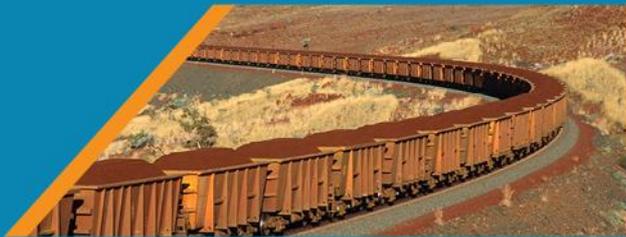


## FINAL REPORT

### INTERNATIONAL INNOVATIONS THAT PROMOTE RAIL PASSENGER ACCESSIBILITY

Revision v1.4 (04/02/2021)



## Executive Summary

There is no doubt that people with disabilities want to access public transport as the most affordable means to travel for both work and leisure activities and that increasing ridership among people with disabilities is a realistic and important goal for most public transport operators and regulators. Towards this end, ACRI engaged CQ-University to examine innovations that could improve rail accessibility for people with disabilities, with a focus on identifying innovations that are implementation ready and can be directly translated into the rail transport environment. This project involved two phases, with the report from Phase one already submitted (Clarkson, Naweed, Unsworth & Lee, Under Review). This is the second and final report for this project.

The first phase of this project involved a comprehensive search of the grey literature and identified 269 innovations across six countries (Sweden, Switzerland, Germany, United Kingdom, Australia, United States) and five domains (education, healthcare, hospitality /tourism, retail, transport) that have potential application in rail. This second phase of the project (this report) involved conducting workshops with stakeholder experts who have backgrounds in rail, health or technology and who live with a disability. Workshop participants were asked to review a number of the innovations identified in the literature search as well as contribute their own ideas, to identify up to 10 innovations or small-scale engineering solutions that show strong potential for successful implementation or pilot trial within Australasian passenger rail operations, in the short term.

The research indicated that the following innovations should be considered for short-term implementation by rail organisations around Australasia. Each of these innovations was identified either in Report 1, or through the workshops with key experts as presented in this Report 2, and are as follows:

1. Snap, Send, Solve (Report 1)
2. Clear lanes (Report 2)
3. Ensuring the disability waiting area is sheltered (Report 2)
4. Implement virtual reality into education and training for drivers and operators as well as travel training for people with disabilities (Report 1)
5. Create virtual touring videos so that people can view the station, platform and train before commencing their journey (Report 1)
6. Virtual reality travel training (Report 1)
7. FAIRTIQ (Report 1)

The innovations identified in these findings suggest that there are several adaptations or ideas that could be adopted into the rail environment in Australasia in the short term and at relatively low cost. While some of these ideas are truly novel (e.g. clear lanes), others are already in use in other jurisdictions in Australia and overseas and therefore templates for their adoption may be readily available (e.g. FAIRTIQ, 'Snap, Send, Solve').

When contemplating any of these options, it would be useful to consider two other connected ideas that emerged from both our review of the literature and conducting the workshops. The first is the idea that many people consider that the world should be fully accessible and already adapted for people with physical, cognitive or sensory impairments since it is only through poorly designed objects and environments that disability is created. The second related idea is that we need to incorporate the concept of universal design in developing, building and operating all public spaces and utilities, including transport. Universal design supports optimal participation for everyone; people who are older, children, people with temporary disabilities, tourists, and of course people with life-long disabilities. ACRI members have an opportunity to "raise the bar" and implement innovations that support rail travel for people with disabilities. However, through adopting some or all of these 7 innovations, our rail networks become more universally accessible and therefore safer and more enjoyable for everybody, on every journey.

## Table of Contents

Executive Summary .....	2
Table of Contents .....	3
Table of Figures .....	4
Table of Tables.....	4
Document Control Sheet .....	5
Document Distribution History .....	5
Definitions .....	6
Disclosure Restrictions .....	6
1 Introduction .....	7
1.1 Phase 1: Literature Review.....	7
1.2 Project Objectives .....	8
1.2.1 Out of Scope .....	8
2 Methodology .....	9
2.1 Participants and Recruitment .....	9
2.2 Design and Procedure .....	9
3 Results.....	14
3.1 Summary of Participant Demographics .....	14
3.2 Areas for Innovation.....	16
3.2.1 Accessible Travel Guides.....	17
3.2.2 Virtual Touring .....	17
3.2.3 Travel Training .....	18
3.2.4 Ticketing App .....	18
3.2.5 Station Improvements .....	19
3.2.6 Announcement Innovations .....	20
3.2.7 Quiet Spaces .....	22
3.2.8 Wayfinding Innovation .....	22
3.2.9 Unlocking Disability Seats .....	23
3.2.10 Dynamic Apps.....	23
3.2.11 Boarding Solutions.....	26
3.2.12 Adding Disability into Modelling Systems .....	28
3.2.13 Education.....	28
3.2.14 ‘Honourable Mention’: Just a Minute (JAM card).....	30
4 Discussion .....	31
4.1 Limitations.....	32
5 Conclusions .....	33
Acknowledgements .....	33
References .....	34
Appendix A: Information Sheet.....	36
Appendix B: Consent Form.....	38
Appendix C: Demographics Form.....	39
Appendix D: Innovations Reference Sheet.....	40

## Table of Figures

Figure 1: Key stages of the Whole Journey approach (adapted from Australian Government Department of Infrastructure and Regional Development, 2017).....	10
Figure 2: Concept map of the innovations selected for the workshop and organised based on the key stages of the Whole Journey approach. ....	10
Figure 3: Concept map of the additional innovations selected for the workshop.....	12
Figure 4: Three-part structure for each workshop.....	12
Figure 5: Concept map of the additional innovations selected for the workshop.....	13
Figure 6: Photos and screenshots of the workshops (VIC top, SA middle, Virtual QLD bottom).....	15

## Table of Tables

Table 1. Number of innovations presented against the key stages of the Whole Journey. ....	11
Table 2. Characteristics of the Workshops.....	14
Table 3. Table of Areas for Innovation. ....	16

## Document Control Sheet

111 Alinga Street, Canberra City ACT 2601  PO Box 238 Civic Square ACT 2608 Australia  Phone: 02 6274 7447  www.acri.net.au	<b>Document Title:</b>	International innovations that promote rail passenger accessibility. Report 2: National Workshop Findings – Potential Technologies for Adoption in Australasia
	<b>Document No.:</b>	v1.4
	<b>Project Number:</b>	PF30
	<b>Project Name:</b>	International innovations that promote rail passenger accessibility
	<b>Project Participants:</b>	<ul style="list-style-type: none"> <li>Central Queensland University</li> <li>ACRI Passenger and Freight Working Group</li> </ul>

### Amendment Record

Version	Change Record	Section(s)	Author	Date
1.0	First draft for ACRI review	ALL	Larissa Clarkson, Anjum Naweed, Carolyn Unsworth (CQU)	30/06/2020
1.1	Minor edits and comments	ALL	Paul Murray (ACRI)	01/07/2020
1.2	Minor edits	ALL	Larissa Clarkson, Anjum Naweed (CQU)	09/07/2020
1.3	Final check and minor edits	ALL	Paul Murray (ACRI)	14/07/2020
1.4	Accept all edits and issue final report for printing	All	Paul Murray (ACRI)	04/02/2021

## Document Distribution History

Version	Date	Recipients
1.0	30/06/2020	ACRI Staff
1.1	01/07/2020	CQU
1.2	09/07/2020	ACRI Staff
1.3	14/07/2020	ACRI Passenger and Freight Working Group and CQU
1.4	04/02/2021	ACRI Participants

## Definitions

ABS	Australian Bureau of Statistics
ACRI	Australasian Centre for Rail Innovation
CQU	Central Queensland University
DSAPT	Disability Standards for Accessible Public Transport
JAM	Just A Minute (card)
NSW	New South Wales
PTV	Public Transport Victoria
RSSB	Rail Safety and Standards Board
VR	Virtual Reality

## Disclosure Restrictions

All disclosure restrictions relating to the Intellectual Property contained within this report should be documented here:

- Any release to a third party to be approved by ACRI.
- Redistribution outside ACRI Participant Organisations is prohibited without permission in writing.

## 1 Introduction

For the four and a half million Australians who live with disability (ABS 2019), access to the passenger rail network can be challenging (Unsworth et al 2017; Moug & Coxon 2013; Moug, Coxon, & Napper 2016; Doman, Scott, & Liu 2018). Both attitudinal and environmental barriers can limit accessibility of the rail network for individuals with disability. Environmental accessibility in rail travel is well documented (Gallagher et al. 2011), however attitudinal barriers are less well understood. Research suggests though, that concerns about interactions with the public significantly restricts the activities of people with disability, particularly those whose disabilities are not visible (National Autistic Society 2016). This real and perceived lack of accessibility mean that people with disabilities use public transport less than those without disabilities, although this depends on the nature and severity of the disability (Clery, Kiss, Taylor, & Gill 2017).

People with disabilities want to access public transport as the most affordable means to travel for both work and leisure (Currie, Stanley, & Stanley 2007; Feeley, 2010; Pyer & Tucker 2017). In addition, transport mobility is a fundamental right enshrined in Australia's Disability Discrimination Act 1972. Despite striving to comply with the Disability Standards for Accessible Public Transport (DSAPT) (Australian Government Department of Infrastructure and Regional Development, 2013) some access difficulties remain due to the inherent legacy nature of the public transport system and heritage buildings it is enmeshed with. In addition, issues with accessibility occur despite compliance with DSAPT.

Given the rapid growth in innovation, it is possible that technologies exist that could improve accessibility for people with disabilities. It is possible that innovations might exist that could help overcome the difficulties associated with the legacy nature of the rail system, as well as those that might offer improvements in accessibility over and above meeting the DSPAT requirements.

The Rail Safety Standards Boards (RSSB) in the UK, under its existing Memorandum of Understanding with ACRI, and with collaborative guidance, review, support and input from CQU, undertook an initial horizon scan (Shooter 2019) of a range of countries and identified a small number of sectors (e.g. retail, tourism, transport, hospitality) where innovations may have developed that could be deployed in rail. The RSSB knowledge search sought to identify accessibility improvements that could be applied for the UK and the Australasian rail industries. To do this, RSSB in collaboration with CQU and ACRI, examined five countries with leading information on accessibility to identify good practice and inadequacies around accessibility within their rail systems. This included examination of practices in Spain, United Kingdom, Australia, Sweden, and the United States. Innovations existing in rail organisations in these countries focussed on a range of advances to improve access for people with hearing, sight and mobility issues. While the focus within many of the countries was primarily around step-free access, many countries were also making progress with low tech innovations to assist people with hidden disabilities. The RSSB focused their search on tourism and transport, with brief examination of other sectors such as aerospace and retail. As the search focussed on broad areas of improvements in accessibility throughout the most innovative countries, a more comprehensive and systematic search of innovations across a wider range of sectors is warranted. This provided a rationale for the first phase of the current project.

### 1.1 Phase 1: Literature Review

The first phase of this project involved a comprehensive and systematic scan of the grey literature (defined for our purposes as non-peer-reviewed, and not commercially published) for innovations that have potential applicability in rail. The scan was limited to six countries in five domains, which were selected based on the probability of innovations being found in these areas, as well as how likely these innovations would translate to the rail context. A total of 269 innovations were identified that showed potential for implementation in the Australasian rail environment. These drew on a variety of technologies ranging from low tech innovations such

as hidden disability identification cards, to high tech innovations that incorporated artificial intelligence, machine learning, and virtual and augmented reality.

In addition, a number of mobile applications were found to exist in the Australian market, as well as in other countries, which have the potential to improve accessibility for people living with disability. Of the 269 innovations, 28 were identified in Switzerland; 30 in Sweden; 33 in Germany; 56 in the UK; 57 in the US; and 65 in Australia. The sector with the most innovations was transport, with 74 innovations; followed by healthcare (n = 57); hospitality and tourism (n = 51); retail (n = 48); and education (n = 39).

These innovations addressed gaps in accessibility for people with a wide range of disabilities, including mobility, vision, hearing, and hidden disabilities. The innovations captured offer solutions for a range of accessibility issues that arise during all aspects of the journey, including planning, ticketing, navigating the station, and riding the conveyance; as well as training technologies not only to assist people with disabilities in using the rail network, but also to improve disability awareness for staff and other passengers.

## 1.2 Project Objectives

This second phase of the project sought to evaluate and validate the innovations identified in Phase 1 through workshops with stakeholder experts who have backgrounds in rail, health or technology and who live with a disability. A second aim was to determine whether any other suitable innovations exist that were not identified in the Phase 1 horizon scan.

The primary objective of this project was to identify up to 10 innovations that show strong potential for successful implementation or pilot trial within Australasian passenger rail operations. We aimed to identify the implementation readiness of these innovations or technologies as being short term (within 12 months), medium term (13 months to 5 years), and long term (>5 years). The emphasis of this report will be on promoting short term innovations and small-scale engineering solutions that have the potential for successful implementation in Australia and confirm the industry's commitment to promoting positive "whole journey" experience for people with disabilities. In summary, this project aimed to:

- deliver small-scale solutions that have potential to be successfully implemented in the short term,
- draw attention to positive innovations that "raise the bar" and
- demonstrate the rail industry's commitment to continued improvements to passenger experience for people with disabilities.

### 1.2.1 Out of Scope

This report represents the second phase of a much larger research topic. As such, several areas are out of scope of this report, and the project as a whole. For the review activity undertaken in this report, out of scope items include:

- While the philosophy of "whole of journey" is adopted in the overall research, the aspects of the journey beyond rail (e.g. bus and other vehicle connections) are beyond the scope of this project.
- While a broad range of innovations will be considered, these will not include innovations associated with larger scale engineering/infrastructure changes to increase accessibility because these are difficult to achieve given financial constraints, and feasibility issues associated with existing infrastructure and rolling stock.
- The research in this project suite will not include lab or field trials, though these may be recommended for follow-up research.

## 2 Methodology

### 2.1 Participants and Recruitment

A series of workshops were conducted to bring together people with specific expertise to debate and evaluate the technologies identified in the first phase of the project, and to identify any other innovations that might exist. Workshops were conducted using two stakeholder groups as follows:

Group A: Rail and transport industry specialists, public transport accessibility user groups and those with lived experience who are avid users of technology.

Group B: Disability/technology accessibility industry specialists and health care professionals who work in managing assistive technology with people who have disabilities.

In order to minimise costs to the project, three states were selected for data collection, which are all host states of the CQU team (SA- Naweed and VIC & QLD- Unsworth, who travels between the two). The workshops were arranged to occur in the capital cities of Melbourne, Adelaide and Brisbane.

Participants in Workshop Group A (i.e. people with lived experience and expertise in technology) and Workshop Group B (accessibility technology and health care specialists) were paid an honorarium for their participation. The payment was in the form of \$250 Coles/Myer vouchers and was intended to cover participation in the workshop and travel time. It is perceived as important in the disability sector that all experts are paid equally for their time.

The aim was to have 10 participants in each workshop, with equal representation from each stakeholder group. Participants were recruited through cold calling of disability advocacy groups and assistive technology organisations; contacting peak bodies representing rehabilitation and assistive technology stakeholders, and occupational therapy and ergonomics professionals. Recruitment of the rail industry professionals was assisted through existing ACRI and CQU relationships with contacts in the rail organisation in each capital city where workshops were being conducted. After the initial contact, formal letters of invitation were sent to each prospective participant as well as an information sheet, consent form (See Appendix A and B).

### 2.2 Design and Procedure

The literature review conducted as the first phase of the project produced 269 innovations. A decision was made to consolidate the number of innovations for use in the second phase of the project, for three reasons. First, there was a degree of overlap in many of these innovations meaning that some would not make a unique contribution to the improvement of accessibility in the rail environment for people with disabilities. In addition, there was also a lot of variation in how translatable some of the innovations would be to the rail context. Finally, it would be unfeasible to present 269 innovations to participants for discussion and validation in the second phase of the project. Therefore, the research team evaluated each innovation in order to select the innovations that would be most likely to translate to rail and that would offer the most in the way of improvements in accessibility.

Initially, the lead research assistant identified the innovations that had the greatest potential to be implemented in rail and made a unique contribution to improve accessibility. This process resulted in 55 innovations. Following this, the senior members of the research team independently evaluated each innovation, giving each a score of “yes”, “maybe”, “no”. The researchers then met to discuss and debate the innovations without consensus as well as those that were marked “maybe”. This process resulted in a total of 45 innovations selected for presentation to participants at the workshops.

The organisation of the innovations was coded and categorised deductively against key nodes of an existing framework of rail travel.

The ‘Whole Journey’ approach (Australian Government Department of Infrastructure and Regional Development, 2017) was identified as a framework to organise and present the information in the workshops because it is well-established within the industry, and offered a linear process that captured all of the elements of a rail journey in a way that could also be easily relayed to participants. The Whole Journey approach was also chosen to remove any expectation that the innovations should improve overall accessibility and instead clarify that certain innovations will target specific aspects of the journey. Although the Whole Journey approach explores a person’s journey across eight key stages, these were consolidated into the five key overall stages shown in Figure 1.<sup>1</sup> Figure 2 presents a concept map arranging the categorised innovations.

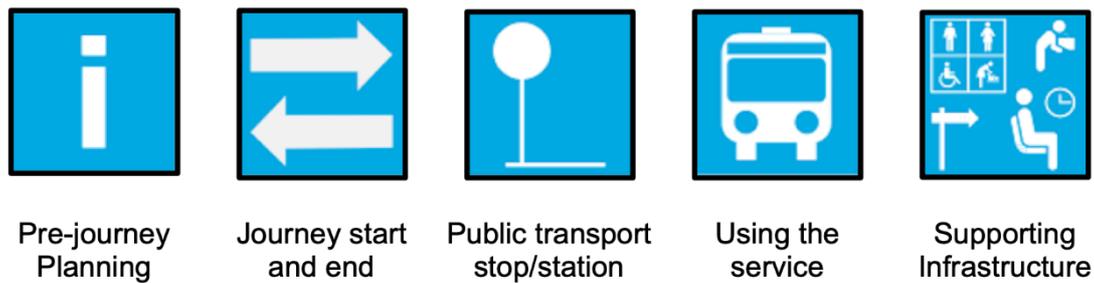


Figure 1: Key stages of the Whole Journey approach (adapted from Australian Government Department of Infrastructure and Regional Development, 2017).

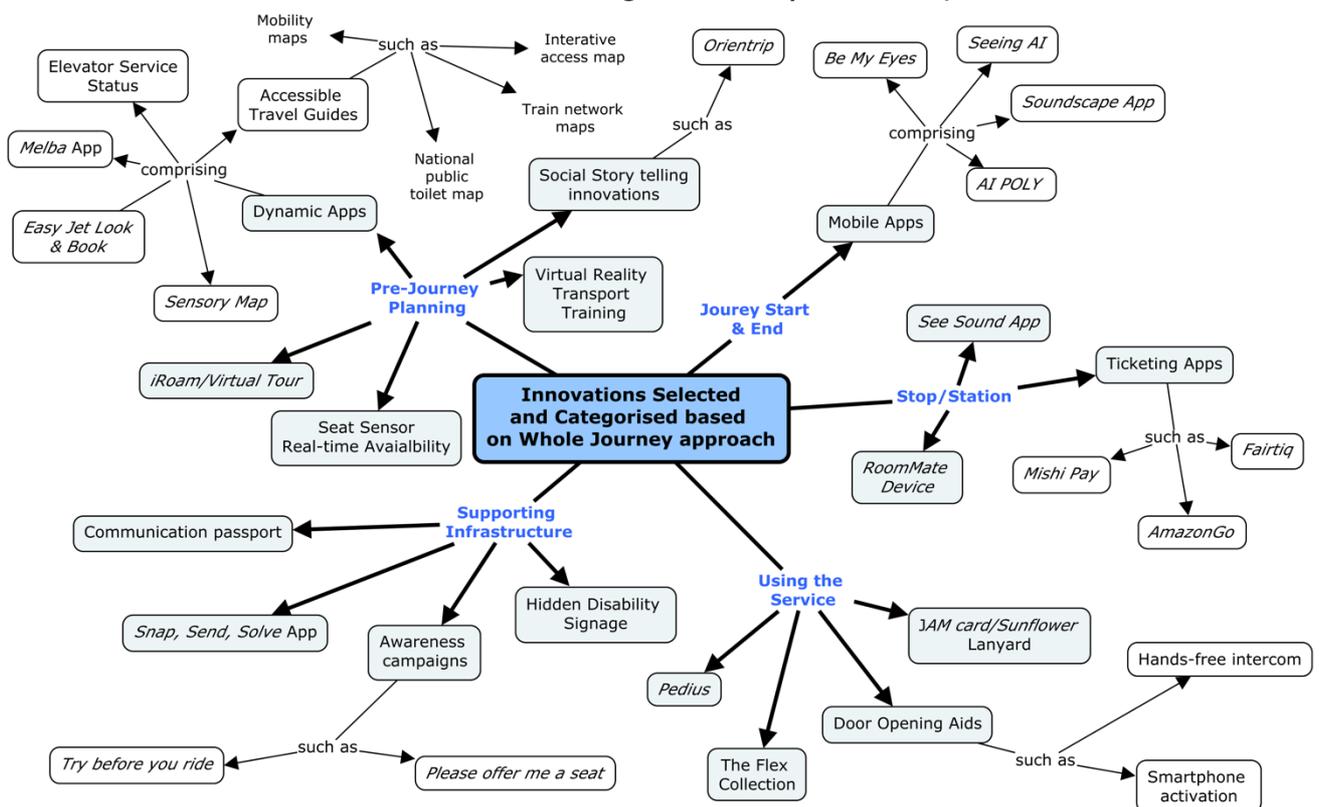


Figure 2: Concept map of the innovations selected for the workshop and organised based on the key stages of the Whole Journey approach.

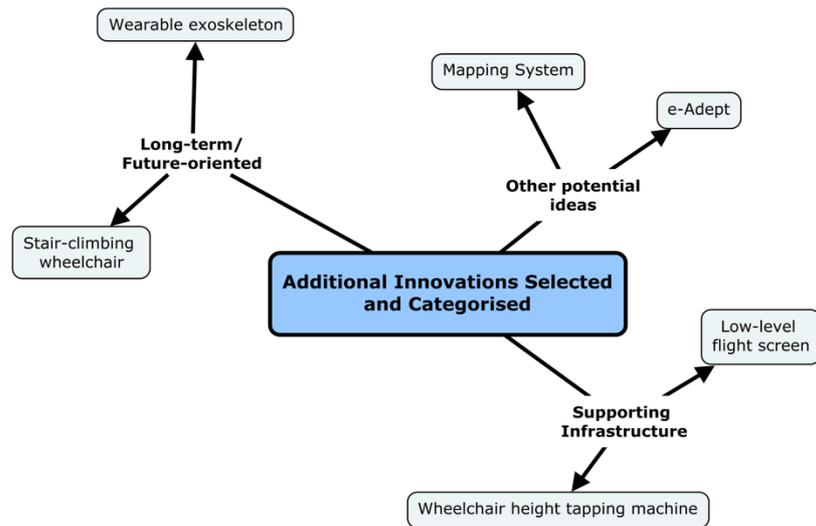
<sup>1</sup> Stages from the framework not illustrated here are “interchange,” return journal planning,” and “disruption to business-as-usual.” Due to their degrees of overlap and considerations for the workshops, these were captured and consolidated within the selected key five stages shown.

Table 1 lists the total number of innovations in each of the five travel stages but alongside descriptions of the travel stage and its key aspirations. As can be seen from Figure 2 and Table 1, the Pre-Journey Planning stage featured the most innovations (15), following by the Using the Service stage (10).

During the categorisation process, a number of additional innovations were coded and captured which did not readily fall into the Whole Journey stages. As these scored well, they were categorised into an “Additional Innovations” category. As shown in Table 1, a total of six of these were found. Figure 3 presents a concept map of these specific additional innovations.

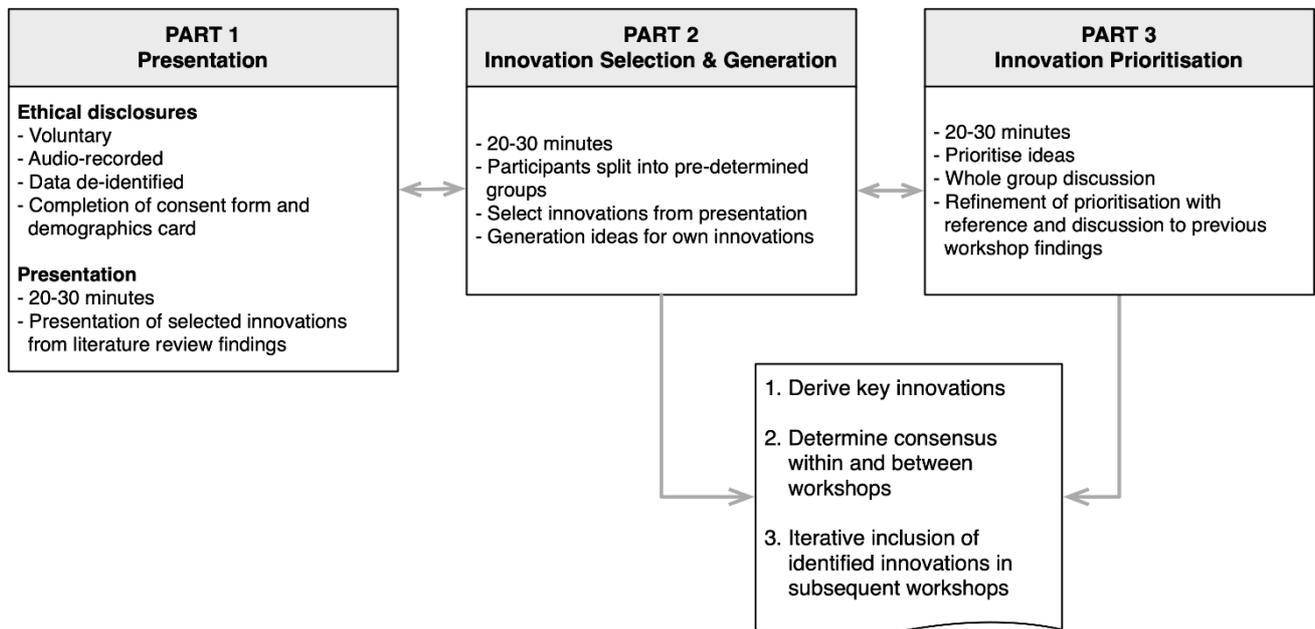
**Table 1. Number of innovations presented against the key stages of the Whole Journey.**

<b>Travel Stage</b>	<b>Description</b>	<b>Aspirations</b>	<b>Number of innovations</b>
1. Pre-Journey Planning	These are the decisions about using public transport that are made based on available information.	a) Encourage more people to make informed decisions; b) Reduce the amount of time in pre-planning; c) Increase the confidence of the public transport users	15
2. Journey start and end	These occur outside the public transport system e.g. travelling from home to the station.	a) Traveling between public transport nodes is easy and efficient b) Stakeholders who manage the environment surrounding the public transport network, need to be involved to understand the impact of their actions and collaborate to resolve issues	4
3. Public Transport stop/station	Dedicated locations where the public transport operates to and from	a) Station is easy to identify through visual & audio messaging, easy to access, information available in a variety of formats; b) Travellers can locate boarding points at allotment boundaries; c) Travellers feel safe and comfortable while waiting at the station for their service	5
4. Using the Service	The conveyance that enables the journey, the ‘onboard experience’, as well as the scheduling of services	a) Travellers feel confident, safe and secure knowing they can get on, travel and get off the service; b) Fellow travellers and staff are courteous and respect requests for assistance	10
5. Supporting Infrastructure	This supports the journey and includes mid and end of trip infrastructure such as toilets, drinking fountains, wayfinding and seating	a) Enable people to travel safely, well-informed and comfortably b) People are available, trained and ready to help when assistance is required.	5
Additional Innovations	-	-	6



**Figure 3: Concept map of the additional innovations selected for the workshop.**

The workshops were designed to be approximately 2 hours long and were conducted in several stages as show in Figure 4. The first stage was a presentation delivered by the research team that summarised the findings from the Literature review. The presentation was made using Prezi software, allowing for a dynamic dive into each of the key stages of the journey, and then the identified categories of innovation.

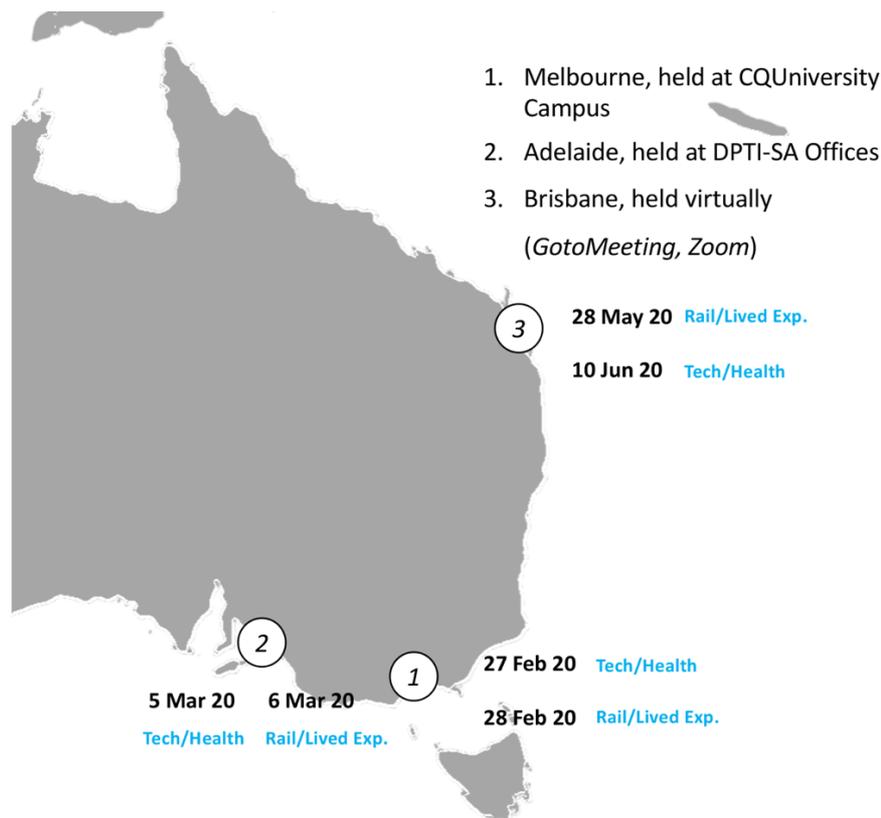


**Figure 4: Three-part structure for each workshop.**

Following ethical disclosures, completion of a Demographics form (See Appendix C) and introductions, participants were divided into two pre-determined groups, calibrated to ensure that each group consisted of representatives from each stakeholder group. Each group sat at a table and one person from each table was asked to volunteer as scribe. Participants were given a piece of paper with two columns to complete the first activity of innovation selection and generation. Participants were asked to select the innovations from the presentation that they believed had the potential to improve accessibility for people with disabilities, as well

as generating other ideas about technologies they have seen developed or perceive to be under development. A reference sheet was placed on each table listing all of the innovations (See Appendix D). In the second task, participants were asked to prioritise the ideas and pick the top 5 ideas to put forward for consideration for the larger group. The third part of the workshop involved a whole group discussion of the prioritised ideas developed by each subgroup. Participants were tasked with the job of prioritising five of the innovations, or could introduce new ideas as appropriate, to create a final list of five innovations for the whole workshop. The workshops were conducted iteratively, with data from each group disseminated to each subsequent group for discussion.

Due to limitations in traveling and social distancing requirements related to the occurrence of COVID-19, the Brisbane workshop was postponed. When it became evident that border closures and social distancing were to continue indefinitely, a decision was made to conduct these workshops remotely. The first workshop was conducted using *GoToMeeting* and the second using *Zoom*. To accommodate for the online format, a few changes were made. These included staying in one group rather than moving people into breakout rooms, due to uncertainty around how familiar and competent participants would be with this online meeting platform, as well as the difficulties associated with moderating discussion across several breakout rooms. Participant numbers were also limited to ensure that the discussion between participants was not hindered by remaining in a single group. A second change involved presenting the results of the first phase of the study using a pdf version of the Prezi presentation, so as to not overload the processing capacity of the meeting software. Figure 5 superimposes the sequence, date and host organisation for each workshop on a map of Australia.



**Figure 5: Concept map of the additional innovations selected for the workshop.**

Informed consent sheets and a demographics data card (Appendix B and C) were completed prior to commencement of Phase 2. The collection and analysis of workshop data was approved by the Human Research Ethics Committee of Central Queensland University (Approval No: 0000022161).

### 3 Results

#### 3.1 Summary of Participant Demographics

There was a total of 48 participants across six workshops held in three states of Australia. The characteristics of the participants is outlined in Table 2.

An effort was made to recruit lived experience participants that represented a wide range of disabilities. Participants with a lived experience of disability included two people with vision impairment, one with hearing impairment, two with multiple physical disabilities, two participants with cerebral palsy, two participants with Spinal Cord Injury and a parent of young adults with autism. Despite our best efforts, we were unable to recruit participants with a lived experience of dementia or other age-related disabilities and we were not able to recruit a participant with other types of disability such as brain injury, cognitive impairments or a learning disability. While it is likely that the health and technology professionals have experience with these types of disability and could advocate on their behalf, it is likely that the range and nature of experience lived or otherwise has influenced the selection and prioritisation of innovations in the workshops.

**Table 2. Characteristics of the Workshops.**

Jurisdiction	Victoria	South Australia	Queensland	Total
Male	10 (50%)	8 (47%)	7 (64%)	25 (52%)
Female	10 (50%)	9 (53%)	4 (36%)	23 (48%)
Total	20	17	11	48
Age (years) *				
Average	49.4	46.6	44	47
Min	30	29	26	26
Max	64	67	59	67
Years of experience*				
Average	18.8	23.0	17.1	20.1
Min	3	1.5	1.6	1.6
Max	44	50	30	44
Industry role				
Rail industry representative	5 (25%)	5 (29%)	5 (45%)	15 (31%)
Technology specialist	4 (20%)	2 (12%)	0 (0%)	6 (13%)
Health care professional	5 (25%)	7 (41%)	3 (27%)	15 (31%)
Lived experience expert	6 (30%)	3 (18%)	3 (27%)	12 (25%)
Total	20	17	11	48

\* A small number of participants chose not to divulge the age or years of experience

It should also be noted that some participants could be considered as belonging to multiple categories of participants. For instance, we had people participating in the workshops as rail industry representatives and tech and health professionals who also live with disability. Similarly, some participating as lived experience experts do considerable advocacy work already for rail accessibility. Figure 6 presents some pictures that were taken from the workshops.

RESEARCH REPORT – INTERNATIONAL INNOVATIONS THAT PROMOTE RAIL PASSENGER ACCESSIBILITY

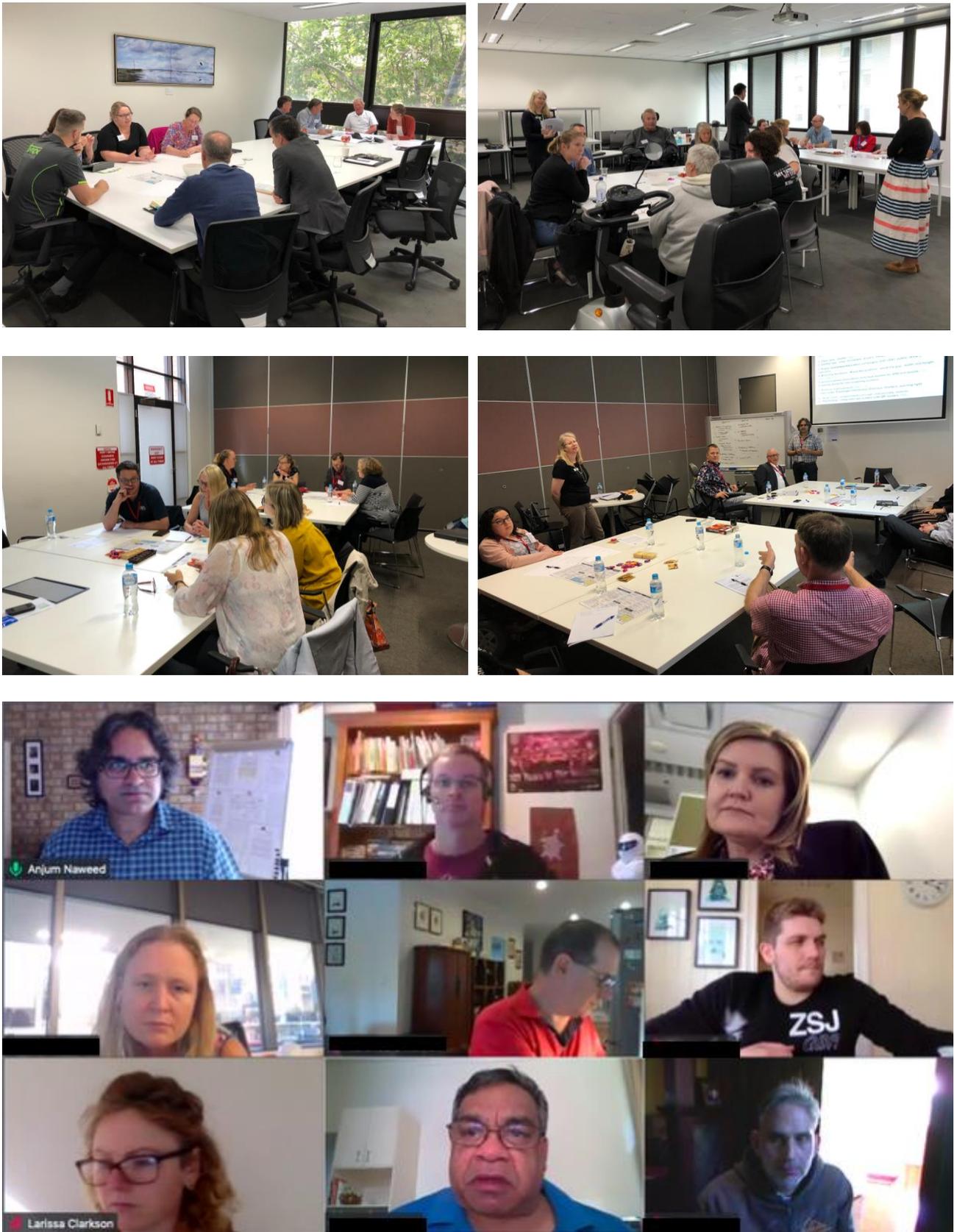


Figure 6: Photos and screenshots of the workshops (VIC top, SA middle, Virtual QLD bottom).

### 3.2 Areas for Innovation

Participants across all workshops welcomed improvements in innovation and technology to improve accessibility for people with disabilities. As identified by one participant, an increasing number of people with disabilities will want to access the rail network, meaning that improvements in accessibility will become even more important. In her words:

“The disabled population are considerably more mobile than they’ve been in the past...before NDIS when they didn’t have the equipment or whatever to get out and about now they can, now they’re able to access their holiday hobbies and the like and go places and engage in things and the train is an ideal way of getting to places” [Female QLD Group B]

There were 13 areas for innovation consistently identified across all six workshops. There was considerable consensus across all six workshops as outlined in Table 3.

**Table 3. Table of Areas for Innovation.**

Travel Stage and Identified Innovation	Victoria		South Australia		Queensland	
	H/T	R/LE	H/T	R/LE	H/T	R/LE
<b>Pre-Journey Planning</b>						
1 Accessible travel guides					✓	
2 Virtual touring					✓	✓
3 Travel training						✓
<b>Transport Station</b>						
4 Ticketing app					✓	
5 Station improvements	✓	✓	✓	✓	✓	
6 Announcement innovations		✓		✓		
7 Quiet spaces			✓			
8 Wayfinding Innovation			✓			✓
<b>Using the Service</b>						
9 Unlocking disability seat	✓					
10 Dynamic apps	✓	✓	✓	✓		
11 Boarding solutions*	✓	✓			✓	✓
<b>Additional</b>						
12 Adding disability into modelling systems		✓			✓	
13 Education*	✓		✓	✓		✓

Notes: H/T = Health/tech workshop; R/LE = Rail experts/Lived Experience workshop

\* While these solutions were recognised by multiple stakeholder groups, we do not classify these as innovative due to their existing widespread implementation internationally, but they still represent important areas for attention by rail organisations.

### 3.2.1 Accessible Travel Guides

Accessible travel guides were put forward as a priority innovation by the Group B workshop in Queensland. This innovation was identified in the Phase 1 literature review and was presented to participants in the workshops using examples from the Rail Network Map and the Interactive Access Map from the UK, and the Mobility Maps and National Public Toilet Map from Australia. In the words of one participant in the workshop:

“even going to, you know, some of the regional stations to see whether people can plan a journey.... are they going to [be able to] get off in different towns or are they going to you know have to plan their journey to get off somewhere else” [Female QLD Group B]

Accessible travel guides were also discussed in the Group A workshop in Victoria. Here, participants discussed incorporating real time information about service disruptions and faults. For example:

“...being able to plan an accessible journey online or on an app and you can personalise it based on your needs so these are my particular access requirements and then being able to optimise the travel journey based on what your needs are and also include real time information such as the lift are out of order so you’ll have to reroute to a different way based on that information” [Female VIC Group A]

The idea that travel guides should be customisable to individual customer needs was supported by a carer of a person with a disability who participated in the Group A workshop in Victoria. She talked about the ability to filter out platforms and stations with poor accessibility would reduce stress for her and her partner:

“.... the current PTV app for the trams and trains, if that can be adapted to have the specifics of our needs so to be able put it in ‘wheelchair friendly’ so therefore when there’s a stop like Ballarat platform 2 it’s taken out of the equation so any trains that stop at that platform are taken out of the equation for your safety.... The stress levels are eased off” [Female VIC Group A]

However, this view was not universally shared, with one lived experience participant sharing his view:

“My view is public transport should be accessible for everyone, there shouldn’t have to be any extra preparation that I need to do because I’ve got a disability as opposed to someone who just gets in their car drives to the station, gets on a train, I don’t want it to be a thing where I have to do all this research to then be able to access what my taxes are going towards” [Male VIC Group A]

### 3.2.2 Virtual Touring

Virtual touring was identified as an innovation in the literature review that was conducted in the first part of this project and was presented to participants in the workshops. With this innovation, a virtual tour of indoor spaces is provided on websites, similar to a google street view, but for indoor spaces. Virtual touring was identified as a priority by both Queensland workshops. In the words of this participant with a lived experience of disability:

“I think the one where you had the virtual [touring] opportunity to look at where you’re going... and find out where you’re going on your journey... you at least get an idea of what it might be potentially be like going through on the footpaths going through the station and getting an idea of where you’ve got to go, that’s pretty cool” [Male QLD Group A]

In addition to wayfinding, virtual touring was seen as a way to allow people to identify the location of accessibility features of the station such as accessible toilets. In the words of another participant from this workshop with a lived experience of disability:

“... and you can actually go into the station before you go... as part of your planning have gone into the station have an idea where everything is how to get to your platform where the toilets are that kind of thing” [Male QLD Group A]

Further, participants noted that virtual tours would allow people with disabilities to evaluate the accessibility of train stations, platforms and carriages and identify any barriers they might encounter:

“Being able to see what possible environmental barriers would be there and whether I’d be able to find a way to overcome them and whether it is indeed accessible to my requirements.” [Male QLD Group B]

Enabling people to pre-plan their journey was seen as a way to reduce the stress and anxiety associated with travelling:

“...the opportunity to actually see where I’m going and plan so I that don’t waste time or I don’t go in the wrong direction... makes it a lot less confusing and much more reassuring if you have a sense of what’s going to be there when you get to a place beforehand” [Female QLD Group B]

### 3.2.3 Travel Training

Travel training was prioritised as an area of need for the Group A workshop in Queensland. While ‘try before you ride’ days were identified by participants in South Australia, these already exist in many jurisdictions in Australia including Victoria and Queensland. Virtual reality was identified in the literature review as a more innovative way to improve on what is already being done in this area. QLD rail and lived experience participants, suggested that VR would provide more interactive and meaningful information than the traditional rail safety and orientation. One rail representative participant noted the following:

“I thought the VR transport training one had a lot of merit to it particularly given our more traditional rail safety orientation day, I thought that this was an opportunity to reach a lot more people and just to look at a different way of providing information to the more traditional that way that we do it” [Female QLD Group A]

Virtual reality transport training was seen as a way for people with disabilities to build confidence with using the rail network, as expressed by this rail representative participant in South Australia:

“We really liked the VR technology as way of building confidence and wayfinding... we thought that would be easily [applicable] to lots of different people” [Female SA Group A]

### 3.2.4 Ticketing App

The FAIRTIQ ticketing app was prioritised by the Queensland Group A workshop. FAIRTIQ was identified in the first phase of the project. It is an innovation from Switzerland that enables passengers to purchase a ticket at the best price using an app on their mobile phone. Customers using FAIRTIQ press a button on their phone to start their journey and again when they complete their journey. The app then calculates the best price for the trip and automatically deduct this from their account. This bypasses the need to purchase, recharge and swipe a physical transit card. FAIRTIQ also allows people to travel with different operators in different cities using the same app, which negates the need to navigate ticketing systems when travelling interstate. In the words of one lived experience participant from the workshop:

“I’m very excited about ... the idea of your ticket being on your phone so you never actually need to remove a pass, it knows you’re there, it knows when you get on, it knows when you get off and it charges you the best price and you can show it if anyone needs to see your ticket.” [Male QLD Group A]

While the ticketing app was only prioritised by one workshop, it was identified as a potential innovation by participants in other workshops. Participants extended on the FAIRTIQ concept and suggested that the app could incorporate elements of other apps such as Stop Announcer:

“...and extra to [FAIRTIQ] having notifications when your stop is coming up so you can get ready so you can [get] your stuff... and get to the door in time.” [Female QLD Group B]

### 3.2.5 Station Improvements

Station infrastructure was a clear area where innovation is needed, as this was discussed in every workshop and was prioritised in 5 out of 6 workshops. Some suggestions were simple low-tech improvements that could feasibly be implemented in the short-term. For instance, participants across several workshops agreed that any specified boarding area for people with disabilities needs to be protected from the elements. Participants supported the idea that a shelter should be located on the platform to allow passengers with disabilities to board via the front door and yet be sheltered from weather, if that state used front door boarding. A second recommendation that had support across multiple workshops was the installation of dedicated clear lanes on platforms to provide people with disabilities with a safe thoroughfare to the dedicated boarding area, especially during peak periods and special events. The following quote from a participant with a lived experience of disability indicates the issues that people with disabilities typically face trying to access the dedicated train boarding door from platforms during peak periods:

“I definitely found that sort of a situation when I went to [a concert location] near a rail line they made you all go in the one way but the thing was it wasn’t quite clear you know the pathway for people with disabilities ... because at the end of the concerts for example ... we all left going through the one entrance and everyone tried to board the train at the same time ... the area where people with disabilities normally board was completely blocked and there was no person from [Queensland Rail] monitoring the situation properly or appropriately to allow you to safely board” [Male QLD Group A]

Clear lanes were supported in the Victorian workshops as well. Participants noted that such clearways would improve the confidence of people with disabilities to use trains. For example:

“...that’s pretty good so it gives people a sense of comfortability as well when they go onto the platform they’re not going to get pushed out of the way” [Male VIC Group B]

Participants in the Group A workshop in South Australia also discussed the need to have a dedicated access lane for people with disability, although there was little consensus on how this might work. One participant with a lived experience of disability drew on examples from airports where:

“...they have express lanes and there’s security staff who will identify people or people can approach the security staff and say ‘hey look I can’t stand for more than 5 minutes’ and they’ll address it and they might get them a wheelchair but they’ll whizz them down and they’ll go straight through and they’ve all had sensitivity training so they know how to deal with people... it’s transformational” [Male SA Group A]

However, dedicated clear lanes may be difficult to implement on some platforms due to inherent space restrictions, as noted by the following participant with a lived experience of disability:

“... [the problem is] obstructing half of the platform by creating a clear way which is being used once, twice a day while everyone else is just crowded in summer... I don’t want to be hated by 1000 people just by the fact that I have something very special which is [intruding on] their space” [Male SA Group A]

In addition, while employing extra staff during peak times to police a clear lane would address the issue, it was identified that it is not particularly innovative. Therefore, participants in the Group A workshop in South Australia discussed how clear lanes might be implemented without needing additional staff, including interactive clear lanes, where dual purpose areas could be linked with beacon technology. This idea that access to clear lanes could be linked to an app was also picked up in Victoria:

“...unless you’ve got the app you can’t open the gate to get into that lane” [Male VIC Group B]

Finally, the Group B participants in Queensland talked about improvements to the built environment including bigger toilets, including those on the train:

“... a lot of my clients say that the bathrooms are too small even though they’re supposed to be accessible” [Female QLD Group B]

### 3.2.6 Announcement Innovations

The Group A participants in both the Victoria and South Australian workshops prioritised innovations in announcements. One suggested innovation that had support across workshops was lights that indicated the direction of an approaching train. This is explained by a lived experience participant in Victoria:

“Directional lights on train and tram platforms, so to show when a train or tram is approaching, so directional meaning they’re cascading from left to right if the train is coming from left to right and right to left vice versa and that helps people with hearing impairments but we also liked it because it helps people who have earphones in or people who are distracted from other reasons and that will increase safety and reduce risks of getting hit by a train” [Male VIC Group A]

This also recognises that this innovation adheres to the principles of universal design, as not only will it improve accessibility for people with disabilities, but it will also improve the safety of the rail environment for those without disabilities. Participants expanded on this general idea with the following suggestion:

“I quite liked the idea of.... the lights on the platform or some sort of indication on the platform of the direction of travel.... that could potentially change in colour intensity or movement depending on how far off the train is, so for example if its static lights you know the arrival is not imminent however if it changes colour intensity or it moves or something just without even looking for a train you know its approaching” [Male VIC Group A]

Another announcement innovation that had support across multiple workshops was improvement in the on-board communications by using visual displays to ensure announcements that are traditionally communicated using the intercom are accessible for people with hearing impairment. In the words of this participant with a lived experience of disability:

“Having a visual display in the train and ... outside the train as well for announcements so if an announcement says the trains cancelled that should also be displayed on the information board inside and outside the train” [Male VIC Group A]

Again, it was recognised that this is another innovation that fits the principles of universal design as it will be useful for those wearing earbuds or unable to hear due to the noisy train environment:

“it’s just equal access for the deaf community but again it will also help people who can’t hear the announcement so lots of these are universal design” [Male VIC Group A]

Visual notifications were extended from ensuring that auditory notifications were also in a visual format, to provide real time information about the location of the train along the train line. As this participant with a lived experience with disability says:

“As a user of the trains and getting around quite a lot is just being able to ... a sense of direction whether it’s a combination of a couple of these apps but I don’t always want to be on my phone having to see where I’m going like being able to know ok well ... like on the Gold Coast trams they’ve got a visual above the door where is going along and it counts the stations to where your destination is and being able to see that and that’s a similar thing in New York on the subways and I found that quite helpful” [Male QLD Group A]

A similar idea was suggested in the Group B workshop in Victoria:

“We quite liked the map of the train line which shows you where you’re traveling, where you are on the progression and that’s sort of communicating visually and in a context and possibly that system could include feeds to personal devices like smart phones whatever ... a bit more of a centralised communication system within the trains which can then feed information in a variety of different formats for different needs” [Male VIC Group B]

The connection to smart phones was picked up more generally in both the South Australian and Victorian workshops. For passengers being able to opt in to receiving the announcements directly to their device, and potentially having the option of two-way communication where passengers can contact a staff member through the app. In the words of this Victorian rail representative:

“...connect audio announcements direct to individuals’ devices so you could potentially have an app that people could sign up for alerts and they get the audio announcements direct to their device.” [Female VIC Group A]

The Group A participants from South Australia envisaged this as part of the general idea of smarter trains and smarter systems. For them, announcements should be able to go further than simply broadcasting general information:

“... it could be announcements that are available just to me through my headset or it could be an announcement ... to everyone through the audible like wheelchair ramps coming out so people know if you’re in a hurry don’t use the front door because a wheelchair ramps about to come out...” [Female SA Group A]

These participants suggested that these announcements could give lots of information including wayfinding information and direction of exits to the platform. These participants identified that such technology would meet the universal design principles. In their words:

“You can see that sort of stuff being usable for a lot of people, because if you’re a tourist...[there’s a] benefit to everyone” [Three participants SA Group A]

A final area for innovation identified in the workshops was around elevator service announcements. This was given an ‘honourable mention’ by participants in the Queensland Group B workshop. These need to be available during the pre-planning part of the journey:

“it’s something my people fear is that ... once they’re in Brisbane it’s finding which stations ... and sometimes that can be a problem and if the elevators are out...” [Female QLD Group B]

This was confirmed by a participant with a lived experience of disability who said:

“I think [the elevator service announcement] would be great because if you’re travelling on a train and you know you’re getting to your destination then all of a sudden it’s not going to be working at least you can try to pre plan what you need to do to get around that” [Male QLD Group A]

### 3.2.7 Quiet Spaces

Quiet spaces were identified by the Group B workshop in South Australia as offering innovation for people with disabilities when using the rail network. These quiet spaces could be both at the train station, and/or on the train itself. In the words of one participant in this group, it is important to have a:

“Quiet compartment in every carriage or every train to assist those with sensory needs be it auditory or visual.” [Male SA Group B]

This was supported by another participant in this workshop who noted that it was important that these spaces were not just audibly quiet but were:

“...quiet in terms of different senses so not only are people not talking but also the windows are tinted more in that carriage as well and the lights aren’t all those fluoro flickery things” [Female SA Group B]

The Group A participants in South Australia also discussed sensory areas, and discussed it as an innovation that could reduce anxiety for people with sensory issues:

“Sensory seats was something that we liked just in particular because it was expandable to lots of different types of people so it might also be able to increase someone’s confidence to take public transport if they know that there’s a seat available because that might be an anxiety for them” [Female SA Group A]

### 3.2.8 Wayfinding Innovation

Wayfinding innovations were prioritised by participants in two workshops. For participants in Group B in South Australia, improvements in wayfinding hinged on integration and consistency:

“This is going to be a really good integrated system where everything is consolidated, there’s integration between signage on the carriages and on the platforms where using IP points to ping information to the phone it’s going to include a map for planning using QR codes as well.” [Male SA Group B]

For these participants it was important that the signage across all aspects of the system were consistent and incorporated universal design principles:

“Not just having words but might be pictures having some universal design about things being simple... [wayfinding information should include] visual communication and possibility of being auditory but it’s not just reliant on text” [Female SA Group B]

Wayfinding was also identified as a priority area for innovation by Group A participants in the Queensland workshop. One rail representative talked about an innovative system that is currently in the design stage:

“we’re looking at something at the moment that’s hopefully cost effective as well but it’s for all customers to use an indoor navigation app so it can be used outdoor, indoor or whatever that... its using stickers at different locations, it’s like a modernised QR code that provides information on directions or what the facility is just by waving.. . it can read up to 20 meters away as you’re going along a path... it will tell you what’s in front of you what’s behind you or what specific stops are planned at the particular location... so that’s something we in [Organisation] are looking at the moment as a proof of concept.... It’s not necessarily Bluetooth we’re trying to steer away from Bluetooth for various reasons.” [Male QLD Group A]

A simple innovation that could be implemented in the short-term that was suggested by the Group A participants in Queensland was installing interactive touch screen displays that help with wayfinding such as those found in large shopping centres.

### 3.2.9 Unlocking Disability Seats

Innovations to allow dedicated ‘seats for people with disabilities’ that can be unlocked only by people that need to use them was identified and prioritised by participants in the Group B workshop in Victoria. This was suggested as an extension of the door opening aids that open doors based on smart phone activation, which was identified in the literature review. One participant described how this might work:

“...could they even claim their seat, the seats for people with a disability, could they actually be for people with a disability, and could you have that seat come down if you used your phone as the connection point ... so you actually claim it for yourself rather than ask for it” [Male VIC Group B]

It was also identified in this workshop that people with hidden disabilities would need to access these seats. In the words of one participant:

“We’ve got lot of people who don’t want to admit they’ve got a disability in public so they’ve got to be anonymous but still need to sit down... that whole hidden disability issue” [Female VIC Group B]

The need to identify hidden disability was also picked up in other workshops. For instance, this rail representative in Queensland noted:

“I liked the hidden disability signage too... it would be good to have that especially around accessible seat just to remind people that you can’t always see disability” [Female QLD Group A]

### 3.2.10 Dynamic Apps

Participants across four workshops recommended a centralised dynamic mobile application that expands on the existing transit apps with the ability to filter information relevant to each individual user. In the words of one participant from a South Australian workshop:

“...it would give you a virtual ID where you set your preferences and that virtual ID would be very universal whatever you tap to ... the beacon or the door or the reader or the screen will serve you with information you’ve already predefined when you were creating your virtual ID” [Male SA Group A]

There are elements of this innovation that were identified in the literature review such as Stop Announcer, an app used by rail organisations within NSW which tracks a user’s location using GPS and informs people with vision impairment when they are arriving at their stop using either a high contrast display and/or an audio announcement. As expressed by one participant from the Group A workshop in South Australia this would be an:

“...app of all apps.... instead of having all these separate apps that all do these separate things something that’s kind of altogether” [Female SA Group A]

Participants in the Group B workshop in Victoria noted that as well as providing travel planning information, which is already available in current transit apps, this would provide data from outside of the station including information on construction works that might affect accessibility, and:

“... coordinate features to enhance travel, can include ramp access, seat claiming to unlock seats... extra door time... journey info.... Stop reminders....” [Male VIC Group B]

This might address a current gap that was identified by a participant with a lived experience in the Group A workshop in Victoria. While it should be noted that this particular participant was not supportive of the app idea as a whole, the issue raised by this participant was that there was a need for:

“...having a reminder system for when a driver puts the ramp down for a person with a disability who needs a mobility aid to get on the train [as] currently there’s no actual system apart from a post it note where they may or not write it down of when to get off and get the ramp down. Many drivers rely on their memory which might be a bit hazy or they change over at a different interchange stop and a new driver takes their place and they’ve got no idea that there’s a person with a disability on the carriage who needs to get out, so that will stop people getting lost and having a bad journey” [Male VIC Group A]

Although that participant did not suggest an app to address this issue, this was suggested by another health professional who was a participant in the Queensland Group B workshop. He suggested that the app could allow for:

“... forward notifications to the people at the next platform that someone would require assistance definitely because the poor train driver has a lot going on and then having to also keep the eyes open and look for people that need assistance when they’re coming into platform um yeah can be quite challenging” [Male QLD Group B]

This demonstrates that an innovation of this sort would not only be beneficial for people with disabilities but would also reduce the workload on train drivers and other operations staff, who would otherwise need to remember to deploy ramps.

Participants across a number of workshops identified a need for a ‘super app’ (encompassing many existing apps) to incorporate ‘Snap, Send, Solve’, which was identified in the literature review and presented to participants in the workshop. ‘Snap, Send, Solve’ is currently used by councils and utility providers in Australia

to allow customers to quickly and easily send feedback and information about faults. This was viewed as something that could easily be adopted in rail organisations. In the words of one health professional in Queensland:

“I think it would be one that would be pretty easily transferred over to the rail system for something that people could just easily identify an issue whether that be accessibility, or you know, the automatic door is broken or whatever, you know. You think that would be something that would be easily transferred” [Female QLD Group B]

This was seen as a way of giving people with disabilities a voice in issues that affect them. For example:

“...it empowers the people who actually experience these difficulties to report them in real time” [Male SA Group B]

This was seen as a way to ensure that improvements in accessibility are inclusive of people with disabilities and relevant to their needs, as indicated by this health professional from the South Australian workshop:

“When you study community development in Uni you learn that us as health professionals [you] can try to predict what issues people are going to encounter but often we’re wrong so you need to hear from people first hand, there’s no better way to do it than for someone to encounter an issue and straight away and bang they can take a picture of it and report it so you’re really getting the most relevant information” [Male SA Group B]

‘Snap, Send, Solve’ was also seen as a way to crowd source data to provide rail organisations with an idea of where their priorities should be for improving accessibility of the rail network. As indicated by this participant:

“It could at least be used potentially for data collection so you’re just getting a bulk amount of data about this amount of people were posting images relating to door handles and that gives some sense of priority in that area” [Male SA Group B]

This idea was also identified in the Victorian Group B workshop, who also noted that this could be used to guide decisions about staff placement, as outlined by this participant:

“... could also help for planning of strategic staff placement at particular times and areas” [Male VIC Group B]

However, while a centralised dynamic mobile app was perceived to have utility in this space, participants also outlined that relying on an app to improve accessibility for people with disabilities as well as elderly people who have lower rates of uptake of smart phone technology, might present some challenges. In the words of one participant with a lived experience:

“it’s the older generation that may not be up to date with all the tech savvy information” [Male QLD Group A]

Another participant with a lived experience of disability expressed concern that along with the potential that an app may not be inclusive to the older generation, it might also marginalise people who cannot afford smart phones:

“With the older generation as innovation and technology increases and stuff there are other people that may not have the ability to use the... smart phone.... The type of phones everyone has may not be compatible with a lot of this stuff.” [Male QLD Group A]

The need to be inclusive was supported by another participant from the rail industry in this workshop who said:

“[...because] you can come up with all sort of great ways of delivering information to people, but you still need to try and capture as many people as possible” [Male QLD Group A]

Although there was clear consensus that an app that contained the features identified above could be useful, it was also clear that any app would need to offer a way to consolidate and improve on existing apps, and that participants did not just want another app. This is reflected by a response by the following participant with a lived experience of disability:

“If there was an app that could consolidate it... if there was an app that meant I could ditch a couple of apps that’s already on my phone ... great” [Male VIC Group A]

Finally, there was a sense that apps developed for the rail industry could generally be better designed using more innovative programming and harmonisation. As a rail representative in Victoria expressed:

“One thing we could be doing better at in transport is integrating a lot of the UX and UCD style approaches we almost hardly ever do that in our app development... if we made that par for the course then it hopefully would address a lot of these user needs that we’re talking about so we could consolidate different apps together we could only get functions on there that you actually need and also with Agile UX you can change things exceptionally quickly.” [Male VIC Group A]

### 3.2.11 Boarding Solutions

One of the clearest outcomes of the workshops was the need for boarding solutions. Suggestions included raising the platform and reducing the gap between the platform and the conveyance. These were not identified during the literature review nor were they presented to participants in the workshops because they have been used in other countries for years and are not considered particularly innovative. However, the fact that four out of six issues prioritised boarding solutions, and it was discussed across all six focus groups highlights that this is an important area for consideration. Group B workshop participants in Queensland noted the variability in how accessible trains are:

“... some of the trains ... have a ramp that will automatically come down but most of the longer distance trains the people have to call for assistance to bring a portable ramp out to allow them to board the train and some don’t even have that option at all I think some trains are just not accessible” [Female QLD Group B]

The most common technological innovation proposed to address the gap issue was automated ramps. These were suggested in the Group B workshop in Victoria. For instance, this participant suggested that ramps:

“...can be automated from the train itself coming out to platform... or platform coming to the train... we don’t know how that’s going to work” [Male VIC Group B]

This potential for innovations in boarding solutions to allow people with disabilities to increase their independence when using the rail service was highlighted by a rail representative in the Queensland workshop:

“.. automatic gap fillers and automated ramps and stuff so that you remove the need for people to even be assisted, people can just get in and out of the train independently” [Male QLD Group A]

This was extended by participants in the Group A workshop in Victoria, who suggested the use of inbuilt guiding systems in automatic ramps. In the words of one rail representative from this workshop:

“...[there needs to be the] development of a tech solution to bridge that gap that would support safe and independent boarding and alighting. It could look like an automatic ramp at a station or on-board the train or the tram but also including things like inbuilt guiding systems so that people can safely use the ramp and reduce that risk of going over the edges” [Female VIC Group A]

Automatic ramps were also identified in the Group B workshop in South Australia, who commented on the potential for mechanisation in this area to improve safety for rail staff:

“...automatic ramps so that users aren’t dependent on rail staff obviously increases their usability, independence also the safety to employees in rail, its maximising their safety. [Because] its currently drivers or whoever is driving the train have to get off” [Male SA Group B]

Installation of automatic ramps would be a costly exercise. However, one idea generated by participants in Victoria would be to initially install this only on the front carriage:

“...something at least for that front carriage which can be retrofitted into the [platform] which just adjusts for height and/or came up against the train, this is a retractable, it would have to be integrated into the seating or whatever and while you’re at it you might as well put a shelter over the top because it’s not much fun standing out waiting for a train in the rain if you have to get that spot.” [Male VIC Group B]

It is also important to note that there was considerable consensus that innovations should not replace access to trained and willing staff. In the words of one participant with a lived experience of disability:

“For all the amazing auto stuff that is available the human factor is the critical one so better training more attentive staff makes way more difference than an automatic platform because that can go wrong and will on occasion but if you have somebody that can step up and say can I help then that makes an enormous difference” [Male QLD Group A]

There was also a sense that the innovations identified, especially gap fillers, education and virtual touring needed to work together. This is demonstrated through the following comment from this lived experience participant:

“For me, cause I have a disability as well, for me I would want to be able to get on and off the train by myself I would want to know in advance where I’m going and what it looks like and what to expect and then if for some reason there’s a technology failure or something like that I would want the staff to be equipped to help me” [Male QLD Group A]

### 3.2.12 Adding Disability into Modelling Systems

One innovation suggested by Group A workshop participants in Victoria was to include disability into modelling systems. Building in the concerns of people with disabilities into modelling means that the infrastructure development and scheduling changes will take into account the nuanced needs of users at the very beginning rather than trying to adjust these for people with disabilities post development. The participants in both Queensland workshops supported this, in the words of one participant from the Group B workshop:

“...that’s sort of relevant if my memory serves me correctly, a big issue with a bunch of new transit that were bought for QLD where no [toilet] facilities and there was no accounting for disability access and they just had to turn around... and retrofit... and it caused gigantic delays in getting the system up and running” [Female QLD Group B]

The importance of including the needs of people with disability in the design and planning stage of any changes and improvements was also highlighted by this lived experience participant:

“You could combine the idea that was the door opening aid with the wheelchair height and low level flight screen so if you say a lot of things could be better planned to be accessible by people in wheelchairs, be that the height of door opening buttons ... the height of a lot of things .... could be a lot better planned” [Male QLD Group A]

### 3.2.13 Education

A clear need for education and training was expressed by participants across all stakeholder groups in rail, including public awareness campaigns as well as training for rail staff. Education and training were prioritised across all three states, with different workshop participants prioritising education for different stakeholders.

Public education campaigns were also identified as a need in this area. This was explored in a number of different ways including adding a disability announcement as part of the general on-board announcement systems on the train as described by this health care professional:

“A good opportunity for disability to be talked about [on the train] saying ‘remember to look around to see if there are people with disabilities that require seating or require extra space’ so just be considerate to people with disabilities then maybe just a reminder saying ‘some disabilities are hidden’” [Male QLD Group B]

Hidden disabilities, mentioned earlier in relation to priority seating, were identified as an important target for public awareness campaigns by participants in other workshops too, for example:

“[Awareness campaigns should be] more around sensory related disabilities or non-physical, hidden disabilities” [Male SA Group A]

Another potential outcome for public awareness campaigns identified in the South Australian Group B workshop was to identify members of the public that might be available to assist people with disabilities. As this health professional said:

“...it would be good to perhaps educate members of the public to encourage them to offer assistance to people with disabilities to make them aware of the JAM [cards] for example, obviously you can’t have assistance at every platform at every station in every city ... but there’s plenty of members of the public that can assist so basically looking at ways to facilitate that” [Male SA Group B]

However, as the Group A workshop in Victoria identified, public education is not particularly innovative. In the words of one rail representative from this workshop:

“I didn’t see public education as a technology or an innovation... to me it should be a given that as public transport operators and providers that we should be doing that anyway” [Female VIC Group A]

This was mirrored in South Australia by a representative from the rail industry who said that public education is something that is already done but:

“...we tend to push it to the back a little bit when it really should be front and centre” [Female SA Group A]

It was also recognised that public education is a two-step process, where the education would be more meaningful if there were increased number of people with disabilities using the trains. In the words of one rail representative, the limitation to public education currently is that people do not often see people with disabilities using the train. In her words:

“...someone goes through an awareness campaign and its ‘people with disabilities are just like us’ or something but then they never see anyone with a disability, they never see anyone in rail, they’re not using public transport, then that information means nothing to them but if people with a disability are given the confidence and the ability to use the public transport those people will see it more and it all kind of comes together” [Female SA Group A]

Another area of education and training that was prioritised by participants was training for staff. As noted by a participant with a lived experience of disability from Queensland:

“The biggest one is having educated staff members, staff members that have been well educated and are aware of what is happening and willing to go and do what their job description is to go and do. You take technology all out of it that’s what it comes down to the human factor and when that all works well everything works smoothly.” [Male QLD Group A]

This idea that technology and innovation that should not be used to replace humans was picked up elsewhere:

“I think part of the problem too with increasing mechanisation and automation of everything what you get is fewer people that are on the ground um that might be available to assist them” [Female QLD Group B]

However, there was a sense that technology could improve interactions with customers. For instance:

“there’s always going to be a need for human assistance, but that the technology can help make them more strategic” [Male VIC Group B]

Participants in Queensland Group A workshop also identified that staff training might need to be coupled with other technological advancements and innovations, while also noting that the focus should be around enhancing staff to passenger interactions rather than replacing staff and passenger interactions with technology. For instance:

“...having ... automatic Auslan translation type stuff is something you could have available to staff that would really enhance their ability to do those kind of things” [Male QLD Group A]

While there was a sense that awareness training in any form was needed, the virtual reality innovation that was presented in the workshops was highlighted as having utility in this space. This training was seen as a way of building understanding and empathy:

“For ... drivers to be aware of what it looks like if you’re vision impaired or what it’s like to get downstairs if you’ve got a limp or a club foot or just to get the training out there so people understand what it’s like for the person they’re actually accommodating for in those vehicles” [Male VIC Group B]

Finally, it was identified that driver and operator training needs to be conducted regularly as there are rapid changes in the disability space. As noted by this participant with a lived experience of disability:

“The staff are not kept up to speed with the new things that are happening in the disability field” [Male QLD Group A]

### 3.2.14 ‘Honourable Mention’: Just a Minute (JAM card)

In some workshops it became difficult for participants to prioritise innovations, and so we suggested participants could give an ‘honourable mention’ award as well. These included innovations where there was much discussion and consensus during the workshop for each innovation, but there were other innovations that were perceived as more pressing. Some of the prioritised innovations are not considered innovative by the research team but came out strongly as needed by the workshop participants. These include boarding solutions and fill the gap ideas, as well as public awareness campaigns and try before you ride days. The focus on boarding solutions and education as not being innovative was also recognised by participants, for example:

“it speaks to how far behind we are in a lot of ways where things like that are thought of as being innovative” [Male QLD Group A]

Given the overwhelming consensus that these things are still significant issues for accessibility, it was important for us to include them in this report although large scale infrastructure changes are beyond the scope of this project. This does indicate a need for rail organisations to work toward ensuring that these fundamental accessibility principles are met, but it has diminished somewhat from participants paying due consideration to those innovations that might ‘raise the bar’ for accessibility in rail. Therefore, we have decided to offer a brief discussion of Just a Minute (JAM) cards, which was discussed across workshops in all three states. For example:

“It’s cheap, it’s a tangible item it can include sensory information on the card, it could be included on your metro card .... It could be just a sticker on the back but it could also be as part of the beacon technology as well” [Female SA Group A]

However, it should be noted that the JAM card might potentially be controversial and should only be used as an opt in basis only. In the words of a rail representative from Queensland:

“Things like that in our experience, here people in South East Queensland especially, have got really strong views on both sides of things like that. Some people feel really strongly that you know you shouldn’t have to identify yourself and its undignified and all that kind of thing but then there are other people feel equally strongly that everything and anything they can have at their disposal or available to get the kind of assistance they need they’ll jump all over it” [Male QLD Group A]

## 4 Discussion

There was a large degree of consensus across all six workshops, offering some clear ideas for innovations that could be adopted by rail organisation in Australia. While some of the prioritisations were around ideas or applications that were truly innovative, there was also prioritisation of issues that were not innovative but considered important for discussion. For instance, boarding solutions were raised consistently by participants and this problem reflects a true gap in accessibility for people with disabilities. However, boarding solutions such as gap fillers and automatic ramps, which were all suggested by participants in the workshops, were not considered by the research team as being innovative as they have been used around the world for a number of years. Furthermore, many of these systems are prohibitively expensive. This speaks to a need for rail organisations to continue to work on their ‘filling the gap’ initiatives with increased urgency, especially as this relates to the principles of universal design.

Gaps between the train and the platform are not only an access issue for people with disability but, by its implications, also a significant safety issue for able bodied passengers and especially parents with prams and people with age related health declines. This issue of universal design underpinned many participant discussions, and innovations identified. Universal design may be characterised as the development of products or environments to enable access by all people regardless of their age, size, ability or disability (Mace, 1997). In the area of travel, it is widely understood that universal design benefits access and safety for everyone: older people, children, people with temporary disabilities, tourists, and of course people with disabilities. Furthermore, the value of universal design has been demonstrated from a cost-benefit perspective among passengers, for example in Norway (Fearnley, Flugel & Ramjerdi, 2011). However, there has been limited overt adoption of this concept in the rail network in Australia.

Another less innovative area prioritised throughout the workshops was the need for education and training for both the general public, but also for rail employees. Public education campaigns were identified as an area of need throughout the workshops. While this is not particularly innovative as it is already being done throughout Australia, there is a clear need for rail operators to revisit their public education campaigns. Staff and operator training were also identified. Again, this is not innovative in and of itself but could involve virtual reality to improve on what is already being conducted throughout Australia. Another area in which virtual reality could be implemented is in travel training and in virtual touring. Travel training could incorporate virtual reality to improve the preparedness of people with disabilities for using the rail network. Further, virtual touring is a relatively low cost exercise that could be implemented in the short-term to allow customers to tour the station virtually to help them plan their trip, identify and problem-solve around any areas that might not be accessible, and locate accessible features such as toilets or help points.

One of the major innovations identified in this project was the development of a centralised or all-inclusive mobile application. Participants across workshops noted that this application should integrate a number of different features including the ability to unlock accessibility features such as ramps, stair climbers, and seats; as well as send forward notifications to allow people to inform operators that they are needed to deploy the ramp. The finding that innovations were needed to ensure that ramps were deployed reliably for people with disabilities has been reported previously (Topfield, 2019). However, there was a clear sense that participants did not want ‘just another app’ but instead, any mobile application needs to be developed with input from end users and needs to be thoroughly user tested to ensure its utility and value add. One of the most talked about elements of this app was the inclusion of the ‘Snap, Send, Solve’ app principles to allow people with disabilities to report accessibility problems in real time. In addition to providing a platform for people with disability to submit accessibility concerns for immediate attention by rail operators, ‘Snap, Send, Solve’ was seen as a way to crowd source data to identify priority areas for intervention. For instance, this app could be used to identify the platforms most in need of boarding solutions. This was also seen as a way to provide other customers with real time information regarding faults, for instance customers could report an elevator fault and this could feed into real time elevator service announcements to warn other customers to alight at

another station. Another innovation that might be connected to this all-inclusive app was accessible travel guides. These would be travel guides with the ability to filter information based on individual travel needs. Finally, the Swiss innovation FAIRTIQ was identified as a priority innovation by a number of participants in the workshops. Again, this could be incorporated as part of an all-inclusive app or could be implemented in the short-term as a standalone innovation.

Another clear outcome from the workshops was the need for improvements in both station-based and also conveyance-based announcements. A number of suggestions were given about improving the current arrangements. This included: lights indicating the direction of the approaching train; announcements on the platform and information being presented on the train in a variety of different formats including audio and visual formats (for example, maps with lights over doorways inside carriages); and as a further extension of this, push notifications going to personal devices. Once again, these improvements are not particularly innovative and have been successfully adopted in the rail sector (e.g., New South Wales).

There was consensus that clear lanes are needed to provide a safe thoroughfare for people with disabilities. However, further investigation is needed to identify how these clear lanes may be implemented, whether low tech solutions such as markings on the platform combined with public awareness campaigns would suffice, or whether other high tech solutions might be implemented in the long term such as installing barriers to prevent the able bodied public from accessing the lanes, coupled with a key card or app that provides people with disabilities with remote access to this facility. In addition to clear lanes, another station improvement suggested in the workshops was ensuring that the designated boarding area for people with disabilities is protected from the elements. Boarding areas in some states (such as Victoria) are often at the far end of the platform, where there is often no cover. Providing a shelter at disabled access points is a relatively low cost exercise that provides an immediate visible and measurable improvement in the comfort and safety of people with disabilities who are waiting to board a train. Other station and rail carriage improvements identified in the workshops involved the need to include quiet, low stimulus spaces for people with sensory intolerances. Again, this is a fairly low-cost innovation that could vastly improve the journey experience for people with Autism, dementia, head injury, and a range of other people with sensory intolerance.

Wayfinding innovations were also selected as a priority by participants in these workshops. While the innovations identified in the literature review as part of this project were not earmarked as priority innovations in the workshops, participants identified that a number of innovations in wayfinding were already underway in Australia, and that more attention should be paid to signage and facilitating people to get around. Again, following universal design principles, wayfinding technologies enhance the rail travel experience for everybody.

## 4.1 Limitations

At times, the face to face workshops provided limited data from which quotes to support the findings could be extracted. While the innovations and ideas generated and negotiated in these workshops were rich, because the two groups were in close proximity, the conversations were unable to be recorded with any quality that facilitated transcription. The ideas prioritised by participants in these workshops have been captured using the pen and paper tasks and the whiteboard activity, however at times we were unable to capture some of the participant's talk during the negotiation of these ideas to support the findings in this report. While this has not impacted on project findings, it has resulted in fewer quotations from participants in the Victorian and South Australian workshops. The loss of this richness of data was particularly apparent when the workshops were changed to an online format in Queensland and we were able to use built in recording software to record the single discussion, overcoming the limitations associated with trying to audio record two small group discussions in a single room environment.

While every effort was made to include people with a wide range of disabilities, we were unable to recruit participants with cognitive impairments, learning disabilities, acquired brain injury, or those with dementia. While participants across the workshops recognised the need to ensure people with hidden disabilities could access the train, it is possible that some of the innovations that might assist with this have been overlooked. It must also be noted that having small numbers of participants with different types of disabilities means that those targeted apps may have been overlooked by the larger group, and there are likely to be divergent views and interests from those not in the workshops.

While this is a necessary limitation due to the scope of the research, it does highlight that rail organisations need to involve people with disabilities in the user testing and piloting aspects of any selected innovations to ensure that these would be useful for that particular community.

## 5 Conclusions

Through a large degree of consensus with a variety of stakeholders across three Australian states, this report identified and outlined a number of Innovations to improve rail transport accessibility for people with disabilities that show strong potential for consideration, implementation and pilot trialling within Australasian passenger rail operations. Based on these findings, innovations identified over the course of this research that should be considered for short-term implementation around Australia pertain functionally to: being able to quickly and easily send feedback and information about faults (Snap, Send, Solve); dedicated access lanes for easier navigation (Clear lanes); sheltering from the elements; integration of virtual reality into education and training for drivers, operators and travel training for people with disabilities; better preview of the journey ahead prior to commencement (virtual touring videos); and ticketing apps that bypass the need to purchase, recharge and swipe physical transit cards (FAIRTIQ). The findings from this research have also illuminated areas for attention, which while not innovative in the truest sense of the world, nevertheless reflect important areas for accessibility solutions and emphasise continuous improvement for rail organisations. In both cases, findings implicate a need for Australasia to move more overtly forward towards universal design in ways that recognise the bigger picture for rail innovation.

## Acknowledgements

The planning and coordination for the workshops would not have been possible without the generous time, input and initiative taken by key contacts from the hosting organisations. The researchers are extremely grateful to David Bell, Stephen Kelly, and Amy Ambagtsheer.

The authors of this report also gratefully acknowledge the input and assistance of Vincci Lee involved in earlier phases of this project.

## References

Australian Bureau of Statistics (ABS) 2019, Disability, ageing and carers, Australia: Summary of findings 2018, cat. no. 4430.0, viewed 11 February 2020, <http://www.abs.gov.au>

Australian Government Department of Infrastructure and Regional Development, 2013, *Review of the Disability Standards for Accessible Public Transport*. Retrieved 10 May, 2019, <https://www.infrastructure.gov.au/transport/disabilities/review/2012.aspx>

Australian Government Department of Infrastructure and Regional Development, 2017, *The Whole Journey: A Guide for Thinking Beyond Compliance to Create Accessible Public Transport Journeys*. Retrieved 22 June, 2020, [https://www.infrastructure.gov.au/transport/disabilities/whole-journey/files/whole\\_of\\_journey\\_guide.pdf](https://www.infrastructure.gov.au/transport/disabilities/whole-journey/files/whole_of_journey_guide.pdf)

Australian Human Right Commission (n.d.), *Disability rights*, viewed 15<sup>th</sup> January 2020, <https://www.humanrights.gov.au/our-work/disability-rights>

Clarkson, L., Naweed, A., Unsworth, C., & Lee, V. (Under review). International innovations that promote rail passenger accessibility. Report 1: Literature Review [Tech. Report PF30 v.1.1] Australasian Centre for Rail Innovation.

Clery, E, Kiss, Z, Taylor, E, & Gill, V 2017, *Disabled people's travel behaviour and attitudes to travel*. Retrieved from the Department of Transport: June 22 2010, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/647703/disabled-peoples-travel-behaviour-and-attitudes-to-travel.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/647703/disabled-peoples-travel-behaviour-and-attitudes-to-travel.pdf)

Currie, G, Stanley, J, & Stanley, J 2007, *No way to go: Transport and social disadvantage in Australian communities*, Monash University Publishing, Clayton, Vic.

Disability Discrimination Act 1992 (Cwlth), viewed 15<sup>th</sup> January, 2020, <https://www.legislation.gov.au/Details/C2018C00125>

Doman, M, Scott, N, & Liu, R 2018, 'The 'unconscionable' state of Australia's train stations' *ABC News*, 29<sup>th</sup> August, viewed 15<sup>th</sup> January, 2020.

Fearnley N, Flugel S, & Ramjerdi F 2011 'Passengers' valuations of universal design measures in public transport', *Research in Transportation Business & Management*, vol. 2, pp. 83-91.

Feeley, C 2010 'Evaluating the transportation needs and accessibility issues for adults on the Autism Spectrum in New Jersey. Presented at 89th Annual Meeting of the Transportation Research Board, Washington, D.C.

Gallagher, BA Hart, PM, O'Brien, C, Stevenson, MR., & Jackson, AJ 2011, 'Mobility and access to transport issues as experienced by people with vision impairment living in urban and rural Ireland', *Disability & Rehabilitation*, vol. 33, no. 12, pp. 979-988.

Mace R 1997, 'What is universal design'. The Center for Universal Design at North Carolina State University. ([https://projects.ncsu.edu/ncsu/design/cud/about\\_ud/udprinciplestext.htm](https://projects.ncsu.edu/ncsu/design/cud/about_ud/udprinciplestext.htm) accesses 01/06/20)

Monash Institute of Railway Technology 2019, 'The Disability Standards for Accessible Public Transport (2002) and Disability ( Access to Premises- Buildings) Standards (2010) Review: Summary Report' Clayton

Moug V, & Coxon SC 2013, 'An analysis of station infrastructure design to improve accessibility between the platform and suburban train carriages, *Australasian Transport Research Forum 2013 Proceedings*. Bunker, J, Burke M, Hickman, M & O'Keefe, B (eds.). Brisbane QLD Australia: Queensland University of Technology, PP 1-19

Moug V, Coxon S, Napper R 2016, 'Evaluating accessibility provisions for existing rail station platforms in Melbourne, Australia', *Australasian Transport Research Forum 2016 Proceeding*. Melbourne, Vic, Australia. Department of Infrastructure and Regional Development pp 1-17

National Autistic Society 2016, 'Too much information' *Report on the 2016 National Autistic Society Survey*. <https://www.autism.org.uk/get-involved/campaign/tmi.aspx>

Pyer, M & Tucker, F 2017, "'With us, we, like, physically can't': Transport, mobility use and the leisure experiences of teenage wheelchair users', *Mobilities*, vol. 12, no. 1, pp. 36-52

Rail Safety Standards Board 2017 *Improving accessibility and safety for mobility scooter users traveling by train (T1055)*. Retrieved 10 May, 2019, from <https://www.rssb.co.uk/Pages/research-catalogue/T1055.aspx>

Shooter, C 2019, 'Rail travel and disability: An international perspective on accessibility' Rail Safety Standards Board. Retrieved 10 October, 2019, from <https://trid.trb.org/view/1673384>

Topsfield, J. (2019, September 27). 'Sometimes train drivers forget you': How to make Melbourne more accessible for people with disabilities. *The Age*. Retrieved from <https://www.theage.com.au/national/victoria/sometimes-train-drivers-forget-you-how-to-make-melbourne-more-accessible-for-people-with-disabilities-20190927-p52vmk.html>

Unsworth, CA, Rawat, V, Sullivan, J, Tay, R, Naweed, A, & Gudimetla, P 2017, "'I'm very visible but seldom seen": consumer choice and use of mobility aids on public transport. *Disability Rehabilitation and Assistive Technology* pp. 1-11.

## Appendix A: Information Sheet



### INFORMATION SHEET

**Title:** Disability innovations in rail: International innovations that promote rail passenger accessibility

**Research Team:** Associate Professor Anjum Naweed and Professor Carolyn Unsworth

#### Project Overview

There is a significant and rising number of Australians living with a disability, and therefore a need for rail operators to be constantly improving accessibility for these customers. It is possible that innovations exist that have the potential to improve accessibility for all customers but have not yet been identified. CQUniversity, with the support of ACRI, have been identifying innovations from around the world, that have been used to improve disability access in a variety of contexts. We think that some of these innovations have the potential to also improve accessibility in rail in Australia. We need your input to help us determine which innovations would be useful in this context.

#### Participation Procedure

You are invited to take part in a workshop to discuss the viability of a variety of disability innovations. You will also be asked to suggest any other innovations that you are aware of, that might be useful in improving accessibility in rail. During the workshops, the research team will take notes and may also audio-record the conversation. In addition, you may be asked to workshop ideas on paper. The workshops will take approximately 2 hours of your time.

#### Benefits and Risks

The outcomes of the workshops will be reported to the Australasian Centre for Rail Innovation (ACRI), who will share the findings with their member organisations. It is anticipated that organisations will choose to adopt all or some of the suggested innovations, which will result in improvements in accessibility on rail networks around Australia.

You will be compensated for your time. An honorarium of \$250 will be paid at the end of the workshop (for all non-transport industry participants). This is to compensate you for both your time and for travel costs.

Although we don't foresee any risks in participating in this research, if you do experience any negative events, you can seek assistance from either the research team or the secretary of the human research ethics committee. The contact details are below.



CRICOS Provider Code: 00219C | RTO Code: 40939



**Confidentiality / Anonymity**

Data will be non-identifiable and therefore you will remain anonymous and any information you provide will be confidential.

Data will be securely stored for five (5) years after the publication date of the last publication based upon the data, in accordance with the CQUniversity policy. After this time, any hard copy documents will be shredded. An electronic file of the research data will be maintained for possible use in future research. If further research is to be completed, a new submission to CQUniversity Human Research Ethics Committee will be conducted.

**Outcome / Publication of Results (if applicable)**

The results of the research will be included in a report to ACRI and may be used to produce journal articles and conference presentations.

**Consent**

Your consent to participate in this research project will be obtained by reading, signing, and returning the research consent form to the researcher.

**Right to Withdraw**

Your participation is completely voluntary. If you decide to take part but change your mind, you are free to withdraw, and at any time, without repercussions to yourself or others. However, as the data is non-identifiable within the workshop, it will not be possible to withdraw the data that you have provided.

**Questions / Further Information**

In you would like any further information concerning this project, the details of the researchers are:

Name:	Prof. Carolyn Unsworth	Name:	Associate Prof. Anjum Naweed
Position:	Principal Researcher	Position:	Principal Researcher
Telephone:	(03) 96160504	Telephone:	(08) 83784520
Email:	<a href="mailto:c.unsworth@cqu.edu.au">c.unsworth@cqu.edu.au</a>	Email:	<a href="mailto:anjum.naweed@cqu.edu.au">anjum.naweed@cqu.edu.au</a>

**Concerns / Complaints**

Please contact CQUniversity's Office of Research should there be any concerns about the nature and/or conduct of this research project

Telephone: (07) 4923 2603

E-mail: [ethics@cqu.edu.au](mailto:ethics@cqu.edu.au);

Mailing address: Building 32, CQUniversity, Rockhampton, QLD, 4702

This project has been approved by the CQUniversity Human Research Ethics Committee.  
CQUHREC clearance number: 0000022161



CRICOS Provider Code: 00219C | RTO Code: 40939

## Appendix B: Consent Form

### CONSENT FORM



**Title:** Disability innovations in rail: International innovations that promote rail passenger accessibility

**Research Team:** Associate Professor Anjum Naweed and Professor Carolyn Unsworth,

**I consent to participation in this research project and agree that:**

1. An Information Sheet has been provided to me that I have read and understood;
2. I have had any questions I had about the project answered to my satisfaction by the Information Sheet and any further verbal explanation provided;
3. I understand that my participation or non-participation in the research project will not affect my academic standing or my employment;
4. I understand that I have the right to withdraw from the project at any time without penalty;
5. I understand the research findings will be included in a report that will be sent to the Australasian Centre for Rail Innovation and may be distributed to rail organisations in Australia. The findings may also be included in academic publications and this may include conferences and articles written for journals and other methods of dissemination stated in the Information Sheet;
6. I understand that to preserve anonymity and maintain confidentiality of participants that fictitious names may be used in any publication(s) unless I have expressly granted permission as outlined below;
7. I agree that I am providing informed consent to participate in this project.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name (please print): \_\_\_\_\_

**Where relevant to the research project, please check the box below:**

I give consent for photos taken during the workshop to be used in presentations and publications arising from the research  YES  NO

I wish to have a summary of the findings from this  YES  NO

study sent to me at the address I provide below:

Postal Address: \_\_\_\_\_

E-mail Address: \_\_\_\_\_

CQUHREC clearance number: 0000022161



CRICOS Provider Code: 00219C | RTO Code: 40939

### Appendix C: Demographics Form

Type of participant	Tick one or more <input type="checkbox"/> Lived experience expert <input type="checkbox"/> Health care professional <input type="checkbox"/> Rail industry representative <input type="checkbox"/> Technology/ equipment industry professional
What is your industry role (if relevant)?	
Global experience	Years:
Focus of expertise in your own words	
Age	Years:
Sex	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Prefer not to specify

Appendix D: Innovations Reference Sheet

Promoting Passenger Rail Accessibility

Innovations reference sheet

PRE-JOURNEY planning		JOURNEY start/end	USING the service	SUPPORTING infrastructure	
<p><b>Dynamic Apps</b> All rounded apps capable of combining features</p> <p>Melba App Smart assistant, provides live information via voice, text, screen</p> <p>Accessible travel guides Various maps e.g. interactive, mobility, toilets</p> <p>Sensory Map Inform visitors about level of sensory inputs</p> <p>Elevator Status Announcement</p> <p>Easy Jet Look &amp; Book Location detection via Instagram and offering of travel details</p>	<p><b>Virtual Touring</b></p> <p>iRoam Locations such as schools, sports centres, healthcare facilities</p> <p>Virtacom Shopping centres, resorts</p> <p><b>Social Story</b> Guides/tools to support individuals with Autism to better understand interpersonal nuances</p> <p>Chichester Festival theatre Festival information</p> <p>National Gallery Victoria Locations such as schools, sports centres, healthcare facilities</p> <p>OrientTrip App Journey planning</p> <p><b>VR Transport Training</b> Using gaming design to educate those with intellectual disability about safe rail use</p> <p><b>Real-time Seat Availability</b> Show free seats by referencing booking data</p>	<p><b>Mobile Apps</b> To assist people with low vision to interact independently and safely with the surroundings</p> <p>Be My Eyes Connects people with vision impairments to sighted volunteers/ reps for visual assistance through live video call</p> <p>Seeing AI Converts visual information into audio descriptions</p> <p>Soundscape App Provides audible cues to people with low vision about where they are and where they are going</p> <p>AIPOLY Detects common objects, reads texts, recognises colours, does not</p> <p><b>STOP / station</b></p> <p><b>See Sound App</b> Able to translate audio into text through machine learning</p> <p><b>Ticketing Apps</b></p> <p>Amazon Go "Just Walk Out" technology comprising Automatic detection when a product is taken</p> <p>Fairtqi Switzerland Purchase of train tickets on smartphones with one swipe</p> <p><b>RoomMate Device UK</b> An electronic wall-mounted device provides be-spoke audio description in a disabled access toilet</p>	<p><b>JAM Card</b> Tell others you need more time discreetly and easily</p> <p><b>Sunflower Lanyard</b> Signal staff that traveler has a hidden disability and requires assistance</p> <p><b>Door Opening Aids</b></p> <p>Hands free intercom Intercoms in LA metro are installed with sensors</p> <p>Smartphone activation Motion sensing cameras shows person at the door and connects to users phone to determine access</p> <p><b>The Flex Connection</b> Easy to grip brushes that cater for individuals with tremors or musculoskeletal conditions</p> <p><b>Pedius</b> Advanced speech recognition technology to make private, real time phone calls – user types message, which Pedius reads to other party</p> <p><b>Long-term/Future-oriented</b></p> <p>Wearable exoskeleton to enable people with paraplegia to walk again</p> <p>Stair-climbing wheelchair self-balancing wheels which can climb stairs</p>	<p><b>Communication Aids and Apps</b> To engage with non-verbal individuals/ travelers</p> <p>Microsoft translator Real-time translation/interpretation of a person's spoken words through advanced automatic speed recognition</p> <p>Story sign Use of AI to incorporate signal language in children's books, via avatars in smartphones</p> <p>Skype with live caption Real-time conversion of audio into text, captions and subtitles</p> <p>Computer interpreting sign language Sign language interpretation and conversion into text and speech</p> <p><b>OTHER</b></p> <p><b>Other potential ideas</b></p> <p>e-Adept Device to assist people with cognitive/vision impairment to navigate surroundings independently and inform their family members when they reach their destination</p> <p>Mapping System Beacon Technology to synchronise customer's shopping list/calendar/ diary to map their best route through the transport network</p>	<p><b>Communication Passport</b> Guide teachers to accurately assess and best communicate with students with different needs</p> <p><b>Snap, Send and Solve App</b> Used in local councils for residents to identify issues with geo location and provide feedback</p> <p><b>Hidden disability signage</b></p> <p><b>Awareness Campaigns</b></p> <p>Try before you ride Simulated tram tour guided by people with vision impairment and guide dogs</p> <p>Please offer me a seat Program Free badge/card for people who want to indicate/alert fellow passengers that they need a seat</p> <p><b>Wheelchair users</b></p> <p>Users can read info/tap their tickets at their height</p> <p>Low level flight screen</p> <p>Wheelchair height tapping</p>

**ASPIRATIONS for 'The Whole Journey'**

**Pre-journey Planning**  
a. Encourage informed decision-making  
b. Reduce time spent in pre-planning  
c. Increase confidence of public transport users

**Journey start/end**  
a. Travelling between transport nodes is easy & efficient  
b. Involve stakeholders who manage the environment surrounding the public transport network, to understand the impact of their actions & collaborate to resolve issues

**Transport Stop or Station**  
a. Station is easy to identify via messaging, easy to access, & info available in a variety of formats  
b. Travellers can locate boarding points at allotment boundaries  
c. Travellers feel safe & comfortable while waiting

**Using the Service**  
a. Travellers feel confident, safe & secure knowing they can get on, travel & get off the service  
b. Fellow travellers/staff are courteous/respect requests for assistance

**Supporting Infrastructure**  
a. Enable people to travel safely, well-informed & comfortably  
b. People are available, training, and ready to help when assistance is required





E [acri@acri.net.au](mailto:acri@acri.net.au)

T +61 2 6274 7447

W [www.acri.net.au](http://www.acri.net.au)

A Ground Floor, 111 Alinga Street, Canberra, ACT 2601

P PO Box 238, Civic Square, ACT 2608, Australia

CONTACT US

