Translating research into design opportunities

Exploring ways to improve accessibility on public transport for disabled people

Highlights Report, October 2025

ncat
national centre for accessible transport

This report is part of a series of research conducted by the National Centre for Accessible Transport (ncat) since its launch as an Evidence Centre in early 2023. Whilst this report, together with its accompanying Design Opportunities, is standalone, we would recommend it is considered alongside other ncat research published from late 2024. As ncat progresses further, reports and insights will also be published on our website www.ncat.uk

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1 Why did we do this work?

We wanted to understand the accessibility barriers experienced by disabled people across different types of public transport, where there is also an opportunity to use a human-centred design (HCD) approach to create new solutions to overcome these barriers. This is a design methodology that prioritises users’ needs, experiences, and preferences at every stage of the design, development and implementation of new products, services, or systems.

Building on foundational research conducted by ncat, in particular the extensive data from the Understanding and identifying barriers to

transport[1] study, our project aimed to explore the everyday realities of disabled travellers and translate these findings into practical, human-centred design solutions.

2 What did we do, how did we do it, and who did we work with?

User engagement and evaluation

Our user engagement work focused on five key areas, selected due to recurring instances in research together with the potential to be addressed through human-centred design: station and stop design, noisy, crowded or bright stations, seating on vehicles, live travel information, and planning and booking journeys. We focused predominantly on buses, overground and underground trains, owing to evidence from the ncat barriers database, as transport modes that are both widely used and most commonly associated with access barriers.

We had 482 responses to our discovery survey, obtaining feedback from a wide range of disabled people from the Community of Accessible Transport (CAT) panel about their experiences in each of the five key areas. We then conducted qualitative user engagement activities to deepen our understanding and to identify areas where improvements could be made. We engaged a total of 50 participants through various methods, including:

- 7 focus groups (34 participants, 4-6 per group)

[1] ncat: Understanding and identifying barriers to transport, 2024

- 9 online interviews
- 7 in-person interviews at transport stations

Participants were carefully selected to ensure diverse representation in terms of demographics and experiences.

We reviewed all notes and transcripts to identify recurring patterns and design-relevant challenges. To move from the barriers to design opportunities, we grouped our findings into topic areas.

Develop design opportunities

Following the synthesis of research findings and generation of evidence-based insights, we translated the key research findings and emerging challenges into a set of eight design opportunities, developed through the following process:

- Cluster insights into themes
- Frame each theme as a design opportunity
- Define objectives and opportunity areas
- Develop design brief structure
- Identify stakeholders
- Review

Each design opportunity reflects a combination of the lived experience evidence from disabled participants and opportunities for design and service innovation.

3 What did we find?

The initial discovery survey provided a robust foundation, clearly highlighting recurring challenges that disabled passengers face in using

public transport. Our in-depth engagement activities, including interviews, focus groups, and in-person sessions, supplemented these with a more nuanced understanding of these issues. These engagements revealed the extent and variability of barriers, the emotional and practical impacts they create, and users' ideas for change.

Below, we summarise key insights identified across all stages of user engagement, including the survey and qualitative activities, structured according to the challenges covered by our eight design opportunities. Each design opportunity is tagged (**#**) to indicate the relevant domain, where possible future design solutions may be focused.

1. Bus stop accessibility (#Environments)

The survey findings showed that physical barriers (e.g. lack of step-free access or high kerbs), unclear boarding points, and poor information clarity were key issues experienced by disabled people when using bus stops.

Key insights from interviews and focus groups:

- Participants shared detailed experiences of confusion and stress related to locating stops, identifying the correct approaching bus, and safely navigating boarding.
- Participants using wheelchairs expressed experiencing anxiety caused by inconsistent boarding points and insufficient space to manoeuvre when boarding a bus or navigating the waiting area.
- Blind and partially sighted participants expressed reliance on auditory cues, which were often unreliable or entirely absent, significantly increasing their uncertainty and travel anxiety.

"When it's not a designated bus stop, and the driver just pulls up somewhere random, that's really hard. I never know where the door will open or if there's space to get on." *(Participant with mobility impairment using manual wheelchair)*

2. Bus interior flexibility and accessibility (#Vehicles/modes)

The survey findings showed that crowded or contested spaces, insufficient wheelchair areas, and unclear priority seating were key issues experienced by disabled people when using buses.

Key insights from interviews and focus groups:

- Research participants highlighted physical and emotional challenges caused by inflexible bus interiors.
- Participants using wheelchairs or other mobility aids often had to compete for limited space with prams, sometimes facing confrontation or being forced to wait for the next bus.
- Blind and partially sighted participants described how inconsistent layouts and a lack of clear tactile, or audio cues made it difficult to find and reach a suitable seat independently.
- The absence of predictable features across vehicles increased stress and reduced travel confidence.
- Frustration with priority seating, either unclear signage or inconsistent social norms, leading to conflict or hesitation, was widespread.

"The amount of stress I get from getting on a bus and seeing a pram in the wheelchair space is awful. Then you have to have the

conversation, and sometimes the drivers won't back you up."
(Participant with mobility impairment using manual wheelchair)

3. Personalising 'live' travel information (#Services/experiences)

The survey findings showed that inaccessible live announcements, unclear or unreadable screens, and insufficient information regarding disruptions were key issues experienced by disabled people when accessing 'live' travel information.

Key insights from interviews and focus groups:

- Participants emphasised the critical importance of personalised, multimodal travel information.
- Standardised information was often inadequate, particularly for vision-impaired and neurodivergent participants.
- Information unreliability and inaccuracy significantly impacted participants' confidence and decision-making, with some avoiding travel altogether.

"I need more than just a screen: I need it spoken, clear, and repeated. I can't keep up if it flashes past or disappears." *(Blind participant with a guide dog)*

4. Train station accessibility (#Environments)

The survey findings showed that inaccessible station layouts, poor signage placement, distant facilities, and sensory overload were key issues experienced by disabled people when using train stations.

Key insights from interviews and focus groups:

- Widespread navigation and orientation difficulties were reported, especially during peak times or service disruptions.
- Blind and partially sighted participants described having to rely on inconsistent or unavailable staff assistance, due to unclear wayfinding and poor signage visibility.
- Participants using wheelchairs shared frustration with physically inaccessible layouts, particularly the placement of lifts and accessible toilets, which were often poorly signposted, locked, or unavailable due to limited work hours.
- Neurodivergent and sensory-sensitive participants reported feeling overwhelmed by loud noise, bright lighting, and crowded concourses, limiting independent travel.
- Across groups, participants called for clearer, multisensory navigation cues, such as tactile paving, high-contrast signage, sound beacons, and consistent lighting, alongside accessible real-time information, and calmer, more predictable environments that reduce anxiety and improve autonomy.

"There are signs, but they're high up, small print, and not consistent. I end up walking in circles trying to find where I'm going." *(Participant with low vision and cognitive impairment)*

5. Awareness of diverse travel needs (#Experiences)

This challenge overlaps with work already being done on inclusive travel culture and public attitudes. For more details, see ncat's Invisible Barriers: How Public Attitudes Affect Inclusive Travel.

The survey findings showed that negative attitudes from the public or transport staff, especially concerning non-visible disabilities were

contributing to emotional strain and creating barriers to equitable access and inclusion.

Key insights from interviews and focus groups:

- Participants described the emotional strain of continuously needing to advocate for their access needs, particularly when disabilities are non-visible.
- Feelings of vulnerability, anxiety, and frustration were common when requesting assistance or using priority seating due to fear of confrontation, judgment, or disbelief.
- Participants repeatedly described the exhaustion of justifying their disability to sceptical staff and passengers.
- Misunderstanding of non-visible impairments reinforced isolation, highlighting the need for better public education, an inclusive travel culture, and widespread recognition of discreet signals like sunflower lanyards.

"I wear a sunflower lanyard, but people either ignore it or don't know what it means. I still have to explain everything from scratch. People assume I'm faking it because they can't see my disability. It's exhausting always having to explain myself." *(Participant with autism experiencing chronic pain)*

6. Clarifying operator-passenger commitments (#Services/experiences)

The survey findings showed that a lack of clarity around what assistance transport providers are expected to deliver was leading to confusion, anxiety, and unmet expectations.

Key insights from interviews and focus groups:

- Findings revealed a strong sense of frustration and mistrust stemming from the inconsistent delivery of promised services, particularly Passenger Assistance on trains.
- Participants spoke about the emotional toll of uncertainty, wondering whether assistance would be available, whether facilities would work, or how to act when things went wrong.
- Participants flagged unclear or inconsistent support from bus drivers, such as whether they would deploy ramps, wait until seated, or announce stops.
- Clear, accountable communication about available support and passenger rights was seen as essential to reducing anxiety and improving travel confidence.

"I booked Passenger Assistance, but when I got there, no one knew. I never really know if I'll get the help I was promised. It's humiliating." *(Participant with neurological condition using powered wheelchair)*

7. Improving existing assistance services (#Services/experiences)

The survey findings showed that inconsistent delivery of assistance services, a lack of personalisation, and limited mechanisms for feedback when things went wrong were undermining trust and usability.

Key insights from interviews and focus groups:

- Participants voiced frustration with inconsistent and unpredictable assistance, particularly at stations and bus stops.
- Anxiety was often associated with booked support not appearing or staff being unaware of their arrival.

- There was enthusiasm for integrated and inclusive tech-based solutions, such as real-time tracking and journey planning apps, provided these tools were reliable, accessible, and designed to complement rather than replace human support.
- Participants desired more personalised support options and greater consistency across different transport modes.
- Limited accountability and a lack of meaningful feedback mechanisms left many feeling overlooked and powerless when things went wrong.

"If the assistance could be tracked on your phone, like a taxi app, you'd at least know someone is coming. Right now it's blind hope."
(Participant with limited upper limb mobility using powered wheelchair)

8. Identifying and sharing inclusive travel practices (#Resource)

Survey respondents often reported inconsistencies in inclusive design solutions across different regions or transport modes.

Key insights from interviews and focus groups:

- Participants experienced frustration with the inconsistent application of inclusive design solutions, even within the same region or transport provider.
- Good practices were often discovered by chance rather than through standardised approaches.
- There was strong support for systematically documenting and standardising best practices as a practical and essential step toward making inclusive transport the norm.

- Involving disabled people in evaluating what works was emphasised as critical to ensure guidance reflects genuine user needs rather than just technical compliance.

"In my town, the buses kneel automatically and say the number aloud. When I visited my sister's, none of that happened. Why isn't it the same everywhere?" *(Participant with visual impairment and partial hearing loss)*

Cross-cutting Themes

Throughout our detailed engagement activities, several recurring themes emerged strongly, highlighting broader systemic issues:

1. **Inconsistent support and services**
   Disabled passengers repeatedly expressed anxiety and mistrust stemming from unreliable services, information, and assistance, emphasising the need for more predictable, visible and transparent support systems.
2. **Anxiety and emotional impact**
   Emotional challenges such as fear of confrontation, judgment, or uncertainty were as impactful as physical barriers, often deterring disabled people from travelling independently and confidently.
3. **Personalisation and flexibility**
   Participants consistently advocated for adaptable, human-centred solutions across physical environments, information delivery, and assistance services. A clear demand emerged for more personalised and responsive transport experiences.

4 What conclusions did we come to?

Discovery survey responses (n = 482) and in-depth engagement with 50 disabled participants revealed that **accessibility is not just a matter of infrastructure or policy, but also of everyday experience, shaped by physical design, social interactions, and access to real-time support**. Participants described the impact of inconsistency, uncertainty, and poor communication on their confidence and ability to travel independently. They also strongly expressed a desire to co-create solutions, valuing inclusive design processes that reflect lived experience and promote dignity and autonomy.

Our findings demonstrate **the value and necessity of deep user engagement**. While the discovery survey provided critical initial insights, in-depth qualitative activities supplemented these findings and revealed emotional, social, and practical complexities essential for informing future projects aimed at developing meaningful and inclusive solutions.

Rather than compiling a conventional findings report, we intentionally translated our research into a set of clearly structured design opportunities that support practical application. This format ensures **the insights are accessible and usable by ncat partners, transport authorities, designers, and other sector stakeholders** working to improve transport accessibility. The full design opportunities are available separately.

The research highlighted **the importance of integrated approaches** that consider physical environments, digital systems, and the roles of transport staff and services. Specific opportunities emerged for both near-term improvements and longer-term, systemic changes. Taken

together, these findings underscore the need to address not just isolated fixes but the wider journey experience.

5 What should happen next?

This project has demonstrated how human-centred design highlights practical opportunities for inclusive innovation. We recommend the following actions as the next steps to ensure meaningful progress in public transport accessibility.

Recommendations for transport manufacturers:

- **Engage actively with the set of eight design opportunities developed through this research** and use these as a foundation for creating or improving products, services, infrastructure and user experience. This includes opportunities focused on awareness, education, and attitudes, which, while not service improvements in the traditional sense, are essential to shaping inclusive and supportive travel environments.
- **Prioritise inclusive co-design approaches in product development**, involving disabled users directly to ensure that solutions effectively address real-world barriers.
- **Implement practical and achievable improvements identified in the design opportunities** (for example, clearer priority seating signage, consistent boarding points, and enhanced live travel information systems).
- **Explore longer-term systemic improvements** (for example, flexible interior vehicle layouts; real-time, personalised journey planning tools;

and better integration between transport modes within a single journey).

Recommendations for ncat and its future activities:

- **Encourage and facilitate further inclusive research to address identified gaps**, including dedicated engagement with underrepresented groups.
- **Disseminate the design opportunities widely** among industry stakeholders, policymakers, and transport operators as a way to ground future innovation in lived experience and real-world evidence.
- **Undertake follow-on work to take the design opportunities further**, using them as the basis for new collaborative projects with disabled people and industry partners to co-design, prototype, pilot, and scale solutions.
- To take the design opportunities forward into practical implementation, **ncat should actively establish and strengthen relationships with key industry stakeholders** across the identified challenge areas.
- **Build stakeholder connections early** to enable collaborative design, prototyping, piloting, and scaling of solutions. ncat could play a key role as a convening partner, helping to build bridges between disabled users, designers, and transport providers to support shared understanding and joint innovation efforts.
- **Support further collaborative research projects** that focus on under-represented groups and regional transport systems variations to expand the depth and inclusivity of findings.

6 About ncat

The National Centre for Accessible Transport (ncat) works as an Evidence Centre developing high quality evidence, best practice, and innovative solutions to inform future disability and transport strategy, policy, and practice by:

- Engaging with disabled people to better understand their experiences and co-design solutions
- Amplifying the voices of disabled people in all decision making
- Collaborating widely with all transport stakeholders
- Demonstrating good practice and impact to influence policy

ncat is delivered by a consortium of organisations that includes Coventry University, Policy Connect, The Research Institute for Disabled Consumers (RiDC), Designability, Connected Places Catapult, and WSP. It is funded for seven years from 2023 by the Motability Foundation.

For more information about ncat and its work please visit www.ncat.uk

To contact ncat, either about this report or any other query, please email info@ncat.uk

7 References

1. Campaign for Better Transport: Better Bus Stops: Creating a national bus stop standard, 2024
2. Innovate UK: Accessible and Inclusive Transport, 2023
3. Motability: The Transport Accessibility Gap, 2022
4. National Centre for Accessible Transport – Transport Barriers Database
5. Ncat: Understanding and identifying barriers to transport, 2024
6. Transport for All: Are we there yet? 2023
7. Department for Transport: Bus Back Better: National Bus Strategy for England, 2021

8 Terms used in this report

Term used in this document	Explanation
Community of Accessible Transport (CAT) panel	A panel predominantly for disabled people, but also assistants, parents and/or carers of disabled children or adults, transport sector workers, members of disability charities, and researchers within higher education institutions. Panel members give key insights and valuable evidence that ncat can use to influence policy and drive change.
D/deaf	An inclusive term used to recognise both Deaf (capitalised ‘D’) individuals who identify as culturally Deaf, often using sign language and participating in Deaf communities, and deaf (lowercase ‘d’) individuals who experience hearing loss but may not associate with Deaf culture or use sign language.
Design opportunity	A concise, evidence-based statement, grounded in lived-experience user research, that highlights a barrier while also framing the potential for positive change through design.
Design opportunity document	Non-prescriptive documents that clearly define specific design opportunities identified through research. Each document outlines a barrier faced by users, sets clear objectives, and suggests opportunities for innovative solutions. They serve as practical guides for designers, transport providers, and policymakers to create products, services, or systems that effectively address identified barriers.
Discovery survey	An initial survey used in research to gather broad insights from a large number of participants typically

Term used in this document	Explanation
	asks general questions to identify common problems and to select participants with relevant experiences for deeper engagement, such as interviews or focus groups. In this research, the survey helped identify and prioritise the transport accessibility barriers experienced by disabled people.
How Might We (HMW)	A phrase commonly used in design thinking and problem-solving to reframe challenges as opportunities for innovation and ideation.
Human-centred design	A design methodology that prioritises users' needs, experiences, and preferences at every stage of the design, development and implementation of new products, services, or systems. It involves actively engaging users, especially those who face the greatest barriers, in research and co-design to ensure solutions are effective, inclusive, and genuinely improve people's lives.
Multisensory navigation cues	Refers to the use of multiple sensory inputs, including tactile paving, high-contrast signage, sound beacons, and consistent lighting, to support a diverse range of access needs.
Design opportunity	An evidence-based statement that highlights a barrier while framing the potential for positive change through design

Term used in this document	Explanation
Thematic analysis	Thematic analysis is a qualitative research method used to identify, analyse, and report patterns (themes) within qualitative data.
Synthesis (in the context of qualitative research and human-centred design)	Process of combining, interpreting, and organising data from multiple sources (e.g. interviews, focus groups, observations) to identify patterns, generate insights, and draw meaningful conclusions. It goes beyond summarising individual findings by revealing deeper connections, recurring themes, and systemic issues that can inform the development of design opportunities.