Customer attitudes to Autonomous Vehicles and Ride-sharing

April 2018
<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>3</td>
</tr>
<tr>
<td>Key Findings</td>
<td>4</td>
</tr>
<tr>
<td>Recommendations for Mobility Service Operators</td>
<td>5</td>
</tr>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>Research Findings</td>
<td>6</td>
</tr>
<tr>
<td>Customer travel decision criteria which could impact AV ride-sharing service</td>
<td>6</td>
</tr>
<tr>
<td>Customer attitudes to an AV ride-sharing service</td>
<td>8</td>
</tr>
<tr>
<td>Attitudes towards autonomous vehicles</td>
<td>8</td>
</tr>
<tr>
<td>Attitudes towards ride-sharing</td>
<td>9</td>
</tr>
<tr>
<td>Scenarios and routes</td>
<td>10</td>
</tr>
<tr>
<td>Recommendations for mobility service providers</td>
<td>11</td>
</tr>
<tr>
<td>1) Offer different types of service and AVs for different market demands</td>
<td>12</td>
</tr>
<tr>
<td>2) Design AV services to cover different operating zones</td>
<td>12</td>
</tr>
<tr>
<td>3) Widely educate about autonomous vehicle and ride-sharing safety</td>
<td>12</td>
</tr>
<tr>
<td>4) Design vehicles and customer service to guarantee personal safety</td>
<td>13</td>
</tr>
<tr>
<td>5) Design some services to have an authority figure, a 'steward' on board</td>
<td>13</td>
</tr>
<tr>
<td>6) Let customers see the benefit of autonomy through pricing and payment innovation</td>
<td>14</td>
</tr>
<tr>
<td>Personas of potential AV ride-sharing customers</td>
<td>15</td>
</tr>
<tr>
<td>Conclusion</td>
<td>18</td>
</tr>
<tr>
<td>Appendix</td>
<td>19</td>
</tr>
<tr>
<td>Methodology</td>
<td>19</td>
</tr>
<tr>
<td>Breakdown of survey respondents</td>
<td>19</td>
</tr>
</tbody>
</table>
Executive Summary

Autonomous vehicles and ride-sharing services are increasingly in the news and at the forefront of industry and Government plans for future transport systems. The last five years have seen significant developments in this space: autonomous vehicle (AV) technology is now being tested on public streets; new mobility services and business models such as ride-hailing, ride-sharing and shuttle services have entered the market and are showing growth; and partnerships have been formed between new mobility services entrants and traditional vehicle manufacturers. Convenience, quality, customer experience, safety and acceptable price are all features that customers expect today and which will drive growth and development of mobility services in the future.

With these customer expectations in mind, the success of AV technology and AV-based mobility services will depend very much on customer acceptance and adoption. It will also depend on cities encouraging and supporting the use of AV based services. Having urban centres serviced by AV in a ride-share mode is widely tipped as a means of reducing congestion, improving air quality, making traffic less of a hazard and making better use of space.

It is critical, therefore, to understand customer perceptions, motivations and concerns about autonomous vehicles (AVs) and ride-sharing in order to know how to engage them as mobility customers, to know how to deliver an AV based service that will meet their expectations on every level, to do so in a way that supports city agendas for social benefits and to understand how to commercially deliver such a service.

The MERGE Greenwich project was setup to develop these understandings, to clarify how an AV ride-sharing service could appeal to customer motivations and could be designed to overcome any potential barriers to adoption.

This report covers the customer research conducted as part of the project. The customer survey allows us to analyse AV ride-share from a consumer perspective. This involved an online survey of 324 people and face-to-face focus groups in order to hear directly from potential users about their willingness, or otherwise, to use such an AV ride-share service. Respondents were asked to consider an AV service not just for individual trips but also in a ride-share mode.

“AV technology was the aspect of the service which potential customers were most excited about, whereas respondents were hesitant about sharing a journey with strangers.”

---

1. Commuting, business travel, shopping, leisure activities, and other journeys.
Key findings

AV technology was the aspect of the service which potential customers were most excited about, whereas respondents were hesitant about sharing a journey with strangers. Over 85% of survey respondents indicated willingness to use an AV in the future. Less than half (46%) were willing to use a ride-sharing service for various types of journeys once or twice a week. This willingness dropped (to 26%) when respondents considered using a ride-sharing service three or more times a week.

While most reactions to AVs were polarised, either positive or negative, the majority of people thought they would eventually use AVs. The readiness to accept AV technology was driven by an assumption that regulators would require AV technology to be proven through rigorous testing before being deployed for commercial use and available for members of the public to use.

On the other hand, concerns relating to privacy and security deterred a number (15%) of participants from showing a willingness to adopt ride-sharing. Sharing a journey in a small space (such as a saloon car) implied different social rules compared to, say, sharing a busy tube carriage or bus. This indicates that vehicle design would be key to overcoming barriers to ride-sharing, by ensuring the environment provided personal space, safety and comfort. Design of the digital customer interface (booking App), presentation of information (e.g. route, location sharing, emergency call button) and the ability to speak directly to a person in authority were identified as other ways to overcome consumer concerns, by providing transparency, emergency contacts and reassurance of safety.

Our research indicated that the most likely users of an AV ride-sharing service will be men with an average age of 45, whereas women over 50 are the least likely to use such a service. Men indicated they are more excited about the technology of AVs, whereas women are much more concerned with personal safety. Having a steward on-board an AV ride-sharing service would go a long way towards easing potential customer concerns (57% of respondents indicated this would increase their willingness to use the service). Also, offering a shared, fixed route, shuttle-type service was more popular than a shared service which had non-fixed destinations. Knowing the route increased the perception of control and safety among potential passengers.

Compared to other survey respondents, private car users are more likely to adopt an AV ride-sharing service (28% of respondents who use a private car for leisure and 18% who use one for commuting indicated a high likelihood), as people are increasingly frustrated with the reality of owning and operating a personal vehicle (traffic, parking, congestions fees and fines or parking tickets). A small number (6%) of frequent taxi users (more than one journey a week) indicated they would be highly likely to switch to an AV ride-sharing service.
Introduction

The MERGE Greenwich project aims to develop a blueprint for an AV ride-sharing service which integrates with public transport systems.

This project is being delivered by a consortium led by global mobility services operator, Addison Lee, and involves expert input from Ford, TRL, Transport Systems Catapult, Immense Simulations and DG Cities. Jointly funded by the UK Government and industry, the £1 million project will take 12 months, concluding in summer 2018.

We designed a two-step study to investigate the attitudes of potential customers towards an AV ride-sharing service. Given that autonomous vehicles are not yet market-standard and that potential customers might be very unfamiliar with the technology, we gathered both quantitative and qualitative data. First, we conducted an online survey, garnering 324 respondents, which focused on current travel modes and attitudes towards autonomous vehicles, ride-sharing and an AV ride-sharing service. Second, we conducted focus groups to gather in-depth and robust qualitative data to understand customer attitudes and barriers to uptake.

This report captures the findings from MERGE Greenwich research to share public attitudes towards an AV ride-sharing service, the key motivations towards using such a service and how to overcome potential barriers to successful implementation. Current travel modes, decision-making criteria along with attitudes towards AV technology, ride-sharing and the combined service offering were analysed in order to develop this report.

Recommendations for Mobility Service Operators

From our research we were able to draw a number of passenger-centric recommendations which may help operators design the next generation of mobility services based on AV technology. These are explored in more detail in this report:

1) Offer different types of service and AVs for different market demands
2) Design AV services to cover different operating zones
3) Widely educate about autonomous vehicle and ride-sharing safety
4) Design vehicles and customer service to guarantee personal safety
5) Design some services to have an authority figure, a ‘steward’ on board
6) Let customers see the benefit of autonomy through pricing and payment innovation
Customer travel decision criteria which could impact AV ride-sharing service

MERGE Greenwich aims to simulate an AV ride-sharing service which complements, rather than competes with, existing public transport services. Thus, we set about knowing potential customers’ current travel habits to help understand where best to promote the service.

Figure 1: Travel habits of commuter and leisure passengers

Current commuting travel habits of potential customers

Current leisure travel habits of potential customers
When commuting (three or more times per week) the most prevalent modes of transport were: bus or underground train with 49% of survey respondents using either or both; 42% said they walked and 38% used their personal car\textsuperscript{3}. However, for leisure purposes (up to three times per week), walking increased to 58%, personal car usage increased to 55% and use of the bus or underground dropped to 29%.

In general, focus group respondents (who were based in London) were positive about current public transport options (e.g. bus and tube) and considered it an efficient way of moving around in central London. However, areas outside central London were noted by respondents as being more cumbersome to reach via current public transport routes. For example, in the Royal Borough of Greenwich there is a disparity in public transport options between the North (closer to central London) and the South (further from central London). Areas in the South are less well-connected to economic activities within the Borough as well as the wider city by public transport; meaning use of a personal car is more prominent\textsuperscript{4}.

This suggests there may be an opportunity to target commuters travelling from further outside London into the city centre with new mobility services. For example, commuters in suburban areas could use an AV ride-sharing service to travel from their home to the train station, and then commute to central London via public transport, instead of using their personal vehicle for the whole journey.

**Figure 2: Decision-making criteria for travel**

<table>
<thead>
<tr>
<th>Current travel decision making criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time</strong></td>
</tr>
<tr>
<td>Not at all important</td>
</tr>
</tbody>
</table>

3. These modes of transport could be interchanged, and survey respondents could choose more than one mode.

4. This is further explored in the MERGE Greenwich report, City Compatibility Considerations for Autonomous Vehicle Ridesharing Services.
Respondents were asked about the importance of various journey aspects when considering their transport choices (Figure 2). The three most important decision-making factors, ranking very important or quite important, were time (97%), convenience (97%) and safety (94%). The three least important factors, ranking not at all important or not very important, were the ability to socialise face-to-face with others (58%), the ability to carry out work tasks while travelling (46%) and the ability to carry out other tasks while travelling (29%). Near the office or at an event could provide a strong motivation for travellers to switch to AV ride-sharing instead of using a private car.

However, not all private car journeys could be replaced with an AV ride-sharing service. Many people choose to drive a car because of the personal space and storage as well as convenience of completing the end-to-end journey. For parents of young children, the car is often seen as adjunct to the home where they can store paraphernalia between journeys (car seats, buggies, sporting equipment, etc.) which would not be easily replaced by an AV ride-sharing service. For some, the personal freedom of private car usage is an expectation which an AV ride-sharing vehicle would struggle to meet.

Although fewer respondents use a taxi on a weekly basis, this small group (6%) expressed the greatest willingness to switch to using AV ride-sharing services. They are therefore likely to be early adopters of an AV ride-sharing service and good targets for running pilots in the run up to a wide-spread publicly available service.

As noted earlier, another opportunity to meet the demand for timely, convenient and safe transport through an AV ride-sharing service lies in areas where public transport options are limited. For example, travellers outside central London would benefit from an on-demand, cost-effective, safe mode of transport that connects isolated customers with current public transport options.

**Customer attitudes to an AV ride-sharing service**

In the focus group discussions, initial attitudes towards an AV ride-sharing service were emotional and powerful and elicited strong immediate reactions both positive and negative. Some people were very excited about the service; intrigued by the autonomous aspect and the modern technology advances it represents. Others were more fearful and rejecting. The notion that a car has no driver feels fundamentally dangerous to some and the added concept of sharing a ride with strangers only increases the sense of risk for some people.

Initial thoughts about the AV ride-sharing service centred around the potential risks rather than the potential benefits. This suggests the success of such a service will depend on increasing awareness about the benefits of AV ride-sharing and explaining how potential risks have been mitigated.

**Attitudes towards autonomous vehicles**

Men (20%) are more likely than women (13%) to state that they would travel in an AV ‘as soon as possible’, while women (20%) are more likely than men (6%) to state that they would travel in an AV ‘when it becomes commonplace’
People under 35 years of age are most likely to use an AV as soon as they are able to (39%), with a smaller group intending to wait until it becomes commonplace (25%). Conversely, among those aged 55 and over, 38% intend to wait until it becomes commonplace and 28% would use an AV as soon as possible. Overall, women are more cautious about using AVs while younger age groups are more eager to use AVs.

Research participants largely agreed (63%) that AVs would allow more free time (e.g. to be able to work instead of drive) on their journey; however, they are uncertain whether AVs would result in more comfortable and safer journeys for passengers and pedestrians. Participants are also uncertain as to whether or not they would still need a driving licence if AVs came into widespread use.

This study highlighted that a major concern about AVs was their interaction with humans. If all vehicles on the road were autonomous then people generally assumed that safety would increase. However, there are concerns about how AVs would integrate with human drivers as people view human judgement and the driving judgement exhibited by AVs to be very different. There is an underlying concern about an AV’s lack of intuition and therefore its ability to predict human behaviour.

Attitudes towards ride-sharing

While most people seem to be familiar with the concept of ride-sharing, very few have ever taken a ride-share service, despite these services being available publicly for some time. Older generations and women are less familiar with the concept compared with younger generations and men. However, familiarity or previous experience with ride-sharing services is not necessarily correlated to willingness to use a ride-sharing service in the future.

There is a higher willingness to use a ride-sharing service for commuting (20% at least once a week) and leisure activities, especially in the evening or late at night (33% at least once a month). On the other hand, there was a low willingness to use a ride-sharing service for shopping or business travel.

Ride-sharing will be the largest attitude barrier to overcome when designing an AV ride-sharing service offering. A key emotional benefit to travelling by car or taxi is the sense of control and personal space. While public transport does not deliver personal space there are different ‘social rules’ that apply in this setting: ignoring people is considered the norm and the idea of talking with fellow passengers is unusual. Also, public transport vehicles are larger so there is usually a choice in where to sit, or even to stand, making it easier for users to avoid people they may have concerns about. This enables a different kind of personal
space to exist within the confines of public transport, but participants were unsure on how these 'unwritten rules' would apply to ride-sharing.

Travelling in a confined space, such as the intimacy of a car, suggests the unwelcome need to talk to other passengers. This is one key reason why many people rejected the ride-sharing services such as Uber Pool or Lyft Line. However, those who initially rejected the idea of sharing a journey with strangers also voiced positive experiences, such as meeting new people on a ride-sharing service while outside the UK. This suggests that the initial reaction of potential customers to reject ride-sharing could be overcome by encouraging them to experience a journey at least once. Research participants indicated that a positive first experience in a ride-share service would go a long way to overcoming that barrier.

In addition to the potential social discomfort of sharing a car with strangers, a number of focus group respondents thought that it would feel 'frighteningly isolated' without an authority figure present, such as a vehicle steward. Other public transport options (underground or bus) benefit from safety in numbers and the frequent stops mean it is possible to call for help at regular intervals. The confined and intimate space, combined with the infrequent stops imagined by respondents in a ride-sharing service, negates these public transport assurances. This uncertainty is increased when respondents imagine ride-sharing at night.

**Scenarios and routes**

The MERGE Greenwich research found that participants thought the most likely scenario for an AV ride-sharing service would be between two fixed locations (e.g. a shuttle service), followed by using an AV to deliver shopping or takeaways, then lastly a private, non-shared journey (e.g. a taxi). An AV ride-sharing service without a fixed destination would be the hardest option to implement as it was seen as the least popular offering and led to the most concerns.

There is more willingness to use a shared service with a fixed route and destination, whereas a shared service with an undetermined route has unknown factors (thus leaving the passenger with a reduced sense of security). Women are slightly more willing than men to use an AV ride-sharing service with fixed locations (W= 42%, M= 35%) and for private journeys (W= 37%, M= 30%) but are roughly equally willing as men to use the service with flexible routes (W= 28%, M= 26%) and as a delivery service (W= 39%, M= 34%).

---

Recommendations for mobility service providers

From our research we were able to draw a number of passenger-centric recommendations which may help operators design the next generation of mobility services based on AV technology.

Although the autonomous technology component was not in itself perceived by customers to carry many benefits, it was nonetheless felt to be the main element of excitement in the service design. Service providers who promote the innovative nature of the AV ride-sharing service, for example through cutting edge digital customer interaction on the App and inside the vehicle, are most likely to appeal to early adopters of technology. Focusing on this audience is, in turn, likely to encourage other customers to use the service once a tipping point of influencers is reached. This tipping point is generally considered to be 16% of the population\(^\text{6}\), which gives AV ride-sharing operators a target market penetration for the launch phase of the service.

The first major concern for service-providers to address is the lack of perceived control over the journey (both around the journey route and shared occupancy), the second is the lack of trust in automation versus human decision-making when dealing with traffic and pedestrians and the third is the lack of an authority figure when sharing a confined space with strangers.

All of these fears can be somewhat alleviated or mitigated by emphasising the perceived benefits of the service offering. While there are many concerns surrounding the ride-sharing aspect of the service, it is also seen as an effective way to overcome current transport and environmental challenges.

Overall, it is important to bear in mind that ride-sharing carries rational benefits (linked to reduced emissions and congestion due to less cars on the road, no need to think about parking, etc.) and the autonomous vehicle element presented emotional benefits (linked to the excitement around new technology). Understanding these distinctions between the rational and emotional benefits could help mobility service providers address the concerns potential customers may have about AV ride-sharing and develop a service which appeals to the motivations of potential users.

---

6. Maloney’s 16% Rule assumes 2.5% of innovators plus 13.5% of early adopters have adopted the innovation. Once 16% adoption of any innovation has been reached, the theory suggests the messaging and media strategy should be updated from one based on scarcity, to one based on social proof, in order to appeal to the wider audience.
1) Offer different types of service and AVs for different market demands

Customer perception of the service is clearly influenced by the design of the vehicle. A customer’s relative proximity to a stranger and the behavioural expectations when sharing a confined space are different from a scenario where the customer is not sharing with a stranger or is taking a private ride. In addition it is clear from the survey that there are market opportunities for shuttle-type shared service options as well as continuing to fulfil the need for independent, private journeys. It is therefore safe to conclude that a number of vehicle types will be required to cover all passenger transportation needs – cars, minivans, shuttle types should all be considered in the design of services and the fulfilment of customer needs.

2) Design AV services to cover different operating zones

The research indicated there are parts of Greenwich which are currently under-served by public transport modes and therefore would lend themselves to new mobility services such as an AV ride-sharing option. It is reasonable to assume that service providers should design their services for operating zones that may be inner city, inner-suburb or suburb-to-city. It is also reasonable to assume that, if autonomous technology reduces operating costs as is widely expected, operators should design for more comprehensive cover of geographic areas to give customers more choice through better availability.

3) Widely educate about autonomous vehicle and ride-sharing safety

Potential customers want to know that the new AV technology is safe. A successful service design must reassure passengers about the security of the vehicle, the safety of the technology and the particularly of the technology when deployed with other road users and pedestrians. Many focus group participants assumed that regulatory measures would account for this aspect of the service design and the service operator will need to make safety assurances visible to the passenger. This could be similar to displaying the licence details of a taxi driver today. Education could also be delivered through engagement with the customer via Customer Relationship Management as part of the services wrapped around a passenger’s journey.
4) Design vehicles and customer service to guarantee personal safety

The results indicated that the concept of sharing a ride with strangers was largely viewed as potentially unsafe. Therefore, the vehicle design and in-vehicle experience will have to allay personal security concerns and create a space which feels comfortable and safe.

For example, designing the AV using current underground seating configurations would transfer the social rules observed on public transport to the AV ride-sharing service.

Furthermore, designing the vehicle with the ability for people outside to look in (e.g. a lot of windows) would increase passengers’ perception of safety. This desire to be ‘publicly visible’ allows for the ‘safety in numbers’ concept that many find comfortable on other modes of public transport. This concept (‘passive surveillance’) is also widely adopted as good practice in wider streetscape design.

The ability to alert those outside the vehicle to trouble inside the vehicle would be crucial to increasing positive assumptions of safety for an AV ride-share service. For example, if a passenger felt unsafe or in case of emergency, they could push an ‘emergency call’ button that would contact the operator for support and make the vehicle light up, or stop its journey if appropriate, thereby alerting other AV ride-sharers, as well as other cars users and pedestrians, that the passengers inside the AV are in need of help. This call for help could be achieved in a number of ways, such as through the booking App or an in-vehicle video link.

To complement the in-vehicle experience, a customer service wrap would provide customers with a digital interface to the service, as well as ensuring that they could speak to a person in a position of authority in real time, in the event of problems, queries or challenges with using the service.

The absence of a person in authority on board, or the lack of driving controls, may cause customers to feel that they lack control. A successful service design will address this by including in the service and experience elements that restore that sense of control. This could mean designing a booking App so that customers can track their journey, and be tracked where permissions allow, share their journey live with trusted persons outside the journey, enable person-to-person contact with the service operator, and give the passenger the ability to stop and exit the vehicle when desired.

The customer service wrap will be a crucial component for combating both the safety concerns surrounding a ride shared with strangers and the new technology aspect, and for delivering a good emotional outcome for passengers. The service design should offer constant connectivity with the service provider’s ‘HQ’ via the digital interface. Where a person in authority is not on board, a direct interface with ‘HQ’ in the vehicle itself would reduce the sense of passenger isolation.

5) Design some services to have an authority figure, a ‘steward’ on board

MERGE Greenwich recommends some AV ride-sharing services would benefit from having a steward on board for passenger comfort and emergencies. Our research showed that this would go a long way towards alleviating some potential customers’ concerns. While the steward would not be responsible for the direction of the journey or driving the vehicle, he/she would be there to monitor social interactions and maintain a level of comfort within the vehicle, as well as carry out other non-driving duties. The steward would provide a much-welcome authority figure who is safeguarding, impartial and trustworthy. In some instances, the steward would be vital for the potential customer’s journey, e.g. if the passenger has a disability and is travelling alone, or has luggage to carry, or for delivering a high quality customer service, e.g. Meeting and Greeting. An in-vehicle video link, which connects passengers to an authority figure in real time in a contact centre, would be one way of
addressing some demands but, for others, having a steward travelling with the vehicle could be the best option.

A current example of this authority figure being present is on the Docklands Light Railway (DLR), a public service using autonomous trains, which has a ‘captain’ on board certain trains. The sporadic presence of this authority figure is enough to offer reassurance to passengers, without the cost of a safety steward being aboard every vehicle. The ‘occasional steward’ model works well in a service which aims for high density with relatively low cost, yet still aims for optimal passenger safety. This could indicate that a service carrying multiple passengers, such as an AV ride-sharing service using minibus-style vehicles, might be more closely aligned with public transport than private services.

6) Let customers see the benefit of autonomy through pricing and payment innovation

Participants were not immediately aware of the benefits to them of autonomous vehicle technology. There is a widespread opinion however that there is a cost benefit of deploying autonomous vehicles in place of conventional driven services. If this is the case, operators should plan for customers to see the benefit of technology in lower cost journeys.

Participants’ expectations of the pricing of an AV ride-sharing journey were dependent upon their individual budgets and current transport choices. Pricing considerations were presented comparatively to current London transport options and most people anticipated a fixed price per journey, regardless of how many other passengers might be in the vehicle. However, potential customers indicated that they would appreciate a mechanism by which they could select from a choice of prices, depending on how many stops they are willing to make. Responses to the survey indicated that respondents would accept an increase in journey time to collect additional passengers of between 6 and 15 minutes for a 30% reduction in fare, compared to a normal taxi ride.

It is also worth noting that focus group attendees expected that payment for an AV ride-sharing trip would be integrated or seamless with paying for journeys on public transport. They would anticipate paying one platform or operator for an end-to-end trip, rather than paying separately (and potentially paying significantly more) to different operators. This may indicate that potential users of AV ride-sharing anticipate the service being part of public transport and/or being provided by a public operator.

To keep prices within an acceptable range and to encourage higher commitment to using services, operators may like to consider alternative payment methods to pay-as-you-go. Subscription based pricing could lend itself well to AV ride-sharing services, either in combination with a pay-as-you-go top-up or to cover all journeys in entirety.
Personas of potential AV ride-sharing customers

Using the results from the qualitative research, five key personas were developed, which capture the different attitudes and motivations of distinct groups of potential AV ride-sharing customers.

It is worth noting that these personas should be regarded as indicative at this stage. They are based on a relatively small sample size, which means it was not possible to carry out statistically significant analysis of small sub groups and a degree of subjective judgement is therefore required. If a larger sample were available, additional personas may be identified. It is expected that more extensive market research would be undertaken as part of the roll out of the AV ride-sharing services, enabling the personas to be updated and become even more representative of the population7.

These personas are being used in the MERGE Greenwich project as an illustrative indicator of potential customer behaviour and will inform the demand model and service design.

The first identifying factor to mention is that the MERGE Greenwich personas are gender specific because the research revealed this was key differentiator in the willingness to use an AV ride-sharing service. Each persona is explained in more detail below:

Five key personas came out of the MERGE Greenwich study:

- **Forward-thinking Fred**
  - Male
  - Mid-high Income
  - All ages
  - 27% of survey respondents (n=88)

- **Independent Ian**
  - Male
  - Low-middle income
  - All ages
  - 15% of survey respondents (n=49)

- **Hopeful Helen**
  - Female
  - Higher income
  - Young and middle-aged
  - 26% of survey respondents (n=82)

- **Safety Susan**
  - Female
  - Low-middle income
  - Mid - older ages
  - 11% of survey respondents (n=36)

- **Neutral Nancy**
  - Female
  - All ages
  - All incomes
  - 20% of survey respondents (n=63)

7. It is also worth noting that lower income groups may not be as well represented in this research as they would be in a larger study. Ing and media strategy should be updated from one based on scarcity, to one based on social proof, in order to appeal to the wider audience.
**Forward-Thinking Fred** is male of varying ages and more likely to have a higher income (above £50k). He is highly motivated to use an AV ride-sharing service with very few concerns surrounding the service offering. He has many key motivators including not needing to park his own car, the convenience of the service and the reduced cost. He is highly likely to be motivated by sustainable aspects of the service. He is very likely to use all types of service offerings (shuttle, non-fixed, delivery, and taxi-style).

**Hopeful Helen** is female and slightly younger (more likely to be under 35) and is likely to be more affluent than other female personas (varying incomes, most often between £20k and £70k). She is highly likely to use an AV ride-sharing service as she believes this will be safer, increase her free time, and be more comfortable and convenient than current transport. Like Forward-Thinking Fred, Hopeful Helen has several key motivators: not needing to park, reduced cost, greater convenience and sustainability of the service. She, too, would use all service offerings including a non-fixed route, shuttle, delivery and taxi-style services. Hopeful Helen is mildly concerned about sharing a journey with strangers. This may not be enough to deter her from trying the service, but the presence of a steward would go a long way towards allaying any concerns she may have.

**Neutral Nancy** is female and slightly more middle-aged than Hopeful Helen (but still likely to be under 45) with a mid-level income (more likely to be between £20k and £50k). She is very unsure about using an AV ride-sharing service in any form: non-fixed route, shuttle service, delivery or taxi-style. She has strong concerns about sharing a journey with strangers and slight concerns about the newness of the technology. However, she does have high motivators to use an AV ride-sharing service in the future, including: not needing to park, reduced costs, convenience and sustainability of the service.

**Independent Ian** is male of varying ages and more likely to have a lower income (more likely to have a lower income than Fred (below £50k). He has an average willingness to accept an AV ride-sharing service; he might use it and he might not. He is slightly concerned about sharing a journey with strangers and the increased travel time compared with his personal car. He has no obvious key motivators to use an AV ride-sharing service and is most concerned with the lack of freedom from sharing a journey route. He probably hasn’t used a ride-sharing service in the past but is open to using one in the future for leisure activities.

**Safety Susan** is female, a bit older (over 35) with varying incomes (£22k to £50k). She is highly unlikely to use an AV ride-sharing service until it becomes common place. She does not view the service as safe, more comfortable or more convenient than current transport options. She is very concerned with sharing a ride with strangers and does not trust the newness of the AV technology. She is also concerned with the increase in travel time of an AV ride-sharing service compared with a personal car. She is highly unlikely to use an service offering of an AV ride-sharing service however she might be willing to use one in the future for commuting or leisure activities.
Personas by likelihood of AV ride-sharing Adoption

Likelihood of adoption (%)

Average income (£k)

100
60
20
20 40 60 80 100
In order for an AV ride-sharing service to be successful it would need to appeal to customer motivations and overcome potential barriers or concerns.

Research conducted by MERGE Greenwich revealed the difference between rational factors (such as how well the technology worked) and emotional factors (such as the customer experience of ride-sharing). The conclusion of this research is that, on balance, ride-sharing presents a greater barrier-to-uptake than AV technology.

Apprehension towards the new AV technology aspect of the service was found to be prevalent but simpler to overcome as people assumed that AVs would not be allowed on the road by regulators until proven to be safe. The new technology also proved to be the aspect of the service for which potential customers were most excited. Therefore the experience of using AV technology is suggested as a key area of focus for service-providers to promote.

Potential customers are extremely hesitant about sharing a journey with strangers. MERGE Greenwich recommends that any AV ride-sharing service is designed with these sharing concerns in mind, in order to ensure both the vehicle design and the App are fit for purpose. Added to this, people are more used to the sharing model in the context of public transport and services. Adopting public transport style seating and payment mechanisms may help meet customer expectations. This could also suggest that mass transit AV ride-sharing services may fit more naturally within the public transport network.

MERGE Greenwich identified that the greatest opportunity for an AV ride-sharing service would be to target areas which are currently underserved by public transport, especially where private car usage is also high. This would have an added benefit of positively impacting the transport network, by reducing congestion and emissions. In order for an AV ride-sharing service to attract customers, public education about AVs will be essential. MERGE Greenwich recommends that Government takes a leading role in this area and that education regarding AVs extends to all road users, not just potential passengers. Adding to this, service providers will need to provide reassurance about personal safety during ride-sharing. Having the ability to make contact with the service provider will be required for all passengers and the presence of an on-board steward will be required for some. This steward would also be able to help certain passengers with luggage, accessibility etc.

As with any mode of transport, a successful AV ride-sharing service will need to satisfy the key decision-making criteria of cost, safety, convenience, and sustainability. The MERGE Greenwich consortium believes this service could be developed in a way which complements, rather than competes with, existing public transport, which could improve the efficiency of the transport network as a whole.

Overall, the MERGE Greenwich research demonstrated people would be keen and willing to use an AV ride-sharing service, provided their concerns are be addressed in the service offering.

Overall, people were keen and willing to use an AV ride-sharing service provided their concerns would be addressed in the service offering.

---

8. 28% of private car users indicated they would be very likely to use an AV ride-sharing service for leisure (18% said the same for commuting). This compares to 10-11% who indicated they would be likely to switch from public transport to AV ride-sharing for leisure trips (15% for commuting).
Appendix

Methodology

<table>
<thead>
<tr>
<th>Method of Data Collection</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Survey</td>
<td>A survey was conducted with 324 participants and focused on current travel modes and customer attitudes towards autonomous vehicles, ride-sharing, and an AV ride-sharing service.</td>
</tr>
<tr>
<td>Focus Groups</td>
<td>Focus groups were held to gather in-depth and robust qualitative data in order to understand customer attitudes and barriers-to-uptake. Solutions to these barriers were then tested and queries made regarding how an AV ride-sharing service could fit in with current transport decision-making criteria. Focus group respondents should be seen as Early Adopters or Opinion Leaders and may not be representative of the general public.</td>
</tr>
<tr>
<td>Persona Development</td>
<td>The results from the survey and the findings from the focus groups were analysed to identify different attitudes from respondents with similar demographic characteristics (gender, age and income). These main demographic categories were compared against each of the survey questions to deduce main findings and attitudes. The comparisons were then generated into ‘personas’ to categorise the main attitude findings. Common western names were applied to these personas as ethnicity data was not collected as part of this study.</td>
</tr>
</tbody>
</table>

Unless otherwise noted, the outputs stated in this report are a combination of results from the survey and focus groups.

Breakdown of survey respondents:

42% of survey respondents were male and 56% were female (others preferred not to say).

Over a third of respondents (39%) were aged under 34, while only a small proportion of survey respondents were aged 65 or over (5% aged 65-74, 1% aged over 75). Older individuals may be a key market for autonomous vehicle ride-sharing services but are under-represented in this survey. Younger respondents have consistently been shown to hold more positive attitudes to new technology, and it appears that this extends to driving technology (for example König and Neumayr\(^9\) (2017) found that older individuals tend to hold less positive attitudes to self-driving cars).

The most common mode of transport used by survey respondents to commute three or more times a week was the private car (37%), compared to underground (25%), local buses (23%) and taxi (2%). This trend was even more prominent for frequent leisure trips: private car (54%), underground (15%), local buses (14%) and taxi (2%).

Therefore, the predominantly younger sample may bias the results towards more positive attitudes. Whilst this may be the case with respect to the survey, the focus groups conducted as part of this research were able to provide some insights from older individuals (73% of focus group attendees were aged over 55). This report aims to present a balanced view by capturing findings from both the survey and the focus group.

86% of respondents were based in the greater London area with the rest of respondents across a geographic spread in the United Kingdom (outside the greater London area, 11%), continental Europe (1%), South Africa (0.3%), Russia (0.3%) and the USA (0.9%). Responses from UK participants were used for this analysis.

All respondents chose to complete the survey following an invitation to do so (either by email or after visiting a website publicising the survey), thus introducing a self-selection bias. The survey was completed online which may increase the possibility that the respondents were more ‘tech savvy’ than the general population. The sample may also tend towards those with a greater interest in autonomous vehicles in Greenwich (for example more than 10% of respondents were employed by the Royal Borough of Greenwich), while those on a higher salary are also over-represented compared to the general population (14% of respondents who indicated their salary reported a personal income of £70k or more, while nationally 5% of workers earn £70k or more).

Understanding the demographics represented by the survey sample will help the project team to avoid biases when making use of the data in future work packages. In addition to the survey and focus group insights, the consortium will draw upon other research into attitudes towards ride-sharing that are identified as the project progresses.