. a private car)	☐	☐	☐	☐	☐
Your own private fully automated, driverless vehicle	☐	☐	☐	☐	☐

If all of the following transport options were available, what impact do you think a typical journey in each of the following transport options would have on the environment?

	Very low impact	Quite low impact	Moderate impact	Quite high impact	Very high impact
A fully automated, driverless bus-like service	☐	☐	☐	☐	☐
A human-driven bus service	☐	☐	☐	☐	☐
A fully automated, driverless taxi-like service where you can call out the vehicle and you as the passenger set the destination	☐	☐	☐	☐	☐
A human-driven taxi service	☐	☐	☐	☐	☐
A fully automated, driverless shared vehicle service where you as the passenger can call out the vehicle but the vehicle could be shared with members of the public	☐	☐	☐	☐	☐
A human-driven shared vehicle service	☐	☐	☐	☐	☐
Your own private human-driven vehicle (e.g. a private car)	☐	☐	☐	☐	☐
Your own private fully automated, driverless vehicle	☐	☐	☐	☐	☐

In general, how do you currently feel about driverless vehicles?

Very negative	Quite negative	Neither negative nor positive	Quite positive	Very positive
☐	☐	☐	☐	☐

To what extent do you have trust in the driverless technology as it is currently?

Not at all - no trust	To a small extent	To some extent	To a moderate extent	To a great extent - complete trust
☐	☐	☐	☐	☐

To what extent do you have trust in the driverless technology to be developed in the future?

Not at all - no trust	To a small extent	To some extent	To a moderate extent	To a great extent - complete trust
☐	☐	☐	☐	☐

How would you describe your current level of knowledge of driverless vehicle technology? *

Very low	Low	Moderate	High	Very high
☐	☐	☐	☐	☐

Which of the following best describes your own personal behaviour in relation to technologies such as mobile phones and household items?

- ☐ I like to buy the latest technology that is right at the cutting edge as soon as it is available
- ☐ I may not be the first but I like to own the latest technology before most people
- ☐ I like to buy the latest technology but only after considering which is best
- ☐ I like to buy items that have a proven technology rather than simply the latest technology
- ☐ I only buy new technology when it has become standard and there is no alternative

Which of the following best describes your own personal behaviour in relation to VEHICLE TECHNOLOGY (including electric vehicles and new vehicle models)?

- ☐ I like to buy the latest technology that is right at the cutting edge as soon as it is available
- ☐ I may not be the first but I like to own the latest technology before most people
- ☐ I like to buy the latest technology but only after considering which is best
- ☐ I like to buy items that have a proven technology rather than simply the latest technology
- ☐ I only buy new technology when it has become standard and there is no alternative

Have you previously had experience of driverless vehicle technologies?

- ☐ No
- ☐ Yes (please specify):

Do you identify as:

- ☐ Female
- ☐ Male
- ☐ Non-binary/other

☐ Prefer not to say

How old are you?

☐ Under 18
☐ 18-24
☐ 25-34
☐ 35-44
☐ 45-54
☐ 55-64
☐ 65-74
☐ 75-84
☐ 85+

Have you completed a survey about your experience with the Greenwich driverless pod before?

☐ Yes
☐ No
☐ Don't know

Do you currently hold a full, valid driver's licence for your country of residence? (This does not include a provisional licence)

☐ Yes
☐ No

How long have you held a driver's licence for?

☐ Less than 1 year
☐ 1-5 years
☐ 6-10 years
☐ More than 10 years

Do you currently own a car?

- ☐ Yes
- ☐ No

Do you have any disabilities or additional travel needs?

- ☐ Yes
- ☐ No

[If yes] Please specify:

- ☐ Wheelchair user
- ☐ Mobility impaired
- ☐ Blind or partially sighted
- ☐ Deaf or hard of hearing
- ☐ Learning disability
- ☐ Prefer not to say
- ☐ Other (please provide details if you are happy to do so):

We would like to know which areas of the country are represented in responses to this survey. Please provide the first 3 or 4 digits of your home postcode (e.g. for RG40 3GA enter 'RG40'). This information only identifies your postal district.

If you have any additional comments or information, please include them here:

Led by

Supported

Crowthorne House, Nine Mile Ride,
Wokingham, Berkshire, RG40 3GA,
United Kingdom
T: +44 (0) 1344 773131
F: +44 (0) 1344 770356
E: enquiries@trl.co.uk
W: www.trl.co.uk

ISSN

ISBN

RPN4206