



InnovateUK  
KTN

# Accessible and Inclusive Transport

Innovation in UK transport to enable access  
and inclusion, successes and opportunities

March 2023

# Contents

*Our interactive contents page can be clicked on:*

Foreword	3
Welcome	5
Introduction	7
Executive Summary of Research Findings	11
Opportunities for Innovation	14
Rail Industry Perspective	19
Barriers to Travelling by Rail	21
Rail Innovations and Solutions	25
Aviation Industry Perspective	29
Barriers to Travelling by Air	31
Aviation Innovations and Solutions	33
Maritime Industry Perspective	38
Barriers to Travelling by Boat and Ship	39
Maritime Innovations and Solutions	40
Micro-mobility and Active Travel	43
Barriers in Micro-mobility and Active Travel	44
Micro-mobility and Active Travel Innovations and Solutions	45
Bus Industry Perspective	47
Barriers to Travelling by Bus	49
Bus Innovations and Solutions	51
Electric Vehicle Industry Perspective	54
Barriers to Travelling by Electric Vehicle	55
Electric Vehicle Innovations and Solutions	56
Automation and Digital Perspective	57
Barriers in Automation & Digital Accessibility	59
Automation & Digital Innovations Solutions	60
Next Steps	62
Bibliography	64
RiDC Survey: Further Data	66

# Innovate UK KTN

Innovate UK KTN is the UK's innovation network. Our mission is to connect ideas, people, and communities to respond to national and global challenges and drive positive change through innovation.

Our diverse connections span business, government, funders, research and the third sector, offering business support, funding, connections to partner organisations and much more.

Learn more and get in touch:

**[iuk.ktn-uk.org](http://iuk.ktn-uk.org)**

This report was prepared by the Transport team at Innovate UK KTN, in partnership and consultation with colleagues and experts across transport, including research and significant input from the Research Institute for Disabled Consumers. Sincere thanks go to every person and organisation who contributed to the research, introductions, and case studies within this report.





# Welcome

## Dr Kirsty Hewitson, Interim CEO, Innovate UK KTN

Innovate UK KTN (IUK KTN) is committed to ensuring diverse connections for positive change. Whether this be across different sectors, different regions or different communities. Inclusion, often used in tandem with diversity, is the practice of ensuring that everyone has equal access to opportunities and resources. Inclusion warrants that everyone's voices and opinions are heard and that everyone feels respected.

Diversity and inclusion (D&I) is one of IUK KTN's key strategic priorities since we recognise the value and impact that it can deliver both within and outside our organisation. IUK KTN's D&I Plan states that we will "amplify the opportunities and voices for those from underrepresented and minoritised groups" and "we will also consider how IUK KTN encourages innovation to enable further inclusion through innovations that support diversity and inclusion". Accessible and inclusive transport is also one of the four strategic priorities of the IUK KTN Transport team and hence we are delighted to support the importance and relevance of the findings detailed in this report.

In this unique report, we have worked with the Research Institute for Disabled Consumers to engage with a significant cohort (>1,000) of older and disabled people combined with transport leaders and innovators. Inaccessibility and inconvenience, regardless of the mode of transport, cannot be ignored and must be addressed holistically through engagement with users, employees, businesses and innovators.

The report highlights a number of areas that could benefit from either use of existing innovative approaches or the development of novel solutions. This includes technological as well as social innovations. Those with lived experiences of the challenges must be involved in any process together with the fundamental need for continued education for all parties. Sharing of best practice, including across sectors, must be encouraged.

We acknowledge and congratulate those organisations that have already made significant efforts to address accessibility whilst recognising that substantial work is still required to ensure inclusive mobility for all.





Research Institute  
for Disabled Consumers

## The Importance of Access

Gordon McCullough,  
CEO, Research Institute for Disabled Consumers

Non-disabled people take being able to use different modes of transport for granted. Ask disabled people and their families what accessible transport means, and you will get a list of compromises, barriers and restrictions that make leaving their homes a challenge.

Accessible and inclusive transport for disabled people is a compromise, not a choice. This report and RiDC's extensive research into accessible transport highlights that the reasons for this situation are numerous and interrelated. At a structural, technological, financial, and societal level there are many challenges and barriers to making transport, across all modes, accessible and inclusive.

It is not all doom and gloom and there are many working in the transport sector that are leading the way on changing the equation - whereby the needs of disabled and older people are put first when designing new services.

That being said, this research highlights the needs of disabled people are not systematically and sensitively considered during the design and implementation of publicly accessible transport solutions. Unfortunately, the inclusion of the voice of the disabled person is often piecemeal and is the exception, not the norm. This is particularly true of new and emerging transport solutions where 'disruptive' technologies are used.

There is also a need to understand and react better to major disruptions such as socio-environmental changes that often ignore the needs and expectations of disabled people (COVID being the most obvious example).

Currently in the UK accessible and inclusive transport for disabled people is a compromise, not a choice. Research like this and the work of the newly created National Centre for Accessible Transport will hopefully begin to close the transport accessibility gap.

# Introduction

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Transport businesses lose £42 million per month ignoring the needs of disabled people (Scope). More than 1 in 5 consumers have a disability, and 75% of them have decided against using a UK business because of poor accessibility (Scope).

The Government has committed to making transport fully accessible for all passengers by 2030 under the Inclusive Transport Strategy. Accessibility is crucial in ensuring our transport networks enable equal access to life opportunities, support social mobility and ensure equitable economic growth (both regionally and in demographic terms). Rating local public transport as good rather than poor makes it nearly three times more likely that someone can access services (healthcare, education, and more) and makes it slightly less likely that someone feels under strain or has poor mental health. Nearly a third of the adult UK population do not have personal car access and are reliant on public transport. This lack of car access is more common amongst young adults, those in ethnic minority groups, those with mobility impairments, unemployed people and those with low incomes. (Access to Transport and Life Opportunities).

Accessibility and inclusion within transport has the power to be transformative for marginalised groups in communities across the UK. For innovators and companies, inclusive change leads to more sustainable, innovative and profitable business. Making employees feel welcome and included at work increases employee retention and leads to more cohesive teams. It improves the reputation of companies externally and internally, improves hiring results, increases staff engagement and results in faster problem solving and more creative teams, which leads to improved innovation outcomes and revenues. In economic terms, the Purple Pound (the spending power of disabled households) equates to £249 billion a year to the UK economy (Spending Power of Disabled people). According to Motability's 'The Transport

Accessibility Gap' report 2022, "In the UK the transport accessibility gap currently stands at 38%, which means that disabled people (as defined under the Equality Act 2010) take 38% fewer trips than those without disabilities. This is a figure which has not changed for over a decade.", with the annual socio-economic benefit of closing the transport accessibility gap standing at £72.4 billion annually to the UK economy (this is the potential benefit from making transport accessible for disabled people).

With this in mind, Innovate UK KTN, working with transport stakeholders and with research input from the Research Institute for Disabled Consumers (RiDC), have produced this report into the innovation gaps and opportunities for accessible and inclusive transport in the UK. This work aligns closely to Innovate UK KTN's aims to support Accessible and Inclusive Transport, as well as Equality, Diversity and Inclusion, alongside Innovate UK's 'UK Transport Vision 2050', which aims to ensure that "The 2050 traveller will experience a connected, cost-effective, accessible and reliable transport system. Transport will be accessible to people of all ages, locations and abilities."

The purpose of this report is to identify gaps in provision of accessible transport that could be addressed (or partially addressed) through innovation. This means that this report focuses on access related to innovation, rather than larger systemic barriers e.g. physical lift access at railway stations. The rationale is to focus on areas where Innovate UK KTN and partners can have most impact. This does not mean innovation is not relevant to these systemic barriers; for example, innovating for material reduction in construction, or improvement in design. The root of this report is research undertaken by the Research Institute for Disabled Consumers (RiDC), on behalf of Innovate UK KTN, in August 2022.







1033 responses were received from their panels of older and disabled people, answering questions focussed on accessibility across transport. You will find anonymous quotes from these respondents throughout this report. This work is complimented by research from other sources, and input by transport sector leaders and innovators as appropriate.

This report specifically focuses on use of transport modes, rather than employment within them. However, more inclusive sectors not only encourage more diverse employees to join, but a range of employees from diverse backgrounds are required to ensure a more inclusive sector can thrive.

This report focuses on inclusion with regards to disability. 16% of the global population live with some form of disability and this number is increasing (WHO). You are disabled under the Equality Act 2010 if you have a physical or mental impairment that has a 'substantial' and 'long-term' negative effect on your ability to do 'normal daily activities'. From 2016-2021 the numbers of disability related hate crime incidents reported to the British Transport Police increased by 24%. Innovations that address disability accessibility and inclusion often lead to increased inclusion for all sectors across society. Many excluded and marginalised groups are not referenced in

this report due to the scale of the challenges associated and the limitations of a single report, but Innovate UK KTN hopes to focus on further groups in future work, including (but not limited to);

- **51% of the population of the UK are women but are underrepresented within transport and travel planning and therefore may be disadvantaged as a result, with men found to be more likely than women to be satisfied with frequency of urban public transport service (72% vs. 67%) (Europeans' Satisfaction with Urban Transport). 55% of women living in London reported experiencing sexual harassment on public transport (YouGov).**
- **LGBT+: homophobic hate crimes reported to the British Transport Police across UK transport saw a 200% rise from 2013-2018.**
- **Faith and race: religious hate crimes reported to the British Transport Police across UK transport increased almost five-fold 2013-2018. Race hate crimes jumped from 1,453 to 2,566 over this period.**
- **Social and economic factors: almost a third of the adult UK population do not have personal car access and are reliant on public transport. This lack of car access is more common amongst unemployed people and those with low incomes (Access to Transport and Life Opportunities).**



- An ageing population and related access needs are closely linked to disability access: According to the Research Institute for Disabled Consumers’ panel of disabled and older people, 52% of respondents said they were unsure about returning to using public transport after Covid-19 travel restrictions have been fully removed. “I am gravely concerned about the lack of disabled access being the new normal” (RiDC report; Covid-19, Public transport and disabled passengers).

46.3% of respondents said that they have changed the way they use public transport since the start of the COVID-19 pandemic. “Since COVID I only go out if it’s necessary. I hardly use public transport as I’m worried about being so close to people as they may have COVID. Also, because of the lack of appropriate seating on public transport.”

There is also a significant amount of crossover between sections, as is to be expected when discussing modes that interact with each other. For example, some accessibility challenges and solutions that may be listed as bus access solutions could also be relevant to rail. Challenges such as digital access and inclusion are also cross-modal, as are the environments and public spaces that link transport modes together.

Similarly, the cost of ticketing and complexity of ticketing, as well as multiple ticketing system requirements across modes, presents a similar barrier across different sectors; an excellent example of mitigation in this space is the Disabled Person’s Freedom Pass in London - a travel pass for disabled people that allows free travel across London and free bus journeys nationally.

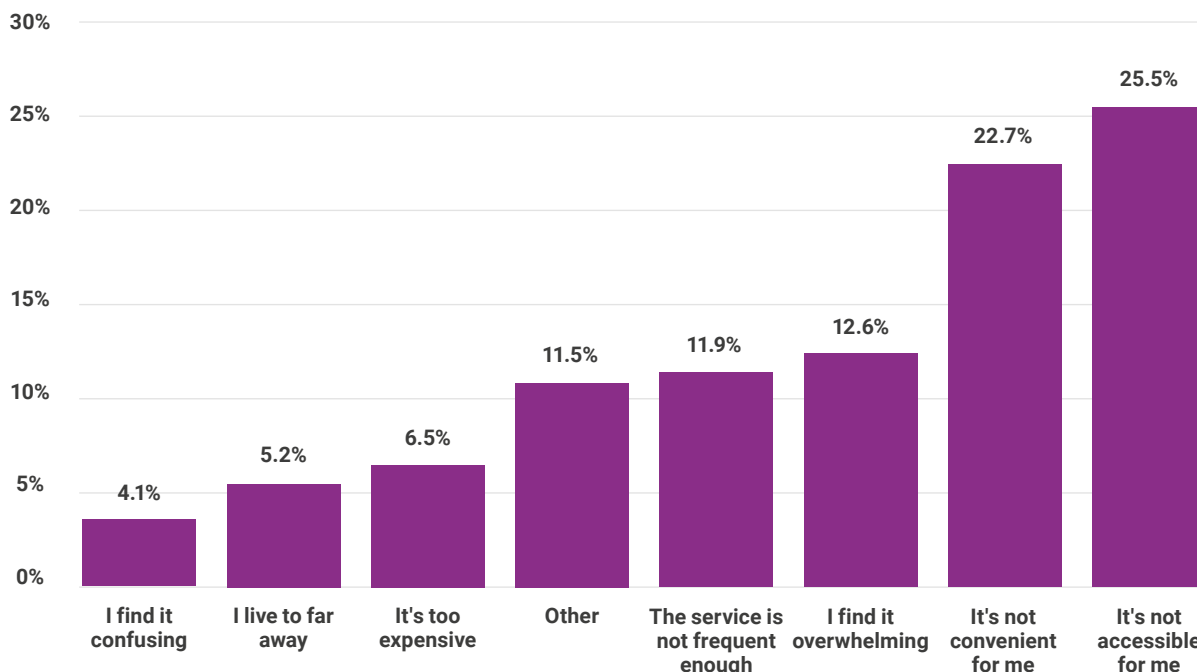
No two transport modes, operators, routes or airports, for example, are the same, therefore one solution does not fit all. However, by identifying common principles and short-, medium- and long-term recommendations we enable long-term innovation and inclusion growth and stimulation across sectors. We can also connect to emerging businesses regarding identified needs and funding opportunities.

# Executive Summary of Research Findings

## Key Challenge Areas Identified by the RiDC Survey

The top three reasons for the panel not using public transport (overall) include: (1) Finding it inaccessible (25.5%), (2) Finding it inconvenient (22.7%) and, (3) Finding it overwhelming (12.6%). Other reasons outside the options given include people having their own car eliminating the need to use public transport, people shielding from COVID-19, and public transport being uncomfortable and causing physical pain. 49.6% of respondents had used public transport in the 6 months prior to the survey.

### Q4 Why have you not used public transport?

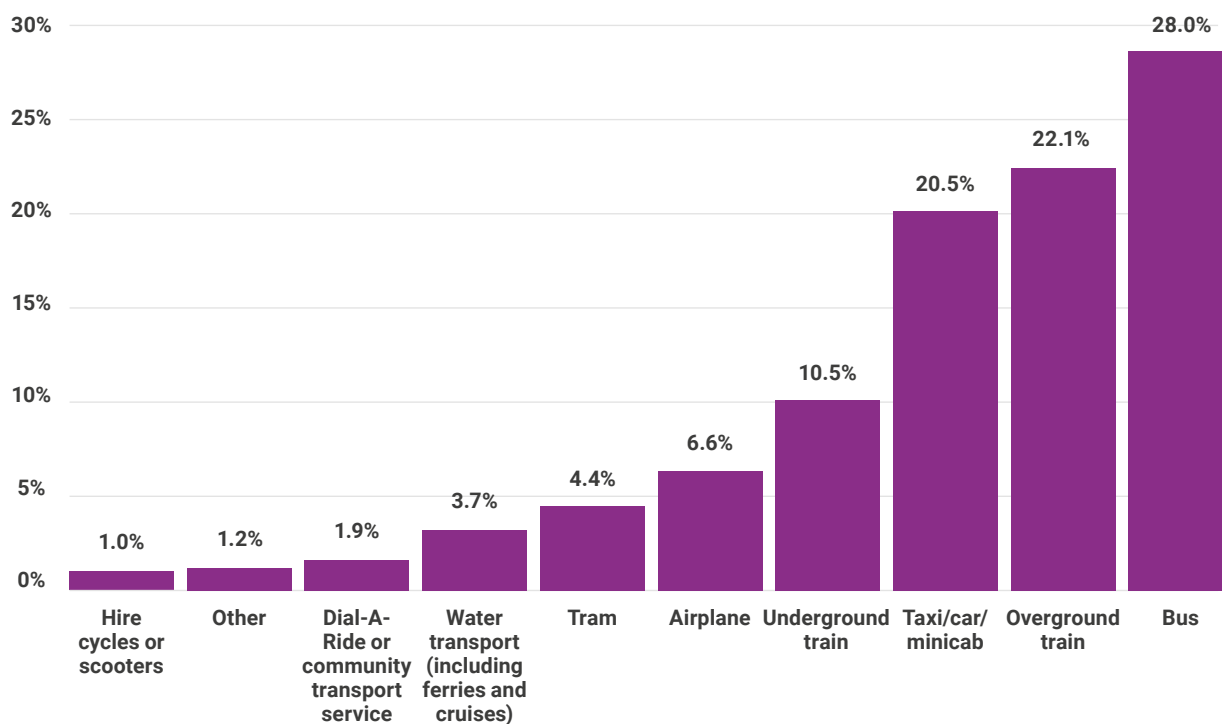


**Of the respondents that had used public transport in the last 6 months, the top three modes used were;**

- Bus (28%)
- Overground train (22.1%)
- Taxi / minicab (20.5%)

Other modes of transport used include the NHS-funded patient transport service, mobility scooters for shopping, the Eurostar, and metros.

### Q5 What modes of public transport have you used in the last 6 months?



#### The biggest barriers to access by mode are:

<b>Bus</b>	Getting on and off the bus (52.3% of respondents)
<b>Taxi</b>	Getting in and out of the taxi (50%)
<b>Train</b>	Getting on and off the train (60.4%)
<b>Tram</b>	Finding a space for a wheelchair or mobility aids (32.8%)
<b>Aeroplane</b>	Navigating the airport (54.3%)
<b>Ferry / boat</b>	Getting on and off the boat (39.2%)
<b>Micro-mobility hire</b>	Finding, booking and usage (35.7%)
<b>Dial-A-Ride / Community transport</b>	Booking (25.9%)

As is clear from the above data, there are some common themes running throughout inaccessibility of transport, with the most common being boarding and alighting the transport mode, followed by navigation of transport spaces, as well as other physical access needs.

According to the government report “Disability, accessibility and blue badge statistics: 2021 to 2022”, disabled adults in England made 28% fewer trips than non-disabled adults.

This difference was broadly in line with previous years. This research also shows that “disabled adults generally made a higher proportion of trips for shopping and personal business reasons, and a lower proportion of trips for commuting and education compared with non-disabled adults. In 2021, some of the most common trip reasons for disabled adults were shopping (27%), visiting friends (14%) and personal business (14%). Disabled adults under 60 made around 60% fewer trips for commuting purposes compared with non-disabled adults.” The most-used method of transport for disabled people was as a car driver, followed by walking, followed by as a car passenger. Car use and walking methods of transport were much more common methods of transport than public transport methods.

## Navigating stops, stations, and ports

Navigating bus stops, train stations (39.9%), airports (54.3%), and ferry ports (31.4%) appears to be inaccessible or challenging for disabled people. Travellers also commented on the lack of knowledge on where to wait or board the bus.

## Boarding and alighting transport

Results show that getting on and off buses (52.3%), trains (60.4%), and planes (54.3%), and getting in and out of taxis (50%), is inaccessible or challenging. Bus travel appears to present an extra challenge particularly relating to when and where to disembark the bus. Plane travel appears to have an added layer of complexity relating to the arrangement of assistance to enable the disabled passenger to board and disembark the plane.

## Improved access for wheelchair users

Wheelchair users commented on specific challenges they encounter when travelling including booking a wheelchair accessible taxi or paying more for large taxis, wheelchair areas on buses with barriers such as poles, small spaces, or people using the area with prams or to store luggage. The need for assistance to board and disembark transport causes anxiety.

## Interacting with others

Respondents commented widely on interacting with others, both staff and other passengers, when using transport. There seems to be a need for disability awareness to prevent challenges and negative experiences for disabled travellers. For example, disabled passengers noted they have received verbal abuse from other passengers when attempting to access a priority seat or use a wheelchair area, and passengers being left in an airport waiting room for hours by assistance staff.

# Opportunities for Innovation

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## Navigating stops, stations, and ports

Navigation is a key area in which innovators can make an impact. From design and layout of spaces to wayfinding solutions ranging from signage to projections and lighting, to augmented reality.

Whilst virtual or augmented reality can offer insights into the design of the environment, it does not solve the original issue around the placement of a physical barrier. Engaging with individuals with lived experience in the design process has the potential to solve many wayfinding issues before they arise. However, where environments remain a challenge (for example, in listed station buildings and in the period of time before redesign and renovation may become possible), digital solutions have a vital role to play; for example, augmented signage and wayfinding through mobile phones.

This also raises the need to consider digital accessibility; ensuring that all information is provided in more than one format (not just digitally) and is mindful of the wider digital exclusion agenda, particularly in older people. This is a space in which innovation through community initiatives can be particularly impactful; Community Rail work, mentioned later in this report, is a key example of this type of successful engagement.

Digital solutions also cannot be used as a replacement for staff presence; with rising hate crime and increased loneliness and isolation, staff presence is consistently one of the most important factors in safe and accessible travel across all modes. WelcoMe is an excellent example of collaboration between staff and digital methods to enable access which is explored later in this report.

## Boarding and alighting transport

A key challenge across modes, and one of the most frequently identified barriers in this report, boarding and alighting remain key access challenges.

In an ideal world, all modes of transport will have step-free access, but this is solution requires a high level of finance and time commitment. In rail, operators such as Merseyrail are looking to enable fully step-free access with their new fleet of trains, as well as through extensive station works. However, until this kind of major renovation and rolling stock manufacturing/ refurbishment work is undertaken across the UK, temporary boarding solutions are vital.

These boarding solutions are a key innovation potential area; following discussion of the RiDC research used within this report, South Western Railway (SWR) are (at the time of writing) working with Innovate UK KTN to enable a solution for deploying boarding ramps for the platform-train interface at two stations, Hamble and Bedhampton, as a result of narrow width platforms at these locations. Traditional ramps used at these stations are unwieldy and difficult for staff to use in windy weather conditions. By launching an Innovation Exchange challenge with Innovate UK KTN, SWR are seeking an innovative solution to the problem for both staff and passengers.

**KTN-iX™ (KTN-innovation eXchange) is a cross-sector programme supporting innovation transfer by matching industry challenges to innovative companies from other sectors. It does this through putting large businesses with technical needs in contact with companies who have the right innovative solutions, for faster development of novel solutions. KTN-iX™ is delivered by Innovate UK KTN, who has worked with key industry stakeholders to identify specific innovation challenges through a series of 'guided innovation' workshops. The challenges predominantly focus on near-term issues that could provide incremental progress in the developments within these growing sectors.**

In maritime, NorthLink Ferries are an excellent example of accessible boarding; three key route ferries (Hjaltland, Hrossey and Hamnavoe) were designed and constructed with the requirements of disabled passengers in mind. Orkney Disability Forum and Disability Shetland were engaged throughout the build process to ensure suitable and appropriate facilities were included for disabled access. All the passenger vessels have wheelchair access available to all internal sections of the vessel and between decks by a passenger lift. All general doorways are of a width which allows wheelchair access and there are four specially designed cabins with wider automatic doors for easier access on the Aberdeen based vessels. All the Serco NorthLink Ferries foot passenger terminal buildings have automatic entry door openings, and low-level ramped access for wheelchair users.

Across modes, solutions from lightweight to automatic ramps may be innovative solutions, as well as looking at innovation in design for vehicles and stops/stations to ensure level access without the need for ramps. The Harrington Hump is an example of this type of design innovation within rail; it is a modular and easy-to-install system by which the height of a railway platform can be increased at relatively low cost (1/10th of the typical £250,000 cost). The system takes its name from Harrington railway station in Cumbria, England, which is the location of the first production version.

## Improved access for wheelchair users

Improving access for wheelchair users encompasses the above section on boarding and disembarking, but also includes wheelchair and mobility aid spaces onboard transport modes.

An ongoing challenge on buses is the use of areas designed for wheelchair users being used for other uses, including pushchair and luggage storage. In 2017, it was legally established that bus companies who had been operating a “first come first served” policy on the use of their wheelchair spaces were acting unlawfully, and that spaces for wheelchair users onboard buses were intended for just that use. However, this still creates potential conflict onboard buses where many users require space; flexible seating (such as fold-down seats) are a

potential solution here, but much of the root of this challenge includes interpersonal interaction and understanding. In 2017, Arriva made a legally-binding pledge to improve accessibility and ensure “comprehensive” disability equality training for all new drivers and refresher training for existing drivers, with all drivers having to reach a basic level of competency before being allowed to drive a bus.

In rail, an excellent example of innovation in the flexible seating space comes from PriestmanGoode, and their Department for Transport funded First of a Kind rail flexible seating prototype. The ‘Proteus – Flexible Rail Interior System’ is a carriage environment and seating layout that provides operators with flexibility of seating, being developed in collaboration with Angel Trains, Quantum Seating Limited and research specialists Insight Inside. The design features a wider, more accessible aisle with a 2-2 seat configuration, and tip-up seat pans on aisle seats to create more flexible spaces. First of a Kind is a competition which is funded by the Department for Transport (DfT) and managed by Innovate UK, delivered in partnership with Innovate UK KTN to help overcome barriers that can make it difficult for new entrants to bring novel technologies to the rail market.

**“Overground and underground trains should all have automatic ramps like on London buses and all stations should have step free access.”**

## Interacting with others

Social accessibility is central; ensuring that there is awareness and empathy from staff through training (as outlined above with Arriva buses), as well as awareness by the public of the needs of a range of transport users. These can be achieved through targeted training programmes, including appropriate use of virtual reality, and through innovative outreach and marketing.

Northern Railway staff, for example, have Enhance the UK delivering disability awareness training to all new frontline staff. The training is delivered by disabled trainers and takes place in a classroom setting as well as at the station to ensure staff are confident in and know how to appropriately assist disabled customers when required.

Design agency Mima worked to develop Heathrow's Accessible and Inclusive Airports Asset Standard to include "back-of-house requirements for disabled staff members, operational guidance regarding disability awareness training and the engagement of lived experience users and has empathy-building narratives and figures at its heart. By providing this solution, Heathrow will not only be renowned for its accessibility in built environment places and spaces, but in how it engages with disabled passengers and staff members, whether online, at recruitment stage or within the airport journey itself."

According to a recent survey, 39% of Heathrow's passengers require some form of assistance. Across transport, staff being present, visible and empathetic is one of the biggest factors.

Education of the public is also vital within this challenge; through in-station/stop marketing and engagement, through to schools-based education and awareness building. Innovative education practices and engagement tools have a central role to play here.

## Across transport modes

Alongside the above, multiple steps towards full accessibility and inclusion can be addressed across different modes of transport:

- Awareness and enforcement of passenger rights - raising awareness of the obligations on transport operators and the processes for raising concerns or complaints. Data sharing, transparency and systems form a crucial part of full access for the future of transport. Tracking (and gathering) accurate, up-to-date data around accessibility is also important, as well as communications and provision of information potential for innovations. This must also include urgent action around reducing hate crimes.
- Staff training - ensuring that transport staff (frontline and managerial) understand the needs of disabled people.
- Improving information - ensuring that transport operators provide travel information in formats that all passengers can easily access and understand, before and during a journey. There is a wide space for potential in this area including across formats of information, methods of provision, virtual reality, wayfinding and more.
- Improving physical infrastructure - ensuring that vehicles, stations and public spaces are designed, built and operated so that they are easy to use for all.
- The future of inclusive transport - ensuring that technological advances and new business models provide opportunities for all, and that disabled people are involved from the outset in their design. A system built without lived experience and consultation cannot serve all those it needs to serve or be inclusive, which is acknowledged by the Government's Inclusive Transport Strategy. Greater representation in transport and transport innovation employment is included within this, and the need to address the skills gap by engaging with the next generation. Many transport bodies including airports and train operators also have their own accessibility panels or forums; consultation with these is vital.
- Potential for innovation areas within transport includes (but is not limited to) information provision, augmented and virtual reality, staff training, wayfinding, lighting and design, ticketing and travel flexibility, physical accessibility and more.



<p><b>13:05 Platform 9</b>  <b>Meymouth</b>          via Winchester          Calling at: Page 1 of 2          Basingstoke          Winchester          Southampton Rpt          Southampton Ct1          Brockenhurst          New Milton          Christchurch          Pokesdown          Bournemouth          Poole          Hanworthy          Holton Heath          Wareham          Nool          Moreton          Dorchester Sth  <b>South West Trains</b>          T1</p>	<p><b>13:06 Boarding</b>  <b>Hampton Court</b>          Calling at: Page 1 of 1          Uauxhall          Clapham Jn          Earlsfield          Mibleton          Raynes Park          New Malden          Berrylands          Surbiton          Thames Ditton          &amp; Hampton Court.  <b>South West Trains</b></p>	<p><b>13:07 Platform 18</b>  <b>Hounslow</b>          via Brentford          Calling at: Page 1 of 1          Uauxhall          Queenstown Road          Clapham Jn          Mandsworth Toun          Putney          Barnes          Barnes Bridge          Chiswick          Kew Bridge          Brentford          Syon Lane          Isleworth          &amp; Hounslow.  <b>South West Trains</b></p>	<p><b>13:09 Platform 1</b>  <b>Guildford</b>          via Epsom          Calling at: Page 1 of 2          Uauxhall          Clapham Jn          Earlsfield          Mibleton          Raynes Park          Notspur Park          Worcester Park          Stoneleigh          Ewell West          Epsom          Ashted          Leatherhead          Bookham          Effingham Jn          Horsley          Clandon  <b>South West Trains</b></p>	<p><b>13:09 Platform 7</b>  <b>Portsmouth Hbr</b>          via Basingstoke          Calling at: Page 1 of 1          Moking          Farnborough          Basingstoke          Micheldever          Winchester          Eastleigh          Hedge End          Botley          Fareham          Portsmouth          Coshan          Hillsea          Fratton          Portsmouth &amp; Ssea          &amp; Portsmouth Hbr.  <b>South West Trains</b></p>	<p><b>13:12 Platform 12</b>  <b>Basingstoke</b>          Calling at: Page 1 of 1          Surbiton          Malton-on-Thames          Weybridge          Moking          Brookwood          Farnborough          Fleet          Finchfield          Hook          &amp; Basingstoke.  <b>South West Trains</b></p>
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# Departures



The government highlights that it will specifically ensure that “future technology is designed inclusively, and opportunities are sought out to harness innovation.” “The fresh thinking offered through innovation could unlock benefits for many, but these will require industry to adopt an inclusive approach to product and service design which will involve active engagement with disabled people. Meeting the Future of Mobility Grand Challenge established in the Industrial Strategy, which aims to make the UK a world leader in innovation to solve transport challenges, is a clear priority for the Department.” (Inclusive Transport Strategy).

An excellent step towards harnessing innovation opportunities was announced in early 2023; Connected Places Catapult, Coventry University, the RiDC, Designability, Policy Connect and WSP UK are developing the UK’s first evidence centre for inclusive transport, the National Centre for Accessible Transport, with grant funding from Motability of £20 million over seven years. The centre will work with disabled people, disabled people’s organisations, transport providers and policy makers to both undertake research and develop innovations to improve transport accessibility and inclusion.

Further innovation funding, scope definition and consistency across transport modes to ensure the best innovations are used nationally is key to the future of transport; ensuring we are sharing best practice across the sector and drawing in best practice from other sectors. Consideration of inclusion within multimodal connections between transport modes is also central to the future of transport and meeting the government’s aims of full inclusion.

# Rail Industry Perspective

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## **HS2** Neil Smith, Inclusive Design Lead, HS2 Ltd

HS2 is Britain's new zero carbon, high-speed railway. It is now under construction, with 350 active sites between Crewe and London supporting nearly 30,000 jobs across the country.

The company responsible for building the new railway, HS2 Ltd, is committed to delivering an inclusive experience for all future passengers. Our focus is to eliminate barriers to participation for everyone, creating a service where people feel safe and can use with ease, independence and dignity.

We have earned the accolade of becoming the only organisation in the UK to have achieved the Clear Assured Platinum Standard accreditation. HS2 Ltd received the award in recognition of its commitment to embedding inclusive best practice into all elements of its work, including the design and delivery of Britain's new railway.

Mark Thurston, our CEO, has identified that "We're building a railway for future generations that will help connect many major towns and cities, so it's imperative that the diversity of the communities it will serve is reflected in our approach to the development, design, construction and operation of the railway." This approach will ensure that the project delivers maximum benefits for all. To achieve this we require that access and inclusion is embedded and integrated throughout the project. HS2 Ltd therefore promotes a design approach that means the design of our stations and rolling stock will be based around the people using them. This approach acknowledges and recognises diversity and difference between individual users and seeks a design which offers an equitable experience. This is clearly set out in our overarching Inclusive Design Policy, which identifies that inclusive design is an integral part of the design and development process and embedded throughout the HS2 programme.

When HS2 enters service at the end of the decade it will welcome passengers with multiple and diverse needs. HS2 Ltd has set strategic goals to achieve new standards in customer experience, placing people at the heart of design and ensuring HS2 will be accessible to all. Developing a better understanding of users and their needs is key to defining the best solutions and to informing the development of new standards and good practice. We will not achieve this without innovation. Innovation is critical in creating spaces that can be adapted to changes in demographics, accommodating both current and future populations.

At HS2 Ltd innovation takes many forms. Like the Community Rail case study in this report, HS2 Ltd also embraces the benefit of innovations in Virtual Reality (VR). We have used VR along with virtual reality, eye-tracking, and emotion-sensing technology to ensure passengers can easily navigate our stations. We also used this work to better understand people's lived experiences and how that can be feed back into the design.

We are developing partnerships with our future passengers such as with Braidwood School for the Deaf to understand and act upon the day-to-day barriers the Deaf community face when using public transport. This partnership even saw the pupils pitch their ideas for building a railway for everyone to HS2's innovation team.

We also seek to innovate by pushing design standards and have carried out research to identify who is excluded from current toilet design to assist in developing new and more inclusive specifications. Importantly we have challenged our designers to work in a more innovative cross-disciplinary approach in assessing the design for means of escape design to enable safe evacuation in an equitable way.



This requires involving inclusive design thinking, fire safety engineering, pedestrian flow analysis, ergonomics, space planning and station operations all to work together to define the problem and develop the tools to solve it. To conclude, our Inclusive Design Policy highlights that the design process embraces the social model of disability, which defines disability as a limitation imposed by the environment and society, rather than the inability of an individual and their impairment. Innovation also has to embrace the social model if we are to deliver accessible and inclusive railway environments and I welcome the publication of this report to help further knowledge and debate on the creation of accessible and inclusive mobility.

# Barriers to Travelling by Rail

According to the Experiences of Disabled Rail Passengers report (Transport Focus, 2017) and 'How Accessible are Britain's Railway Stations' from the Commons Library:

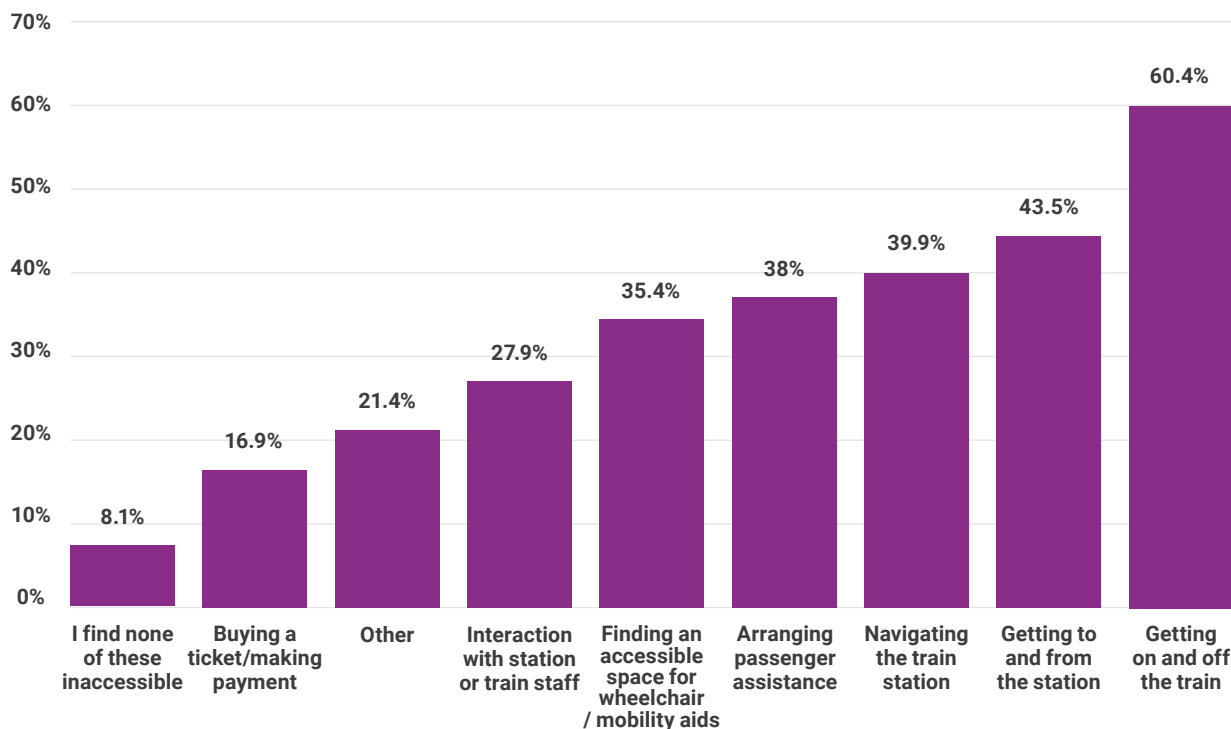
- As of January 2019, hearing induction loops are available in all stations across Great Britain. Just under half of stations (1,217) provide two or three types of accessibility and around 360 (14%) provide six or seven disability access provision types.
- One in five stations provide an accessible ticket office or disabled toilets (as part of the National Key scheme to enable easy access to public toilets). Train ramp provision is generally high (second only to induction hearing loops) with around three in four stations providing access.
- The Sunflower lanyard scheme operates within rail, as well as across other modes including at airports, which all UK rail operators acknowledge.
- Two thirds of disabled passengers reported experiencing at least one problem during their rail journey. Of all the transport modes, train passengers experience the most problems with 23% of disabled passengers reporting bad experiences on trains.
- Over half of disabled rail passengers who reported a problem at the journey planning stage reported a lack of confidence and not being able to find enough information. Travel training can play a key role in increasing confidence where relevant and necessary.
- A lack of "Turn Up and Go" service is reported as a barrier, as well as complexity of ticket offices and inaccessible ticket machines. Disruptions to journeys including unplanned delays can have a particular impact on disabled people. Wayfinding in stations is also highlighted as a key need.

"Knowing that I will be able to get off a train once I arrive at my destination, for that matter, knowing that I will be able to get on it!"

A major audit is currently underway at the time of writing as part of the creation of Great British Railways, which will assess accessibility at every UK railway station, and report new and more accurate statistics.

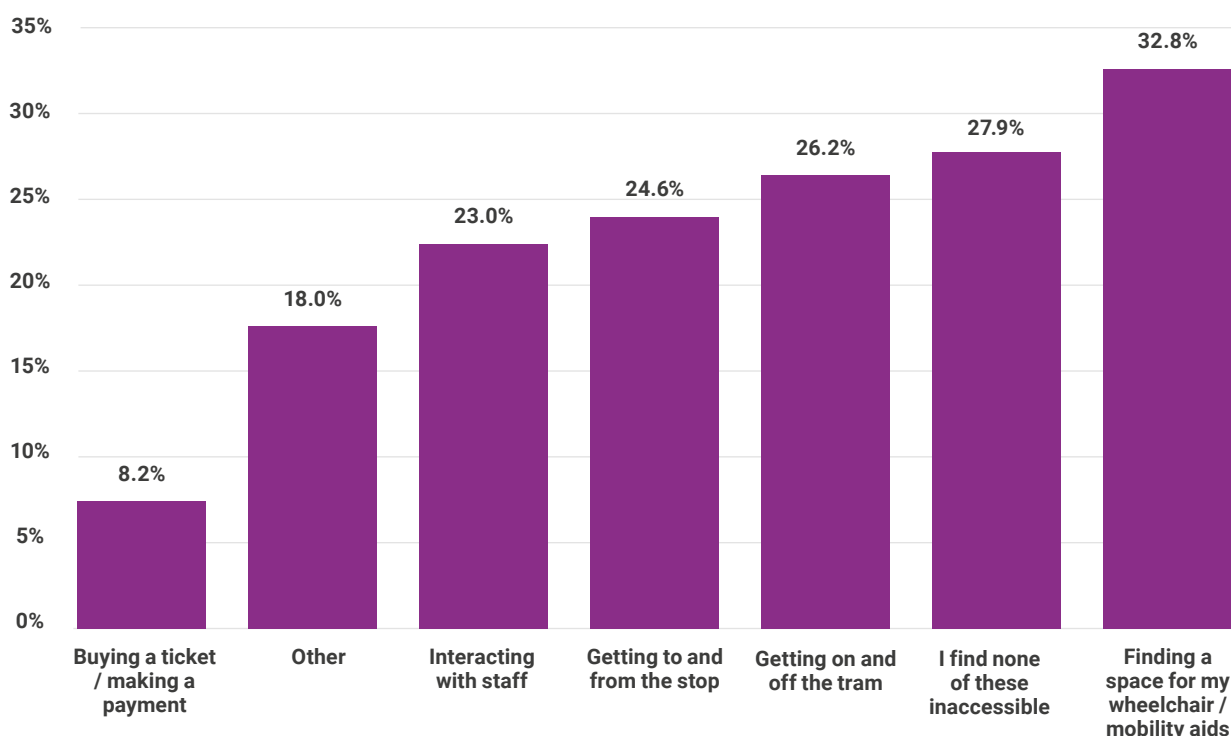
According to the research undertaken by the RiDC for this report; 455 respondents have travelled by train in the past six months and 93% face challenges. The top three inaccessible or challenging aspects of train travel are: getting on and off the train (60.4%), getting to and from the station (43.5%), and navigating the train station at (39.9%). It appears that for wheelchair users finding an accessible space is also challenging. Other responses also include experiencing issues with booked assistance and toilets not working properly.

### Q8 What aspects of travelling by train do you find inaccessible or challenging?



Research also included access to tram travel, which shared strong similarities with barriers to train travel; for trams, the most challenging aspects of access are; finding a space for a wheelchair or mobility aid (32.8%), getting on and off the tram (26.2%), and getting to and from the stop (24.6%). Respondents also mentioned that finding a seat and hearing the announcements posed challenges.

### Q9 What aspects of travelling by tram do you find inaccessible or challenging?



Research also included access to tram travel, which shared strong similarities with barriers to train travel; for trams, the most challenging aspects of access are; finding a space for a wheelchair or mobility aid (32.8%), getting on and off the tram (26.2%), and getting to and from the stop (24.6%). Respondents also mentioned that finding a seat and hearing the announcements posed challenges. Alongside access in terms of physical boarding and suitable seating/spaces, the provision of information is also key; before, during and after journeys, including in real-time. An excellent example of this comes from You.Smart.Thing, who developed a system to improve the 'whole journey' experience for disabled passengers on multiple modes of transport. It includes a navigation and help function from the user's front door to their destination and was funded by the Department for Transport's Technology research and innovation grants: accessibility (TRIG-A) grant programme, which is delivered in partnership with Connected Places Catapult (CPC).

Provision of staff who are trained and able to assist is also vital. Booking assistance is also a consideration; as of April 2022, passengers who require assistance must give two hours' notice of their journey plans, but the ultimate industry aim is for all passengers, regardless of assistance need, to be able to 'turn up and go'; further information about Transreport, the passenger assistance booking app, can be found under the 'digital' section of this report.

The RiDC reviewed unbooked assistance and 'help points' at stations in their 'Accessible Travel Policy Implementation' report in 2022. "Help Point operators in the main were helpful and tried to understand our auditors' needs and travel plans. Where auditors did interact with staff (and the public), their experiences were predominantly positive." Some aspects of this research gave mixed results, however, "inconsistency (of results) suggests it may be difficult for disabled passengers to have confidence in boarding a train if they request assistance from a Help Point at an unstaffed or partially staffed accessible station."

The research also uncovered the need for standardisation across design and functionality of Help Points, as well as consistency in service provision. There are also areas for improvement including in communications, signage, information, and support at each stage of a journey (arriving at the station, navigating the station, getting on the train, and post journey), including online. "Overall, these audits suggest priority is not given to displaying information and advice to assist disabled passengers travelling on the network. Instead, advertisements and offers seem to take prominence in many stations."

According to "Research on experiences of disabled rail passengers" (2019, Department for Transport), it is clear that there are many spaces within rail accessibility where innovation could have significant impact, with two-thirds of passengers reporting experiencing at least one problem during their rail journey. "Over half of disabled rail passengers who reported a problem at the journey planning stage reported a lack of confidence. This problem was ranked by passengers as the problem having the biggest impact on their journeys at the journey planning stage." Ticketing was also highlighted as a key barrier; from ticketing being too complicated, to ticket offices being closed, to being unable to use ticket vending machines. This report also reflected that boarding the train from the platform is a challenge, alongside challenges around finding accessible toilets that are operational both in stations and onboard trains, and a lack of availability or information around accessible seating.





# Rail Innovations and Solutions

## CASE STUDY

### Community Rail



#### What is community rail?

Community rail partnerships and groups across Britain work to develop and cement the place of railways and stations at the heart of local communities. This growing, thriving grassroots movement, brought together under Community Rail Network's umbrella, now includes 76 community rail partnerships (CRPs) and 1,200+ station friends' groups and other local groups, spread across Britain. These are community based and led groups and organisations, working closely with the rail industry, and delivering increasingly wide-ranging activities to:

- Enhance the railways' contribution to local sustainable development and community wellbeing, including by maximising access to and use of the railways;
- Ensure the community has a voice and plays a part in the development and improvement of our railways, so this meets community needs and aspirations and delivers maximum benefit;
- Communicate the development and importance of our railways to communities, enhancing understanding and pride, and promoting rail as a key part of sustainable, healthy travel.

#### Ensuring accessibility

Opening up rail travel to more people and working with rail partners to make rail more inclusive and accessible is a common thread through community rail, and our experience suggests this is often where greatest gains can be made with social value – in some cases transforming lives – as well as contributing to sustainability. It means thinking beyond 'the passenger' (i.e. those using rail already), to those who don't or rarely use rail, for whom by breaking down barriers, we can offer new opportunities.

We all recognise that a key part of opening up rail is working to better meet the needs of people with disabilities and other mobility needs or vulnerabilities, as well as breaking down travel barriers for all who face them.

Addressing these issues effectively means working with local communities, to understand local needs, issues, and concerns, and in the process, we can empower local people and marginalised groups and create a sense of ownership towards rail.

We have many examples in community rail of initiatives that draw on lived experience – such as from those living with dementia, young people with learning disabilities, or new parents from low-income backgrounds – feeding these views and voices into the rail industry to support improvements, while empowering these groups through positive experiences and links to new opportunities.

We see in community rail how initiatives founded on listening, responding, and empowering can profoundly transform lives and strengthen communities, through initiatives such as:

- Rail confidence programmes, particularly for young people and groups who feel marginalised/excluded from rail;
- 'Try the train' trips and sociable, supported journeys for families, or groups with additional needs;
- Guided walks, bikeability, travel planning and route improvements to enhance active travel access;
- Projects to make the railway more inclusive for those with hidden disabilities such as dementia or autism, including engaging these groups and gathering their input, rail staff training, as well as physical adjustments to stations;
- Arts and creative projects that celebrate diversity and bring people together with the railway as a focus and shared interest, and make stations more visually welcoming and inclusive and encourage social interactions;
- Inclusive volunteering opportunities promoting social confidence and skills.



## Community rail innovation in action

In developing and delivering the activities outlined above, the community rail movement has shown innovation to complement accessibility improvements driven by the rail industry. While the importance of major physical infrastructure projects cannot be underestimated, community rail has led on a diverse range of initiatives to open up stations and rail journeys to people who may otherwise feel marginalised from rail travel and be at risk of transport-related social exclusion.

Some of these projects have been firsts for rail, such as the work of the Leeds-Morecambe Community Rail Partnership, who worked with industry partners to create **Britain's first-ever dementia-friendly railway route** on the Bentham Line. Partnership staff and volunteers became Dementia Friends Champions via the Alzheimer's Society, and delivered training to hundreds of people, including front-line rail staff. The partnership also carried out audits of the line's stations looking for ways of making them dementia-friendly, such as simplifying display information, adapting timetables and ticket information, and highlighting accessible routes to and from stations. A series of dementia-friendly walks were also created from stations along the line, and the partnership has supported other train operators in replicating elements of the project, which was highlighted as an example of best practice in the **Plan for Rail**, in their own areas.

There are many other examples of community rail striving to create more accessible journeys, with another first being the work of Community

Rail Lancashire and their project to develop the **autism-friendly Todmorden Curve Line**. This again involved training for rail staff, alongside innovations including specialist resources such as sunglasses and ear defenders to assist passengers who may have sensory needs, and detailed line guides for families to download and help them prepare for their journey.

This tailoring of resources to make journeys more comfortable for people who may feel apprehensive over rail travel can also be seen in the emergence of audio guides developed by community rail partnerships to help enhance the sensory experience of passengers, and projects that directly engage marginalised groups, such as **Tyne Valley Community Rail Partnership's 'Lyric and Line' initiative**, which used creative songwriting sessions to identify and understand barriers to rail use among groups with additional needs. Alongside promoting accessible journeys, community rail also plays a key role in the accessibility of stations, maximising their potential as sites for developing social and community cohesion, and not just transport interchange. Community rail partnerships and groups have embraced innovations such as talking benches, sensory gardens, tactile art, and accessible planters, all designed to promote the notion that stations act as welcoming gateways to the communities they serve, and that rail is a sustainable and attractive travel option for all.

For more information on accessibility projects within community rail, go to [communityrail.org.uk](https://communityrail.org.uk)

**CASE STUDY**

# Accessible Travel VR Simulation “Serious Game”

Travelling on UK Railways can be extremely challenging for the 14 million+ people with a wide range of mobility impairment, mental health conditions & cognitive impairments.

The Fair Travel Report (Scope, September 2019) surveyed 2,000 disabled people about how difficulty using public transport affects their ability to lead independent, confident, and connected lives. The report found that two thirds of disabled people have experienced problems using public transport in the last year and 30 per cent of disabled people say that difficulties with public transport have reduced their independence. Not being able to travel with confidence has a big impact on disabled customers, and four fifths of disabled people said they feel some level of anxiety or stress when they travel by public transport. The Office for National Statistics has published new data that shows just 22% of autistic adults are in any kind of employment and this group can find travel particularly challenging.



Chrome Angel Solutions and technology partner Totem Learning have been working with industry partners Northern, Community Rail Lancashire and Angel Trains to develop an innovative Accessible Travel VR Simulation “Serious Game” to tackle this problem. It supports people who are anxious or need Passenger Assistance to build confidence to access travel by train. This is a first-of-a-kind use of serious games technology to simulate using a service and building confidence to access it.



Funding from the DfT’s TRIG: Accessibility programme delivered by Connected Places Catapult supported developing and testing a proof-of-concept demonstrator. This has recently been further enhanced and upgraded thanks to Innovate UK’s FOAK21 project, making the application available for wider trials and testing end users.

After working closely with a group of 33 disabled people and carers over 6 months to develop the first release, users can now choose a character to experience trains, stations and interact with staff in a realistic simulated environment on their own phones, tablets, PCs or in VR headsets for a fully immersive experience.

Northern Accessibility User Group and Community Rail Lancashire groups supported the process of designing and testing the simulation bringing a broad range of travel, technology and accessibility experience. They engaged in design workshops and testing the prototypes. A customer experience map was built, detailing the process of a routine rail journey for a passenger with no accessibility support needs, a wheelchair user and an autistic traveller. This journey was overlaid with the challenges and anxieties identified by the users, which formed the foundation of the simulation experience.

The simulation platform provides for a wide range of user configurable accessibility settings for visual, audio and controls including multiple languages, visual schemes and controls whilst a headset version using gaze control is accessible to people who only have head movement. Our vision is that someone who has never had the confidence to take the train before could arrive at the station for the first time and feel like an experienced traveller. To have all the information they need, know what support to expect and what to do if anything goes wrong. The simulation is specifically aimed at those people with disabilities who would otherwise lack confidence to use public transport, but can support anyone who is anxious about travel for any reason.



Community Rail Lancashire is now trialling the simulation in “Try the Train” supported journeys, as well as taking VR headsets into schools to engage children with special educational needs and wider groups, thanks to funding support from Angel Trains and Northern. We are continuing to work on developing the simulation for customer use and seeking support from industry partners for:

- **Journey expansion to include changing operators**
- **Development of additional characters**
- **Development of enhanced accessibility support simulation detail**
- **Development of ‘challenge scenarios’**
- **Expanded testing and trials to prove user impact and benefits**

A key opportunity has been identified to develop a Staff Training version of the simulation to support building awareness, confidence and competence of staff to provide passenger assistance. This was highlighted by the user comment during testing that “every member of staff should have to play this simulation to understand how important their role is to me”. A project is now being developed that will enable us to develop new Staff Characters. This is exactly the same concept as the passenger characters, only instead of a customer using the assistance available the ‘game’ will be played from the perspective of the staff character with the challenge to provide good assistance to customers who need it:

- **Recognising customer needs**
- **Competent in the policy, process, information and standards**
- **Confidently interacting with customers and responding to their challenges and problems**

Data analytics, assessment and achievements will provide feedback to staff, instructors and managers. Staff awareness training is a key challenge for all operators. Raising staff awareness of the challenges disabled and elderly customers face when travelling, as well as building confidence and competence to interact with customers who need support, is one of the most important factors in making our railways more accessible.

In user testing 100% agreed the travel environment was detailed and realistic, 91% said that the simulated journey experience could help build confidence to travel by train, and 100% wanted to see the project developed further - demonstrating the potential of this technology to support a lot of people.

This was recognised with Northern winning the Gold Innovation award at the recent national cross industry **Customer Experience Awards 22**.

Find out more at [chromeangel.co](https://chromeangel.co)

# Aviation Industry Perspective

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## Christiane Link, Head of East Midlands Airport Accessibility Advisory Forum

The impact of the Covid pandemic on the aviation sector has been well documented. The entire sector and its supply chain had not experienced disruption like it. While demand is now returning, a full recovery is expected to take several years.

The effect on customers was significant too with many people's willingness and confidence to travel being knocked. This uncertainty was felt particularly by disabled passengers and those who rely on airport assisted travel services.

East Midlands Airport (EMA) prides itself on the quality of its customer service and its assisted travel team has had national and international recognition.

This is possible thanks to a close working relationship with its accessibility advisory group, a diverse group of disabled people who advise the airport in areas like customer experience, training, monitoring and recruitment. All members are disabled, including the Chair. The group advises the airport constantly, also between meetings, and is an essential critical friend for the management team.

After advice from the advisory group, EMA decided to invest significantly in equipment and infrastructure for disabled customers. More than £500,000 was spent upgrading vehicles and equipment. The airport also introduced its first Assisted Travel live chat service - a UK first for an airport. Customers scan a QR code and are connected via WhatsApp to the Assisted Travel team in the control room. This provides vital communication for deaf customers and all others who want to contact the assistance team wherever they are in the airport. The idea for the WhatsApp service came from the advisory group, along with many other enhancements planned for the near future.

In December 2022, the Civil Aviation Authority (CAA) released its "Accessibility in Airports" report. EMA was one of only six airports UK-wide to receive a rating of "Very Good" from the CAA for its assistance provision for disabled customers. The CAA noted that EMA had made "impressive efforts to enhance the customer service" of their assistance provision. The customer satisfaction surveys reflect this too, where 91% of EMA customers rated the airport as "Good" or "Very Good".



# Barriers to Travelling by Air

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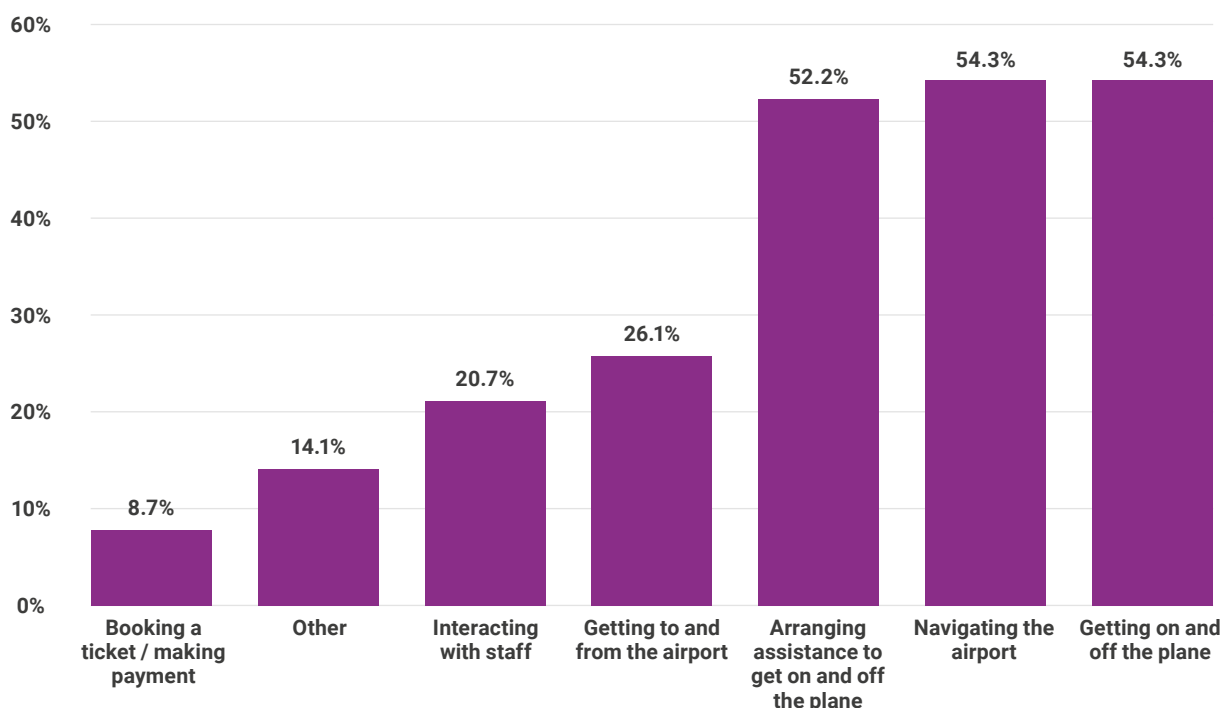
In 2014, the UK Civil Aviation Authority first published CAP1228 “Guidance on quality standards under Regulation EC 1107/2006” offering a set of quality standards which airports should meet in providing assistance to disabled persons and persons with reduced mobility at airports. Since this first publication, the CAA has published five annual airport accessibility reports setting out ratings against these quality standards for all airports which handled over 150,000 passengers per year. An interim report from 1 April to 31 October 2022 was produced to highlight those airports that need to put in place further improvements as we moved into 2023. This interim report is limited to the largest 16 airports (by passenger numbers) and the rankings are based on the performance standards against which airports are measured regarding providing a timely assistance service only.

## From this Interim Airport Accessibility Report;

- “The aviation industry faced major challenges in 2022 and although airports have reported fewer passengers overall, the number of passengers requesting assistance has increased overall as a proportion of all passengers. This has impacted some airports more than others. For example, London Heathrow, Manchester and Birmingham reported 20% to 30% increases in most months of 2022 for the proportion of passengers using the assistance service compared to equivalent months in 2019.
- Aberdeen, Belfast International, East Midlands, Edinburgh, Glasgow and London City were rated as ‘very good’ over all periods in this report. Liverpool performed to a ‘very good’ rating for quarters one and two and ‘good’ for October. Newcastle performed to a ‘good’ level in quarter one and October, and to a ‘very good’ level in quarter two.
- The CAA was impressed particularly by the efforts made by East Midlands and Liverpool to enhance the customer service aspect of their assistance services, despite the challenges of the summer. They noted how East Midlands has set up a messaging service for those passengers requesting assistance but who want to be able to use airport facilities independently. This allows these passengers to be in constant contact with airport staff so they can receive support when needed.
- Birmingham, London Gatwick, London Stansted and Manchester provided a ‘poor’ or ‘needs improvement’ level of performance in quarters one and two. However, following significant efforts to improve performance, for October London Stansted and London Gatwick met the targets for ‘very good’. Manchester and Birmingham also later met ‘good’ targets.
- Three airports have been ranked as ‘poor’ in Q1 but subsequently showed improvement to ‘needs improvement’; London Heathrow, Bristol and Leeds Bradford.
- London Luton was classified as ‘poor’ for every period.”

According to the research undertaken by the RiDC for this report; air travel was one of the least used methods of transport, which in part may be attributed to the ongoing impact of COVID-19. 92 respondents had travelled by aeroplane in the past six months and 85.9% faced challenges. The top inaccessible or challenging aspects of air travel are; Navigating the airport (54.3%), boarding and disembarking the plane (54.3%), arranging assistance to board and disembark the plane (52.2%), and getting to and from the airport (26.1%). Respondents commented on challenges faced with assistance e.g. not having enough help through security, uncaring staff or lack of staff.

## Q10 What aspects of travelling by plane do you find inaccessible or challenging



Various airports and airlines are also investing significantly in community/charity outreach and staff training. Gatwick airport has an independent Gatwick Accessibility Panel that advises on accessibility services for the airport, as well as an Accessibility Community Forum (launched as part of the airport's Autism Friendly status) with members from surrounding communities. Gatwick has also previously announced that over 2,500 staff across 14 different businesses on the airport campus received training to recognise and help people with dementia and that it plans on continuing to do so. British Airways also introduced a specialist support team for customers requiring additional assistance, all of whom have received intensive training including sessions with Queen Elizabeth Foundation, Guide Dogs UK and Open Doors.

**“Staff training and disability awareness is severely lacking for most public transport.”**

With respect to navigation and wayfinding, Heathrow Airport worked with the RNIB to trial the Navilens app, which uses bluetooth locator beacons to provide location-specific information to the user via their smartphone within the terminal. This helps passengers with sight loss to navigate through the airport.

Heathrow also uses the Aira assistance app to connect passengers directly to a trained professional agent to provide guided assistance on-demand for navigating through the airport and finding specific locations – including gates, special assistance facilities, retail outlets and restaurants. In terms of preparation and awareness before a journey, Queen Elizabeth’s Foundation for Disabled People’s Tryb4uFly service aims to give passengers with mobility or accessibility needs greater confidence about the support available for them.

Services offered include online flying guides and checklists; consultations to assess navigating the airport, security, medication management, oxygen etc; cabin assessments by qualified health professionals to simulate the cabin environment to assess passengers' needs ahead of travelling and offering rental of specialist equipment such as travel chairs and supports/cushions. There are also opportunities within design; Air4All (which holds designated design approval from the CAA), has designed the first cabin seat prototype system that can operate as a standard seat, or fold back to convert to a wheelchair-compatible seat, allowing passengers using wheelchairs to do so for the duration of their journey.



# Aviation Innovations and Solutions

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## CASE STUDY

### WelcoMe

In 2019 Edinburgh airport was featured on Scottish Television for its launch of WelcoMe. The solution was championed by Edinburgh Airport CEO Gordon Dewer and Scottish Health Secretary Jeane Freeman and demonstrated by Disability Champion, Ken Reid.

WelcoMe was developed by Guide Dog Mobility Instructor turned Assistive Technology Company CEO, Gavin Neate following his professional observations and studies into disability awareness within all forms of customer service interactions.

Gavin's observations led him to realise that whilst there was an increasing awareness of the need to engage with Equality Diversity and Inclusion, the delivery of equitable services was more than likely connected to the individual staff members personal awareness rather than a reflection of training provided within the industry. Gavin found that disability awareness training was either not provided or when it was, not reinforced with either further training or operational experiential reinforcement. This was leading to varying instances of disability discrimination which was damaging to the service provider and confidence sapping for the disabled individual.

In 2006 with the advent of Voice Over on iOS personal devices it was increasingly apparent to Gavin that accessible mobile technology and location services could be combined to deliver personalised user-led service delivery and by 2014 Gavin and his team were working on WelcoMe in order to deliver this.

WelcoMe connects disabled visitors and travellers directly with customer service representatives and, through a pre-populated profile delivers in the moment, general and specific, disability awareness training in order to enhance the efficiency and effectiveness of each interaction.

The innovative and multi-award winning web service allows the disabled visitor to fill out a profile, look for participating venues, notify an intention to visit and then inform the venue digitally of their arrival and location. The staff member receives an overview of any condition the visitor wishes them to have awareness of alongside their picture, easy identification and best practice communication advice and tips and links to further information and training. The staff member is prepared in the moment and can then recognise and approach their guest with a level of disability-related confidence and certainty unavailable through traditional training.

WelcoMe encourages users to review service delivery directly following an interaction providing feedback directly to the venue and its management team as well as the individual staff member involved. It also collects previously unavailable data in relation to the makeup of disabled passengers with the service covering over 30 different conditions and disabilities, many of which are invisible and remain so to service providers unless declared by the visitor in a moment of interaction.

WelcoMe was initially launched in 2018 with a limited number of venues around Edinburgh and with an interest in improving service delivery for disabled travellers, Edinburgh Airport were keen to be involved. Initially there was a good take up of the service with consistent use throughout 2019 however with the outbreak of the pandemic the service was suspended. With the opening up of air travel the service is in place and awaiting relaunch.



WelcoMe has been the recipient of numerous awards including winning the “World Summit Award for the Inclusion & Empowerment of Disabled People” (UN SDG 10) and also the National Diversity Award for Business in 2020 and is now available in over 170 venues and locations across the UK and Republic of Ireland, including major shopping centres (Westfield, St James Quarter, Battersea Power Station), transport hubs (NorthLink Ferries, Irish Rail), Leisure centres (50+ UK Leisure centres), Councils (Westminster, Edinburgh, Coventry) and many others.

Understanding who is about to arrive at a venue is of paramount importance if we are to be prepared to provide an equitable service and WelcoMe is increasingly proving it is possible to deliver this in all environments. Aviation has long been aware that it has to improve the level and consistency of its service delivery to disabled passengers and much has been done to address this, however, it is hoped that the experience of Edinburgh Airport will lead to the service being made available at an increasing number of facilities both in the United Kingdom and abroad.



## CASE STUDY

# Sunflower Lanyards

Starting at Gatwick airport in 2016, the Sunflower Scheme was designed to provide people with a disability with a way to signify to others that they may need a little more time or assistance in certain circumstances, such as working their way through a busy airport, for example. The scheme features a lanyard, available to anyone, which features sunflower print. Staff are trained to recognise the lanyard and to provide any additional assistance as might be needed.

The scheme quickly spread from Gatwick across transport and even into rail, and scheme CEO Paul White credits this sector with much of its success to date. “The Sunflower Scheme started at a UK airport and spread quickly to the rail sector as people got off planes and onto trains” he explained.

“Being embraced by the transport industry has helped it move quickly around the UK, and we’re delighted that it is now recognised up and down the country, and even abroad – as well as the rail network, all UK ports support the scheme, and their foreign counterparts, as well as many international airports. We hear every day how the scheme has empowered people to go out to different places, be brave enough to travel and try different things, because they now feel supported, simply because they are wearing a lanyard around their neck. It’s a really positive message.”

## CASE STUDY

# Creating an accessible and inclusive future flight

The UK is playing a key role in the global effort to revolutionise the way we move people and goods through the development of new innovative aviation solutions. The global market for drones and advanced air mobility (AAM) is projected to be approximately \$74 billion by 2035 with drone services alone predicted to offer a 1.8% increase in GDP by 2030. To fully realise the economic and social benefits of these new aviation solutions, they must be accessible to all.

Empowering innovators to embed inclusive solutions in their future flight projects at the concept stage is the key to unlocking the full economic and social benefit. Many companies fail to consider the needs of disabled people and often solutions are an afterthought. To address this, Innovate UK KTN, in collaboration with CCD Design and Ergonomics Ltd (now Mima Group), recently worked with a selection of organisations to encourage them to think about different scenarios and consider inclusive solutions.

### Three commercial scenarios and personas were assessed:

- **Drone delivery service for someone with a visual impairment:**
  - What products might drone delivery be available for?
  - What platform, technology or method of updates might be most appropriate?
  - What information will be included?
  - How will individuals know the item is being/has been delivered?
  - How will individuals know where the item has been left?
  - How easy is it to reorder?
- **Urban journey for two people with mobility impairments:**
  - How will the service and journey to vertiport be booked?
  - Will staff be available at the vertiport? Who are they, how will they help and what training do they need to provide this?
  - What assistance will be available for pre-boarding and boarding?
  - Have you considered storage for mobility aids including wheelchairs?
  - How will individuals be supported to disembark?
- **Sub-regional journey for family with cognitive impairments**
  - What can help alleviate anxiety?
  - When booking, what information should be provided and what information will the operator require?
  - Who will be at the airport to greet them?
  - How will the family fill their time whilst waiting for their trip?
  - Will there be any specific facilities the family may need to know about? How will they find them?
  - What will be included in the onboard experience to ease anxiety?
  - How will the experience differ from traditional flight?



### Some common themes to emerge from the work included:

- The need for a trained customer engagement team to support people through their whole journey.
- Clear wayfinding, signage and flight information in a range of formats.
- Being able to accommodate assistance dogs and/or mobility aids.
- Adjustable and flexible designs to cater for a range of impairments (e.g. seat height, charge points).
- Physically accessing the new aircraft and onboard comfort.
- Ensuring pre-service familiarity to negate anxiety and/or potential safety issues.

### How to get further support for your future flight project

If you would like to be connected to organisations to help you embed inclusive solutions into your project or work with people with lived experiences, email [futureflight@ktn-uk.org](mailto:futureflight@ktn-uk.org).

### About the Future Flight Challenge

The Future Flight Challenge is a four-year government and industry funded £300 million programme to advance the development of new aviation technologies. Future Flight will enable the operation of drones, advanced air mobility (AAM) and sub-regional electric or electric-hybrid aircraft. It will revolutionise the way we move people and goods by creating efficiencies and improving connectivity to jobs, education, health and services.

Find out more about the Future Flight Challenge by visiting the UK Research and Innovation website. To find expertise, services, news, publications and events from Innovate UK KTN, go to the Future Flight webpage, or email the Future Flight team: [futureflight@ktn-uk.org](mailto:futureflight@ktn-uk.org).

# Maritime Industry Perspective

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## Introduction provided by Geoff Holt MBE DL, a pioneer in the accessible and innovative maritime space.

Geoff was paralysed in a swimming accident in 1984 and uses a wheelchair. In 1995 he became the inaugural Chairman of RYA Sailability. In 2007 he became the first severely disabled person to sail single-handed around Great Britain. In 2009 he sailed across the Atlantic Ocean unassisted. He was awarded an MBE for "Services to Disabled Sailing" in 2010 and named 'Yachtsman of the Year' shortly after. He was made a Deputy Lieutenant of Hampshire in 2012. He is a Council member of the RNLI. He is patron and ambassador for several charities for people with disabilities and was Chairman of selectors for the sport of sailing in 3 Paralympiads. Geoff is recognised as a leading figure in the field of disabled boating and maritime sectors.

Geoff is an entrepreneur with 30 year's experience in marketing & PR working for international accountancy firms including Deloitte. He is the founder of Wetwheels, an organisation that takes disabled people to sea in purpose-built, fully accessible motorboats.

*"I have been involved in the maritime sector all my life. I worked as a professional yachtsman sailing the oceans before my accident which put me in a wheelchair when I was a young man. Since that time, I have seen first-hand the challenges of access faced by people with disabilities within the maritime sector, both the leisure sector and the commercial sector. Although I am a wheelchair user, my access requirements can differ from other disabilities, for example those with sight impairments or cognitive disabilities. However, having built a successful commercial maritime business supporting all disabilities, I do have a wide understanding of the different barriers to participation and inclusion within the maritime sector.*

*I founded Wetwheels as a truly barrier-free solution for people with all disabilities to access the maritime environment. (Further information about Wetwheels can be found later in this report). Whilst the Equalities Act 2010 provides legislative protection for disabled people when*

*accessing goods and services, in reality, as a disabled person, the barriers we face are not necessarily intentional, they are often physical barriers due to lack of foresight in the planning and building process. There is also a lack of training of staff. Such barriers often dissuade disabled people from even trying to access public transport for fear of a bad experience.*

*Having worked with some of the U.K.'s largest ferry companies, there is a very real sense of wanting to make vessels a welcoming and barrier-free experience, however, because some vessels are older, it is more difficult to make physical changes which may affect its coding.*

*Giving consideration to design at an early stage in terms of accessibility is the ideal solution. I have proven with my Wetwheels project, when you remove the barriers to access, people come. A recent study showed that disabled people in the UK have disposable income in excess of £200 billion. Disabled people do not just come on their own, they bring their friends and families. The economic argument for making services more accessible is very strong and, in many ways, is more powerful than the legislative option.*

*There is still much work to be done and all operators within the public transport sector - from trains and buses to planes and ferries - need to do more to build confidence within the disabled community. With an estimated 15% of the UK population having a disability, and that number is growing, the public transport sector needs to do more. It needs to listen to disabled people and it needs to invest to make changes.*

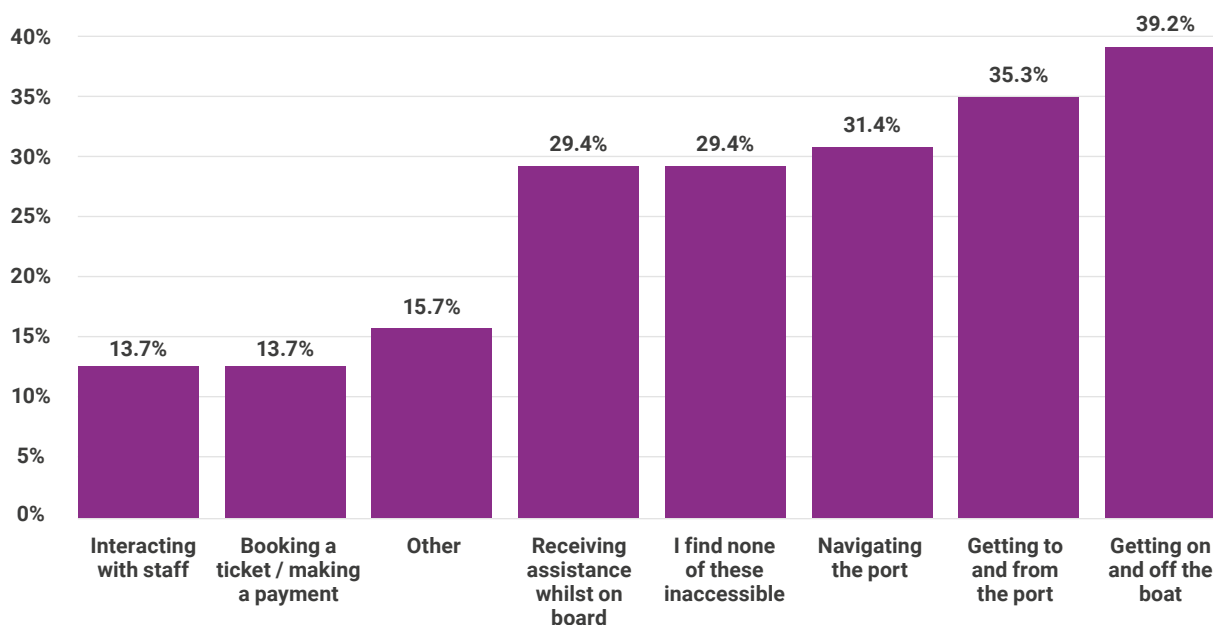
*In conclusion, I have proven that with good design and consultation with the disabled community, it is possible to create a thriving business which offers a safe, exhilarating, fully inclusive and participatory experience for everyone, including those with the most profound and complex disabilities."*

**[geoffholt.com](http://geoffholt.com)**  
**[wetwheelsfoundation.org](http://wetwheelsfoundation.org)**

# Barriers to Travelling by Boat and Ship

According to the research undertaken by the RiDC for this report; 51 respondents have travelled by ferry in the last six months and 70.6% of these faced challenges. The top three inaccessible or challenging aspects of ferry travel are; boarding and disembarking the boat (39.2%), getting to and from the port (35.3%), and navigating the port (31.4%). Respondents also mentioned steep steps as a challenge and trying to pass between cars to get off the car deck.

## Q12 What aspects of using ferries or other types of water transport do you find inaccessible or challenging?



Maritime is an area of transport with limited engagement within the accessibility space. Though there are examples in this report, including NorthLink Ferries and Wetwheels, this is an area of transport with much room for growth and innovation. As is clear from the RiDC research above, boarding and navigation remain some of the most pressing challenge areas.

There is work ongoing at a departmental level too; in 2022, the Department for Transport announced that it would provide £1 million to lifeline ferries and seaports serving the Isle of Wight and Isles of Scilly to improve accessibility, including for passengers with disabilities.

Policy/educational work is also vital. In 2020 Maritime UK launched the Diversity in Maritime programme. "Diversity in Maritime aims to promote a fair, equal and inclusive UK maritime industry that embraces diversity and creates a supportive and open atmosphere for all to be able to achieve their potential. The programme works closely with

the Maritime Skills Commission to ensure the UK maritime industry has a continuous pipeline of highly skilled, diverse people and to support the Department for Transport's Maritime 2050 People Route Map." This work represents a vital step forward for the maritime sector in terms of internal diversity and inclusion, which is also crucial in enabling full accessibility for passengers and enabling innovation growth with lived experience. According to the 'Maritime and Coastguard Agency disabled passenger satisfaction survey' (2019), "Those who travelled by ferry in 2019 showed lower levels of satisfaction, averaging 46% in 2019, around 10 percentage points down from 2018, again largely driven by falls in satisfaction during booking". 33% of those surveyed reported being very dissatisfied or dissatisfied during the booking stage of their ferry journey, 33% reported being very dissatisfied or dissatisfied during their time at the port, and 29% reported being very dissatisfied or dissatisfied during their time onboard the ship. Booking accessibility and technology in particular could be a key area for innovation.

# Maritime Innovations and Solutions

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## CASE STUDY

### Wetwheels

Wetwheels offers a unique opportunity for disabled people of all ages - including those with multiple, profound and complex impairments - to access the water. Central to the experience is active participation - helping to broaden aspirations, increase confidence and directly impact on health and wellbeing. The Wetwheels team continually innovates through new technologies and improves experiences through the excellence of their teams and feedback from participants.

Wetwheels has seven commercially coded vessels operating around the UK providing the opportunity for nearly 10,000 disabled people and their families each year to access the maritime environment; not only for pleasure, but also for training and the mental well-being and Blue Health benefits of being at sea. Much thought and resource has been expended addressing the many barriers to access and participation on Wetwheels including, for example:

- Physical access onto the vessel via level ramp and suitably wide gateway
- Identify new ways of safely securing wheelchairs to the deck of a vessel
- Developing bespoke disability awareness training in a maritime context for our crew
- Creating a suite of SOP's and policies which exceed the government's Maritime and Coastguard Agency (MCA) MGN280 commercial coding requirements
- Worked closely with safety providers such as lifejacket manufacturers and identified ways for people with varying disabilities to don their lifejacket safely

Wetwheels has also developed virtual reality experience options ensuring nobody is excluded from the experience. Wetwheels is an outstanding example of innovation within transport accessibility at different levels; for physical access and safety, through to digital enhancements, and innovation in training, policy and delivery.





**CASE STUDY****WelcoMe**

The necessity to provide equitable services for disabled people has never been more acute, with first point of contact interactions either building trust and ensuring brand loyalty or conversely where service has fallen short of expectations threatening to create anxiety and disengagement in the consumer.

Traditionally, disability awareness has been provided through targeted roles seeking those with experience or more commonly through induction training at commencement of employment, however, with a high turnover of staff the challenge to maintain a consistent level of service has been challenging, invariably leading to a lack of consistency in service provision. In 2018 WelcoMe, the world's first proximity-based disability awareness training platform, was launched. The pan-disability service connected disabled people directly in real time with the venues they were visiting via an app or directly through the venue website. A pre-populated profile then triggered both general and specific training advice relevant to the individual visitors' needs prior to any in person interaction. The service reduced anxiety in visitors and provided staff members with key access and communication advice which could be used in order to provide the highest level of service at first point of contact.

NorthLink Ferries was the first ferry service provider in the world to adopt the platform and by 2019 WelcoMe was in use in all NorthLink Ferry terminals in the NorthEast Highlands and through the Orkney and the Shetland Islands.

*“NorthLink Ferries has always been committed to ensuring that all passengers have an easy and comfortable journey between the Scottish Mainland and the Orkney and Shetland islands, and our ferries, terminals and walkways were built with accessibility in mind. Over the years we have looked at ways to improve the service we offer, taking on board new technologies to ensure easy access for all. We are proud to use WelcoMe, which provides a fantastic facility for our passengers arriving at our ports and vessels and empowers our staff with the knowledge they need to provide the best assistance they can. Ease of use and detail is key for our business, and we look forward to continuing our partnership with WelcoMe at Serco NorthLink Ferries”*

**Billy Rob, Customer Service  
Director, NorthLink Ferries**

In 2020 WelcoMe won the World Summit Award for the Inclusion & Empowerment of Disabled People (Goal 10 SDG) and is now in use in over 170 venues across the UK and Republic of Ireland including Rail, Aviation, Retail, Health, Leisure, Local Government and others.

# Micro-mobility and Active Travel

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Micro-mobility describes the transport mode that encompasses lightweight vehicles such as bicycles or scooters, including electric and short-term hire ones. Micro-mobility and active travel are key, complex priority areas when it comes to accessible travel. According to the report “Disability, accessibility and blue badge statistics: 2021 to 2022” from the Department for Transport, the percentage of all trips by walking made by disabled people stood at just under 30%, making up a significant share of all journeys made by disabled people. Challenges within active travel methods range from wayfinding to the public realm environment itself; the barriers of poorly maintained pavements and of parked cars, as well as cars that are active within the environment.

Micro-mobility also presents a unique set of challenges; again, within the design and maintenance of public realm spaces themselves, but also the availability, design accessibility and affordability of owned or rented micro-mobility devices, such as bicycles and scooters.

Micro-mobility options are still going through a range of legislative processes, which present their own challenges – from storage and availability to their use. Met Police Commander Kyle Gordon, the National Police Chiefs Council lead for Roads Policing Operations, said in February 2023 at a Transport Select Committee hearing on e-scooters that the ambiguity over the legality of electric scooters on the roads of the UK is causing confusion, and creating policing challenges, due to a “void” in terms of legislative clarity.

Connected travel, in this context, meaning the connectivity between different transport modes, is also central to travel access and inclusion; ensuring consistency and connectivity of ticketing, timetabling and travel between modes.

# Barriers in Micro-mobility and Active Travel

- **Walking, cycling or other forms of physical activity for all or some parts of a journey can improve physical and mental health and wellbeing, air quality and congestion. Active travel is therefore an important consideration in the planning of new residential and commercial developments with the forecasted growth in UK population. As Public Health England state: “Switching more journeys to active travel will improve health, quality of life and the environment, and local productivity, while at the same time reducing costs to the public purse. These are substantial ‘win-wins’ that benefit individual people and the community as a whole.”**
- **Through the Inclusive Transport Strategy the government aims to explore the feasibility of amending legislation to recognise the use of cycles as a mobility aid in order to increase the number of disabled people cycling.**
- **Infrastructure around active travel and safety for all demographic groups (for example, women, faith groups) is also important to ensuring active travel engagement success.**

According to the research undertaken by the RiDC for this report; 14 respondents have travelled by hire cycle or scooter transport in the past six months and 50% face challenges. Those who face challenges said that finding or booking the transport (35.7%) and using it (35.7%) are challenging aspects.

The research also included Dial-a-Ride or community transport, and 27 respondents had used these services in the past six months with 66.6% facing challenges. 25.9% find booking the service to be inaccessible or challenging. Respondents also mentioned that the service has poor availability and a requirement to book far in advance, the service also seems to run on limited days and hours which poses problems.

When accessing micro-mobility solutions, a lack of safe road space can discourage users, which is a key area for innovation. For example, a mobility cloud platform developed by Vodafone to improve the safety of road users is being tested for the first time on the open road in the UK. Drawing on the power of mobile and data technologies, the platform is a new type of information superhighway which will ultimately connect vehicles, cyclists, pedestrians and infrastructure in a seamless digital transport ecosystem.

Other road users also present challenges, including improperly parked cars or cars parked on pavements. Many of the challenges in the shared public realm and road space fall into the category of human engagement and interpersonal interactions, which is another area where innovation can have real impact. For example, the GreenRoad Platform aims to improve car driver behaviour, using tools to motivate drivers to improve their safety and efficiency. GreenRoad works by giving drivers real-time feedback, displaying green when they drive safely and yellow or red for less ideal behaviour. Performance-based safety scores help drivers track their progress.

A key challenge raised through the research within this report was the usability of micro-mobility options, presenting an innovation in design opportunity. An example of work in this space comes from micro-mobility company Lime – ‘Lime Able’ will offer two new vehicles specifically designed to serve people with varying abilities and needs, including a three-wheeled sit-down scooter and a three-wheeled stand-up scooter. The vehicles are designed for riders who are either not comfortable or are unable to use traditional Lime e-scooters or require storage capacity to carry vital medical equipment or mobility aids.

# Micro-mobility and Active Travel Innovations and Solutions

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## CASE STUDY

### Neurodiversity Inclusive Design Standard

In 2022, the British Standards Institution (BSI) launched a first-of-its-kind standard on the design of the built environment for a neurodiverse society. “Neurodivergence includes people with autism, ADHD, dementia, and a range of other sensory and/or information-processing differences. It is estimated that around 1 in 7 people in the UK are neurodivergent in some form. The guidance from BSI contained within the new standard, PAS 6463, applies to buildings and external spaces for public and commercial use, as well as residential accommodation for independent or supported living. A significant number of people find elements of the built environment uncomfortable, distressing or a barrier to their use.

For example, when interacting with the built environment, neurodivergent and neurodegenerative people can frequently experience “sensory overload”, overstimulation of the body’s senses leading to a feeling of being overwhelmed. The increased demand on an individual of the associated cognitive load can unsurprisingly lead to increased anxiety, fatigue and, in some cases, poor mental health. PAS 6463, Design for the mind – Neurodiversity and the built environment – Guide aims to assist building designers in mitigating and eliminating these negative impacts.”

**CASE STUDY**

## Hubs Mobility Services Standard

£1.5 million was allocated in 2022 to support all 13 Mobility Centres across England roll out a 'Hubs Mobility Service'. These services help people stay mobile after they have been advised to stop driving or if they are unable to learn to drive due to their disabilities, offering them advice on alternatives such as powered wheelchairs, community transport and local services.

The hubs have been successfully piloted at 7 of the centres over the past 2 years and have already helped over 4,000 people regain and retain confidence to travel.

**CASE STUDY**

## SkedGo

SkedGo provides personalised trip planning, corporate mobility and other Mobility as a Service technology. Their senior developer team creates tailored solutions, meaning that organisations can rapidly create their own multi/mixed modal MaaS offering, including journey planning, parking, book and pay features, events and itineraries.

SkedGo's intermodal routing engine currently integrates over 4,000 transport service providers globally. They offer many features, such as accessibility routing, occupancy information and personalisation options (tailored route prioritising low carbon, exercise, speed of trip, cost of trip or convenience).

**CASE STUDY**

## Voi

In 2021, micro-mobility company Voi announced plans to launch re-designed parking stands for their rental e-scooters in the UK, in partnership with the Royal National Institute of Blind People (RNIB).

The new parking stands feature extended and raised side panels which enclose the entire length of the e-scooter which assists cane users in identifying the location of the racks, as well as reducing the risk of people tripping over e-scooters. The stands are also fitted with high-contrast markings on all sides to further aid in their identification.

Each stand can hold up to 10 e-scooters and Voi has so far deployed several in one of its largest UK e-scooter trials in Birmingham and other locations. Similar stands have also been deployed by Superpedestrian in Nottingham and by Lime in Salford.

This project is part of Voi's working collaboration with RNIB to understand the needs of blind and partially sighted pedestrians. The micro-mobility operator has already taken the first steps in implementing the organisation's recommendations looking at key elements, such as rider education, training, e-scooter sound alerts and now the redesign of its parking racks.

# Bus Industry Perspective

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**Claire Walters, Chief Executive,  
Bus Users UK, Disability and Access  
Ambassador for the bus industry**

Improving access to public transport benefits everyone – it boosts the economy, reduces congestion, improves air quality and gives people access to life’s opportunities through education, employment, healthcare and leisure. For bus operators, getting more people on board is good for business and improving access is one of the most effective ways to achieve that. The number of disabled people in the UK is growing with 22% of the population reported as having a disability in 2020/21 according to the Government’s UK Disability Statistics. That’s 14.6 million people and with an ageing population the number will continue to grow.

Having a physical disability is not the only thing that can make travelling by bus challenging. Mental health conditions, learning disabilities and cognitive, neuro-cognitive and sensory impairments can all influence someone’s ability to travel.

Thanks to the 2019 Regulation ‘The Rights of Passengers in Bus and Coach Transport’, some of the barriers facing disabled people and people with restricted mobility have been removed in law (if not always in practice). There remains huge scope for improvement, however, and this study from Innovate UK KTN makes a welcome contribution to raising the bar on accessibility. It also highlights some of the often simple adjustments that operators can make to their services that have the power to transform lives.

Accessibility is about more than just the journey. It starts with planning a trip from timetable information, websites and apps to transport integration, ticketing and booking. Information and assistance with all of these things needs to be available in a range of accessible formats, be accurate and up-to-date and provide every possible assurance that a person will actually be able to travel.

Technology has opened up a world of opportunity in this regard with advance booking options, on-board space checks, bus tracking and audio-visual announcements at stops.

Not every improvement requires an expensive or technological solution however. Asking bus drivers to pull into every stop with a waiting passenger means no-one gets left behind, regardless of whether they can signal to a bus or even see it arriving. And facilities like toilets and seating can be an absolute game-changer.

Other barriers can be removed through clever and thoughtful design – extra wheelchair space plus room to manoeuvre into a space, additional room for buggies to avoid conflict and on-board AV announcements that can be seen and heard by everyone. Then there’s staff training and awareness programmes which, along with lanyard and card assistance schemes mean passengers receive the support they need to travel.

Not every barrier can be overcome by the operator alone. Being able to travel by bus, particularly for work, education or appointments, depends on having frequent and above all reliable services. This requires planning, investment and the political will to prioritise public, shared and active travel over private cars.

These measures have the potential to improve transport for everyone, including disabled people. To be effective they have to be done in collaboration with passengers and that means engaging with local charities, community groups and disabled passengers and involving them in the design, planning and delivery of services and infrastructure.



Bus Users UK has been at the forefront in campaigning for accessible, inclusive transport. Our annual Accessibility Audit calls on bus and coach operators to share the work they've been doing to improve access and journeys, and the results are used to promote best practice and encourage innovation. We also work closely with passenger groups, disability charities and NGOs, local authorities, operators and governments to make sure passengers are at the heart of decision making when it comes to transport.

As Chief Executive of Bus Users UK, I have also been appointed Disability and Access Ambassador for the bus industry. Along with other industry leaders our aim is to champion access and disability inclusion and to drive improvements in accessibility and the quality of services and facilities. This study is an important reminder of the lived experience of many passengers. Improving the journey for them improves it for everyone. In this way we can create a virtuous circle, encouraging more people out of their cars, reducing congestion and making bus travel more attractive and even more accessible.

## About Bus Users

Bus Users is a charity that campaigns for inclusive, accessible transport. We are the only approved Alternative Dispute Resolution Body for the bus and coach industry and the designated body for handling complaints under the Passenger Rights in Bus and Coach Legislation. We are also part of a Sustainable Transport Alliance, a group working to promote the benefits of public, shared and active travel.

Alongside our complaints work we investigate and monitor services and work with operators and transport providers to improve services for everyone. We run events, carry out research, respond to consultations, speak at government select committees and take part in industry events to make sure the voice of the passenger is heard.

Bus Users UK Charitable Trust Ltd is a registered charity (1178677 and SC049144) and a Company Limited by Guarantee (04635458).

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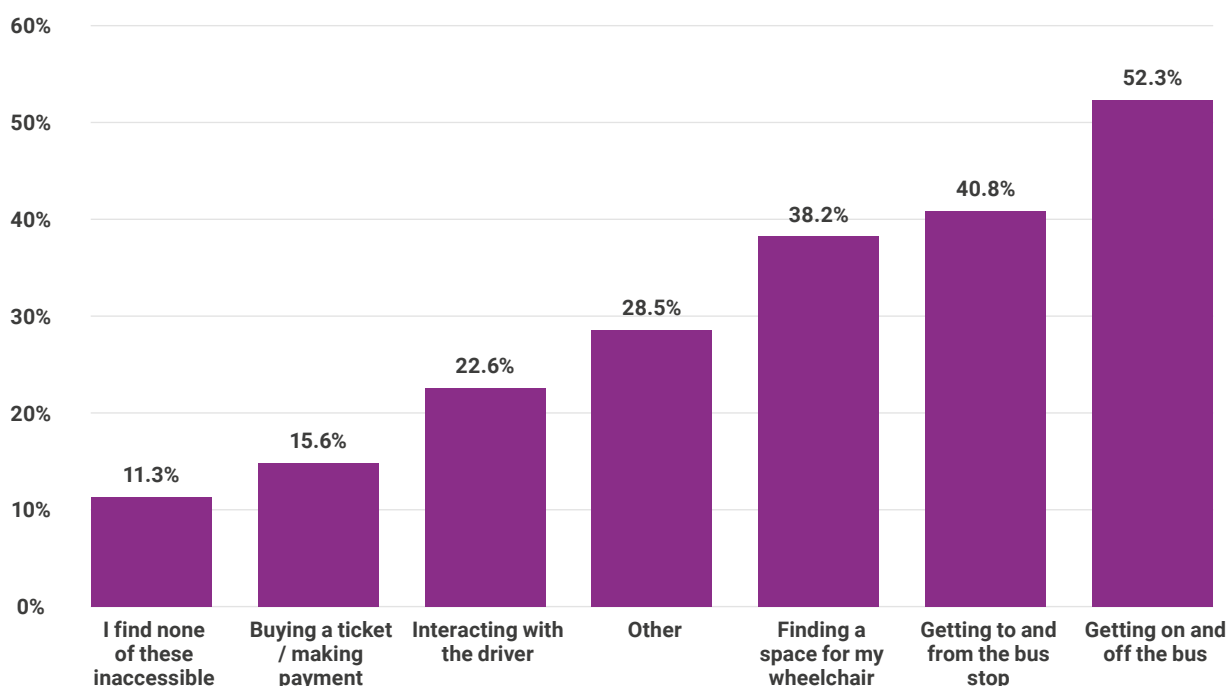


# Barriers to Travelling by Bus

Through the Inclusive Transport Strategy, the government has committed to ensuring a tool is developed to enable disabled people to report issues within bus travel, alongside a commitment to improve and upgrade on-board audible and visible information provision.

Bus was the most popular method of transport used by RiDC surveyed participants in the last six months. 390 respondents have travelled by bus in the past six months and 88.7% faced challenges. The top three inaccessible or challenging aspects of travelling by bus are; getting on and off the bus (52.3%), getting to and from the bus stop (40.8%), and finding a space for a wheelchair (38.2%). Other aspects include finding a seat, knowing when to get off, pushchairs getting in the way, and poles near the wheelchair area.

## Q6 What aspects of travelling by bus do you find inaccessible or challenging?



Boarding and spaces for mobility aids and wheelchairs are some of the biggest challenges for bus accessibility. The provision of real-time information is also a key challenge; before and during journeys, at stops and on buses. There are also ongoing challenges around accessing the bus service; how to flag down a bus if a passenger has an upper body mobility need or disability, for example, and being aware of which services are arriving next.

“Ensuring there are visual announcements at all times or, if audible, that they are not quickly spoken.”

As mentioned earlier in this report, challenges can also be found in design. Trapeze, a technology company, undertook a piece of research titled ‘Putting the Bus at the Heart of our Communities’, which found that “Buses are also vital providers of independent mobility for people with disabilities,



with one respondent commenting on the ability to access the bus without having to rely on staff, in comparison with trains and the tube”, but also identified design challenges, including the digital information display screens onboard buses often being placed directly behind the space reserved for wheelchair users, meaning it is not only hard for the wheelchair user themselves to view, but also for other bus passengers. This, combined with the research from this report which included feedback from wheelchair areas on buses with barriers such as poles, identifies a clear need for innovation in design for buses.

“Having flexible seating systems so that both wheelchair users and non-wheelchair users can use the same space.”

# Bus Innovations and Solutions

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## CASE STUDY

### Talking Sign System

Launched in 2007 by Brighton and Hove Council in partnership with the Royal National Institute for the Blind (RNIB), the react talking sign system has also been introduced in Birmingham and Portsmouth, enabling blind and visually impaired bus passengers to access travel information at bus stops.

The talking sign system is activated by pressing a button on a key fob, which when pressed near

an enabled bus stop sends out a signal to the bus stop which allows the user to hear, via the key fob, announcements regarding the stop name along with destination and arrival times of expected buses. The technology is linked to real time passenger information. To receive more information, push one of two buttons. The first button starts a message that gives further information about the bus stop location and the second tells you when the next few buses are due.

## CASE STUDY

### GoAhead Demand Responsive Transport

Demand-responsive transport (DRT) provides a flexible solution for passenger journeys, with a tap on an app or a call on the phone.

GoAhead have offered demand-responsive transport on three occasions, including a one-year trial in Sutton and a two-year trial in Oxford. They are now using the learnings from these trials to begin a new demand-responsive offering in North Lincolnshire. DRT means that buses do not have a strict timetable, but meet the needs of customers across a region. A passenger can simply request a ride and will be picked up.

DRT can enable a high level of flexibility and freedom, whilst ensuring that the needs of the passenger will be met in terms of any boarding requirements and information provision ahead of time.





# Electric Vehicle Industry Perspective



**Catherine Marris, Head of Innovation,  
Motability, the charity**

The transition to electric vehicles (EVs) in the UK is moving at pace, with the sale of new petrol and diesel vehicles set to end by 2030. With one in five people in the UK reporting a disability, it is absolutely vital that all EV charging is accessible to all.

It is estimated that there will be 2.7 million disabled drivers and passengers by 2035, and our research with the consultancy Ricardo Energy & Environment has found that up to half of these people will be reliant on public chargepoints. However existing infrastructure has not been designed with disabled people in mind. Disabled people can face a range of accessibility barriers when trying to use public chargepoints, including inadequate space, high kerbs, heavy cables, lack of signage and confusing interfaces.

In response to this issue we formed a partnership with the UK Government's Office for Zero Emission Vehicles (OZEV), and together we commissioned the British Standards Institution (BSI) to develop a national accessible charging standard for EV chargepoints.

The standard, PAS 1899, was published in October 2022, and provides industry with a clear specification of how to make chargepoints accessible. It has been designed to apply to all public chargepoints and covers all aspects of the chargepoints themselves and the built environment that surrounds them. Disabled people were involved at every stage of the creation of the standard, as well as representatives from industry bodies, manufacturers, chargepoint providers and disability groups.

To support innovation in this area we also provided grant funding to Designability, a charity which creates products to enable disabled people to live with greater independence. They have created freely available design guidance for manufacturers, providers and designers, to help them design chargepoints that meet the accessibility standard.

Designability carried out extensive research and testing with disabled people to inform their work. Through this we learnt how important it is to listen and engage with disabled people to really understand their needs. To be truly inclusive it's also really important to understand the range of requirements that people using chargepoints may have.

For chargepoint providers it makes sense to embrace accessibility now, especially for those seeking to make use of the Government funding streams to support the transition to zero emission vehicles. Implementing the recommendations of the standard into their infrastructure plans now will help providers to avoid expensive retrofitting in the longer term. Better accessibility benefits everyone, from older people to parents with young children. We've seen an encouraging response from the EV industry to the launch of the standard, with a number of providers already indicating that they will be using it going forward to ensure their infrastructure is fully accessible. Motability is continuing its work in this area, and we are now exploring ways to help ensure compliance with the standard. Throughout 2023 we will be engaging with and supporting local authorities and other landowners to embed compliance with PAS 1899 into their procurement practice for EV charging infrastructure.

We hope that in future disabled drivers will be able to confidently make the journeys they want without having to worry about the accessibility of public charging.

## About Motability

Motability is a national charity set up with all-party parliamentary support in 1977 and incorporated by Royal Charter. Our vision is that no disabled person shall be disadvantaged due to poor access to transportation and our objective is to facilitate the relief and assistance of all disabled people in connection with the provision of personal or other transportation.

# Barriers to Travelling by Electric Vehicle

- Access to electric vehicle (EV) charging points is an area of concern identified within the Inclusive Transport Strategy.
- “Technological developments such as more open data, and innovations such as connected and autonomous vehicles (CAVs) have the potential to benefit many disabled people” (Inclusive Transport Strategy).
- An inclusive design standard has been developed for EV charging - Motability, the charity, has worked with the UK Government Office for Zero Emission Vehicles (OZEV) to sponsor a new accessibility standard for public EV chargepoints, developed by the British Standards Institute (BSI). Motability carried out extensive research with disabled people in order to understand what their EV chargepoint experience is like. Their findings have been used as the basis for the BSI’s Standard, which covers all aspects of the charging experience. These include:
  1. The physical environment surrounding the charging unit (e.g., kerb height, ground type, etc.)
  2. The location, placement and spacing of charging units, with relation to other objects (e.g., distance from parking bays, adequate space surrounding the charging unit, etc.)
  3. The design of the charging unit itself (e.g., its height, weight, ease of use, accessibility of information, etc.)
  4. The standard outlines what is required in order for EV chargepoints to be fully accessible for disabled drivers, passengers and pedestrians. The standard, named PAS 1899:2022: Electric vehicles – Accessible charging – Specification, is available to view on the BSI website.

The RiDC survey did not include questions relating to EVs as personal car use does not fall directly under the remit of public transport modes (the focus of the survey). However, this report does address some of the challenges associated with

accessible EV charging as this is an important area for both accessibility and net zero targets.

Taxi use was included in the RiDC survey, as this is an important method of travel for disabled people. 286 respondents have travelled by taxi in the past six months and 82.5% faced challenges. The top three challenging aspects of taxi or minicab transport are: getting in and out of the taxi (50%), issues with wheelchairs and mobility aids (40.2%), and booking a taxi (24.8%). Respondents also said that it's difficult to book a wheelchair accessible taxi and there are inflated charges for wheelchair users due to the need for a bigger vehicle.

As with many areas within this report, electric vehicles and taxis have significant crossover with other areas of transport and mobility. Anything that uses highways and footways should be hierarchically arranged using the triangle system as adopted by most major transportation authorities. Private cars and on-street charging should have the least importance under the order which puts pedestrians first, followed by active travel, then public transport, and private cars in the least-important spot when designing pavements and roads. Accessibility is a holistic public realm consideration.

For taxis and minicabs access, taxi drivers must, by law: stop for disabled passengers, enable wheelchair users to travel in their wheelchair if they're driving a wheelchair accessible vehicle (most black cabs), transport assistance dogs, and not levy various extra charges. Taxi licensing offices in local authorities are able to help passengers find accessible taxis. In some areas such as larger cities, licensed taxis must be wheelchair accessible. Some of the most-identified issues with taxi accessibility include boarding and disembarking, including with wheelchairs, and the booking of the accessible taxi itself. There are also multiple anecdotal challenges in some cases of taxi drivers refusing to transport disabled passengers due to the perception of time lost providing assistance, or the presence of assistance dogs.

# Electric Vehicle Innovations and Solutions

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As personal electric vehicles themselves are fairly new in the UK (in the context of personal transportation), alongside the related infrastructure needed for the vehicles, there is still a lot to be done in the innovation within accessibility space for EVs. This is an opportunity to build-in inclusion from near the beginning of EV journey in the UK.

According to Motability's 'The Transport Accessibility Gap' report 2022, "5G and AI technology can be harnessed to proactively identify customer needs and prepare for them, improving journey planning and reliability, while also having direct contact with customers through instantaneous feedback channels. Enhanced customer requirements data is also key to enabling the accessible design of new products and services."

## CASE STUDY

### Electric vehicles – Accessible Charging specification

With the aim of providing an inclusive experience for people with accessibility needs, PAS 1899:2022 is a new standard – released in October 2022 - giving designers, procurers and installers essential specifications on how to provide accessible public charge points for electric vehicles, as outlined above.

It aims to support the building of an inclusive EV charging infrastructure in the UK. As such it can help designers, procurers and installers to:

- Anticipate and overcome restrictions and barriers that could prevent any user from making full and independent use of the charge point
- Accelerate innovative practices
- Improve the efficiency with which EV charge points are deployed
- Build confidence in the accessibility and inclusivity of EV infrastructure
- Strengthen the risk management of EV projects

The PAS can also be used by owners and operators to assess the accessibility of their existing charge points.



# Automation and Digital Perspective

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Advances in data science, AI, and sensor technologies are revolutionising the transportation industry and creating new opportunities for clean and inclusive mobility. Automated mobility has the potential to transform how people, goods, and services are moved, improving accessibility and inclusiveness in multiple ways. Eliminating human error through automation can improve safety, particularly for vulnerable groups such as the elderly or disabled. Increased accessibility can be achieved through vehicles equipped with ramps or lifts, making travel easier for those with mobility impairments. Additionally, automated vehicles can operate around the clock, increasing convenience and access to transport on demand and potentially reducing the overall cost of transportation, making it more accessible to low-income populations.

To realise the full potential of automated mobility for people with physical and cognitive impairments, it is crucial to consider accessibility and inclusiveness in the design process from the outset. The Department for Transport's Inclusive Transport Strategy highlights the importance of inclusive design and requires prospective funding recipients to consider accessibility in their project proposals. The Centre for Connected and Autonomous Vehicles (CCAV), in its Connected and Automated Mobility 2025: Realising the benefits of self-driving vehicles document, has also established nine principles for Connected Autonomous Mobility (CAM), one of which is that "CAM services must be available to all segments of society". This principle is reinforced by the requirement for applicants to future CCAV competitions to answer a question on equality, diversity, and inclusion, highlighting the importance for project teams to consider from the outset these factors in the design and delivery of their projects.

It is, therefore, essential that the design of future Connected Autonomous Mobility (CAM) vehicles and services take place in close dialogue with people with disabilities to ensure we eliminate the risk of designing products and services that exclude disabled members of our communities that could benefit the most. Early active engagement in the design of CAM products and services to consider critical attributes required by people with mobility, vision, hearing, and cognitive or mental disabilities will ensure that these innovations benefit everyone in society.

Automated mobility holds great promise for improving accessibility and inclusiveness in transportation. With the proper focus on inclusive design, these innovations have the potential to bring about transformative advances for people with disabilities and enhance the quality of life for everyone. The UK government is focused on delivering these benefits and promoting inclusive design for future mobility solutions and is supported by the principles established by CCAV for automated mobility.



## Barriers in Automation & Digital Accessibility

The RiDC survey did not include questions on automation and digital barriers as the barriers in these areas do not relate to a single mode but are cross-modal challenges.

Barriers to digital engagement and services across transport are varied, but many are connected to accessing technology, e.g., smartphones, not being aware of how to use technological solutions and a reluctance to engage with them. There are a range of reasons for this; some of these barriers may be financial, some of them may be related to lack of signal reliability for devices (especially in rural areas), some of them may be related to age and a possible reluctance to engage with new technology and more. It is vital that assumptions around barriers are not made, but that interventions are put in place holistically and fairly, across modes, to overcome these barriers.

Community support can play a significant role in overcoming some of these barriers; Community Rail, earlier in this report, is an excellent example of where this type of dedicated support can help to overcome challenges around digital access.

A key area in which a lack of digital technology is disadvantaging is in ticketing; being able to access ticketing digitally, to compare different ticketing offers, and a wider systemic issue of ticketing systems being siloed within modes rather than offering cross-modal ticketing solutions (in many cases). Integration across modes and indeed across digital services is essential (for example, a wayfinding app integrated with ticketing offers). Examples of this integration include AccesRail 9B/450; under which rail operators Great Western Railway, Avanti West Coast, London North Eastern Railway, TransPennine Express and coach provider National Express all offer integrated rail or coach and air ticketing; purchasing one ticket for both modes via AccesRail.

In terms of basic digital access, further information can be found later in this report, but the basics of being able to be screen-read, accessibility for non-mouse users, interactivity with panning and zooming are all central to any digital transport solution. Being able to engage with staff is also vital; digital methods should not be used as a replacement for staff interaction, but to enhance and enable independence where relevant/desired.

In terms of Automated Mobility, or Connected Autonomous Mobility (CAM), according to the Society of Motor Manufacturers and Traders' survey 'Revolutionising Mobility in Society':

- 1. Over 50% of all 3000 respondents across different backgrounds feel their mobility is restricted,**
- 2. Greater mobility could improve access to education, employment and healthcare,**
- 3. Connected and autonomous vehicles (CAVs) could give 1 million UK people better access to higher education,**
- 4. 48% of respondents said reducing stress of driving is greatest benefit of CAVs,**
- 5. 55% were aware of CAV technology but mostly unaware of potential benefits and,**
- 6. 56% of people surveyed with disability were the most excited about CAVs.**

As much of the work around CAVs in the UK is still in very early stages, examples of innovation in the space are also in early development; largely focussing on policy and opportunity. It is vital that, as CAV develops, there is a focus on safety and accessibility for all across all services, for example, providing braille on controls in vehicles, enabling voice and gesture controls, and providing in-cabin monitoring. Globally, an example of this early engagement comes from Volkswagen, who are speaking to multiple accessibility groups including the American Association of People with Disabilities and are working on how autonomous vehicles could communicate with users who are deaf or have low vision. This work includes looking into a software interface with an accessible screen reader, interior concepts with visual, text, and tactile notifications, and external vehicle speakers and microphones to support locating and boarding.

The Centre for Connected and Autonomous Vehicles (CCAV) in the UK has stated that it is committed to ensuring that connected and autonomous vehicles (CAVs) are accessible and inclusive for all users, including those with disabilities. The CCAV has stated that CAVs have the potential to revolutionise mobility for people with disabilities and that it is working to ensure that CAVs are designed and developed with accessibility and inclusivity in mind.

# Automation & Digital Innovations Solutions

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## CASE STUDY

### Transreport

In 2021, Transreport launched the new passenger assistance app, which aims to make it quicker and simpler for disabled passengers to request assistance for and travel using rail.

The Passenger Assistance app was designed alongside the Rail Delivery Group, disabled passengers and accessibility experts, and enables users to request assistance for their train journeys in a single app, rather than requiring a customer to contact each train operator by phone/email prior to travel. Any assistance request submitted is sent directly to the train operator who can arrange assistance across the entire journey, including where journeys span multiple operators.

Part of the development of the app was funded by First of a Kind rail competition funding, which is funded by the Department for Transport (DfT) and managed by Innovate UK, delivered in partnership with Innovate UK KTN, as outlined earlier in this report. Jay Shen, founder and managing director of Transreport, said that the company was “inspired by The Social Model that says people are disabled by the world around them, not by their impairment or difference”, adding that it was exploring how the solution could be applied to other modes of transport including buses, coaches and air travel.”

## CASE STUDY

### Project FLOURISH

FLOURISH was a multi-sector collaboration that helped to advance the successful implementation of connected and autonomous vehicles (CAVs) in the UK, by developing services and capabilities that link user needs and system requirements, maximising the benefits of CAVs for users and transport authorities. The three-year project was worth £5.5 million and was co-funded between industry and the Centre for Connected and Autonomous Vehicles (CCAV). It was delivered in partnership with Innovate UK. It was part of the government’s £100 million Intelligent Mobility Fund, supporting the Future of Mobility Grand Challenge.

FLOURISH adopted a user-focused approach to understand consumer expectations of CAV technology. The project explored how this technology can be harnessed to enhance and enable mobility for older adults and those with mobility-related needs, contributing to the development of a stronger and more inclusive society. Participants were involved through workshops, and simulator and pod trials.

The project considered the technology required to deliver these user benefits. The FLOURISH car trials focused on the optimum conditions for the effective wireless transfer of data between vehicles and with the roadside infrastructure. This development will enable the future real-time communication of journey information to users, allowing them to make ‘on the move’ choices about their travel.

FLOURISH also examined how innovative technologies such as Artificial Intelligence can be used to model a networked environment which responds immediately to any changes in traffic flow. These learnings from FLOURISH will enable the operation of CAVs at network level and the optimisation of regional traffic management systems, delivering further benefits for users.

**CASE STUDY**

# Digital Standards

Looking at digital accessibility for apps on mobile phones in particular, the RiDC has an excellent list for use in ensuring that apps are accessible:

**1. Easy download and set-up**

- Is the app easy to find and download from your app store?
- Are clear instructions provided throughout the whole set-up process?
- Does the set-up process involve minimal steps?
- Is it easy to pair your smart device(s) with the app?

**2. Assistive technology compatible**

- Is the app compatible with your screenreader (VoiceOver or Talkback)?
- Are you able to enlarge parts of the app using Zoom or Magnification?
- Does the app support other enhancements (e.g., enlarged text size, contrast, colour inversion) made to your smartphone or tablet?

**3. Ability to customise**

- Are you able to adjust the text size or change the colour contrast in the app's settings?
- Are you able to customise the app's layout and chose what information is displayed to you?

**4. Good visual features**

- Is there good colour contrasting between text or icons and the background?
- Are buttons and images clearly presented and labelled with text?
- Is the interface minimal and not crowded with too many buttons or information?
- Are important features clearly visible to you on the screen without needing to scroll down?

**5. Easy to operate**

- Are buttons large enough and is there enough space between them for you to target them by touch?
- Are buttons placed where they can be easily reached when holding your device in different positions (i.e. portrait vs. landscape)?
- Does the app require simple tap or swiping gestures to operate it?
- Does the app allow you to enter text and numbers in different ways (e.g. drop-down menus, autofill and speech input) that reduce the time and effort spent doing it manually?

**6. Responsive**

- When you tap or swipe on something, does the app let you know that something has changed visually, through audio tones or vibrations?
- Does the app help you recognise, diagnose and recover from errors?

**7. Easy to understand**

- Are you able to easily recognise and understand what buttons and icons allow you to perform certain actions?
- Are you able to understand the information that is presented to you?

Many of these guidelines apply to web page accessibility too, where the Web Content Accessibility Guidelines (WCAG) should also be used.

Alongside these guidelines, ensuring that people who don't have digital access, for whatever reason, are still able to access ticketing, journey planning and transport is key.

# Next Steps

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The findings from this research have highlighted several challenges that impact people's ability to access a selection of the most common modes of transport. The most common of these challenges is boarding and alighting vehicles - this was the primary issue for those with accessibility needs when travelling by bus, taxi, train, and boat - as well as navigating transport hubs or airports and travel booking services.

With an increasing number of public transport users reporting accessibility needs - in the year ending March 2022 there was a 25.7% increase in Blue Badges issued compared to the previous year - it is more important than ever that accessibility considerations are built into transport services from the outset. In response to this, Innovate UK KTN will continue to work closely with transport operators, local authorities, and central government to ensure that both existing and planned transport services are appropriately designed and operated to be accessible for all. We will also continue to engage with people with physical and cognitive accessibility needs to ensure their lived experiences are what drives the direction of this work.

While these themes are common across all transport described in this report, the experience of accessing different modes of transport differs significantly - boarding a boat or ferry is plainly a

very different process to boarding a train due to the different environments, staffing, and facilities available to support travellers with mobility needs. Innovate UK KTN has already established a KTN-iX™ (KTN-innovation eXchange) with South Western Railway to seek solutions for ramp access to trains at stations where narrow-width platforms preclude the use of the standard ramps used on much of the railway network. We will run further KTN-iX™ challenges in future in response to specific accessibility challenges across modes.

While this report has focussed on disability-linked access needs, there are other areas where additional work is required to make transport safer and more accessible for all. Concerns about personal safety disproportionately affect women and minority groups. Transport Focus reports that nearly half (49%) of women and girls have felt threatened when making a journey on public transport, while the British Transport Police experienced a 67% increase in reported hate crimes on the public transport network in 2021/22. The result of specific groups feeling unsafe when using public transport effectively restricts transport accessibility for women and minority groups. Innovate UK KTN will therefore expand its focus with regards to transport accessibility to also consider how gender, ethnicity, sexual orientation, religion, and economic status impact people's access to transport.

## Summary of Innovate UK KTN future work to improve transport accessibility and inclusion:

- Continued engagement with transport operators, vehicle designers, and local authorities to understand accessibility challenges by mode, and provide feedback from those with accessibility needs when accessing transport, as well as women and minority groups.
- Consolidate Innovate UK KTN's role in spreading awareness of these challenges and driving change in industry by running a programme of awareness activities through roundtable discussions, seminars, and newsletters distributed to Innovate UK KTN's expansive, cross-sectoral network, potentially building to an Accessible and Inclusive Transport Summit.
- Publication of a biennial report on transport accessibility and inclusion, highlighting successes that could be replicated elsewhere, as well as challenges that require intervention by industry and the public sector to resolve.
- Establish working groups for specific issues (e.g. physical accessibility, designing transport with considerations to neurodiversity, women's safety, hate crime on public transport etc.) which will provide detailed feedback to transport operators on the challenges facing these communities when using transport.
- Deliver further KTN KTN iX™ challenges with transport operators, similar to the collaboration already established between Innovate UK KTN and South Western Railway.
- Conduct additional, mode-specific research - for example, how micromobility services can be adapted to provide vehicles that are more easily accessible for all, the role of 15-minute neighbourhoods in improving mobility, and how to improve wayfinding in large transport hubs or airports.
- Embed considerations of accessibility and inclusion needs across Innovate UK KTN's entire transport work programme, making this a key consideration for all organisations we work with.
- Work with the rest of UK Research and Innovation - including the research councils and the wider Innovate UK system - to include elements relating to improving accessibility and inclusion in all future funding competitions and policy development.

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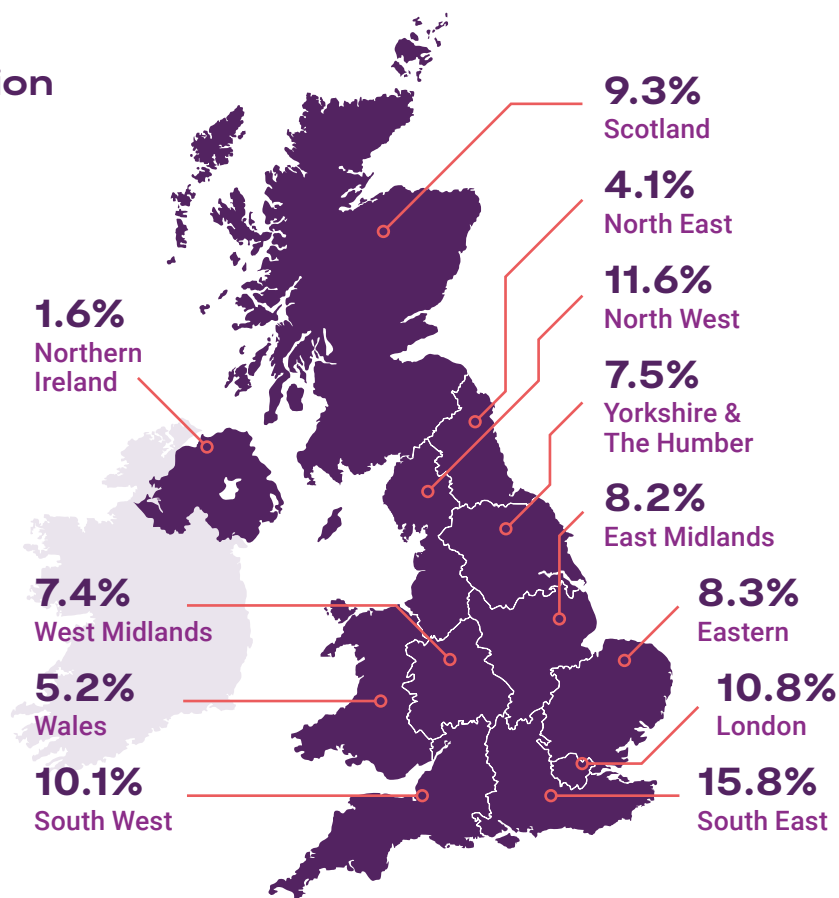
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# RiDC Survey: Further Data

## Participants by Region

### Which best describes the area you live in?

- 29.9% of respondents live in an urban area,
- 41.8% live in a suburban area and,
- 28.3% live in a rural area.



## Participant Demographics

Gender	% of Participants
Male	41.5%
Female	56.9%
Other	0.7%
Prefer not to say	0.6%

Impairment	% of Participants
Visual	32.6%
Hearing	24.9%
Cognitive	28.6%
Mobility	88.8%
Dexterity	40.9%

Region	% of Participants
East Midlands	8.2%
Eastern	8.3%
London	10.8%
North East	4.1%
North West	11.6%
South East	15.8%
South West	10.1%
West Midlands	7.4%
Yorkshire & The Humber	7.5%
Northern Ireland	1.6%
Scotland	9.3%
Wales	5.2%

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