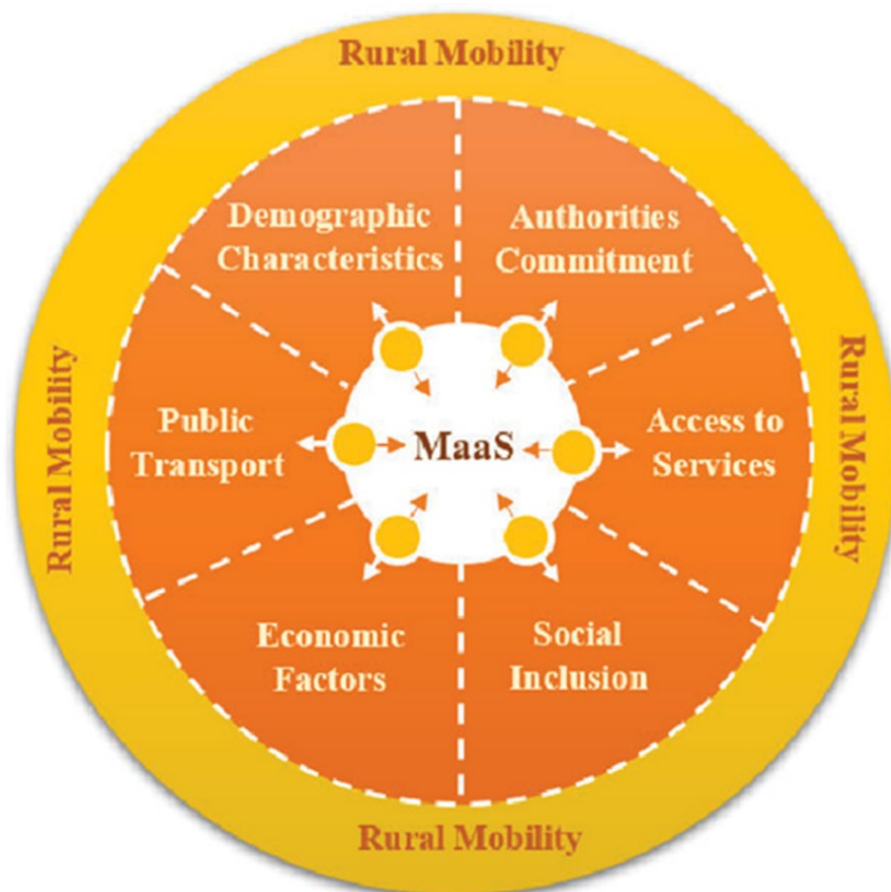# REPORT SUMMARISING THE MAIN FINDINGS FROM ANALYSIS OF COLLECTED PRIMARY DATA FOCUSSING ON THE BLUEPRINT FOR RTRH MAAS

FINAL REPORT – ANNEX 3

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Report Summarising the Main Findings from Analysis of Collected Primary Data Focussing on The Blueprint for RTRH MaaS

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1. Executive Summary

This report presents the main findings from the analysis of primary data collected focussing on the blueprint for Regional Towns and Rural Hinterland (RTRH) MaaS in NSW. The findings are presented in three main parts. The first is the qualitative analysis of 17 in-depth interviews with supply-side providers / organisers at the three locations selected for detailed study (Dubbo, Nowra, Coffs Harbour). The second part is a qualitative analysis of end-user group discussions, including a "pencil & paper" survey at the three locations (45 participants across 6 groups). Finally, the quantitative analysis of the NSW-wide online survey of residents comprising 916 respondents of the 16 regional cities is presented.

The results of in-depth interviews show that users in the RTRH areas have been experiencing long-term transport disadvantage while stakeholders have been facing barriers to meeting users' mobility needs. It is acknowledged that there is a gap between users' unmet mobility needs and the transport services and solutions provided by stakeholders. The qualitative analysis of the group discussions has provided valuable insights into the "pain points" faced by NSW regional and rural residents. The results have identified barriers to meeting the mobility needs of vulnerable groups, as well as users' positive and negative responses to a potential MaaS offering in regional NSW. The findings have also provided preliminary knowledge on the types of mobility services that are attractive to users. Modelling of the online survey data showed strong support for the proposed Car Community Club as well as for bundling non-mobility services as part of mobility plans.

In the final section of the report, policy implications based on the results of the data collection which will inform the development of the blueprint are discussed.

2. Introduction

This report presents the outcome of the data collection as part of Task 6 (i.e.., undertake all appropriate data analysis and prepare a report, prepare a blueprint for future RTRH MaaS trials) of iMOVE project 3-020.

2.1 Context and purpose of this report

This report comprises outcomes from the three strands of data collection:

- Qualitative analysis of in-depth interviews with supply-side providers / organisers at the selected three locations (Dubbo, Nowra, Coffs Harbour).
- Qualitative analysis of end-user group discussions, including a "pencil & paper" survey at the selected three locations.
- Quantitative analysis of the NSW-wide online survey.

One-to-one in-depth interviews with key stakeholders were conducted to gain insights about the services and products they provide and their fit within the RTRH MaaS blueprint, and how they could be leveraged through greater integration. Building on the insights gained from the in-depth interviews, group discussions were conducted with end users in the three locations with a view to gaining an understanding of users' everyday travel needs and their likely interest in integrated mobility plans. The NSW-wide online survey targeted respondents living in the 16 regional cities in NSW (based on the 16 Regional Cities Services Improvement Program to improve bus services).

2.2 Aims and purpose of the primary data collection

An overview of the primary data collection process is given in Table1.

Table 1. Overview of primary data collection and aims

Phase	Data type	Sample	Location	Key output
1	In-depth interviews with stakeholders	• Transport providers • Non-transport providers	• Nowra • Dubbo • Coffs- Harbour • Sydney	Highlight complex mobility issues in RTRH • identify the mobility framework • capture perception of customer needs
2a	Group discussions with community	• Drivers • Non-drivers	• Nowra • Dubbo • Coffs Harbour	• Confirm barriers of stakeholders • Further insight into nature of issues of transport disadvantage and vulnerability • Implications for RTRH MaaS
2b	Online Survey with end users	• Drivers • Non-drivers	• 16 Regional Cities	• Explore new initiatives offering travellers more travel options for both short and long-distance trips • Elicit travellers' preference on different subscription plans with a set of travel options at discounted prices as well as other services

The principal aims of the data collection to meet the requirements of developing the MaaS blueprint can be summarised as:

- to identify the barriers and business opportunities of different **stakeholders** (Transport/Non-Transport Providers) and factors influencing the ability to meet users' requirements and investigate what role the government could play to improve things;
- to explore current transport needs and experiences among regional and rural **residents** in terms of how they access their surroundings, what constraints they face, and how to address barriers; and
- to elicit switching behaviour potential under varying mobility subscription plans associated with different mobility services and non-mobility services in regional towns and their rural hinterlands in the **16 cities**.

2.3 Structure of the Report

The report is organised as follows. Chapter 3 summarizes the results of the in-depth interviews. Chapter 4 summarizes the results of the end-user discussion groups and surveys and the online survey. Chapter 5 discusses provides policy implications for the design of the MaaS blueprint. Chapter 6 concludes this report.

3. In-depth interviews

This chapter first introduces the aims and objectives of in-depth interviews for stakeholders (Section 3.1), then introduces the methodology adopted for analysing in-depth interviews (Section 3.2), before discussing the results of in-depth interviews (Section 3.3).

3.1 Aims and objectives

The major aims and objectives of the in-depth interviews are summarized in Figure 1. The interviews with service providers and organisers of transport were designed to gain insights about the services and products they provide and their potential fit within the blueprint for Rural and Regional MaaS, and how they could be leveraged through greater integration. Interviews sought to establish the barriers the transport service providers face in meet users' needs, key success factors of MaaS, and business opportunities that MaaS will bring.
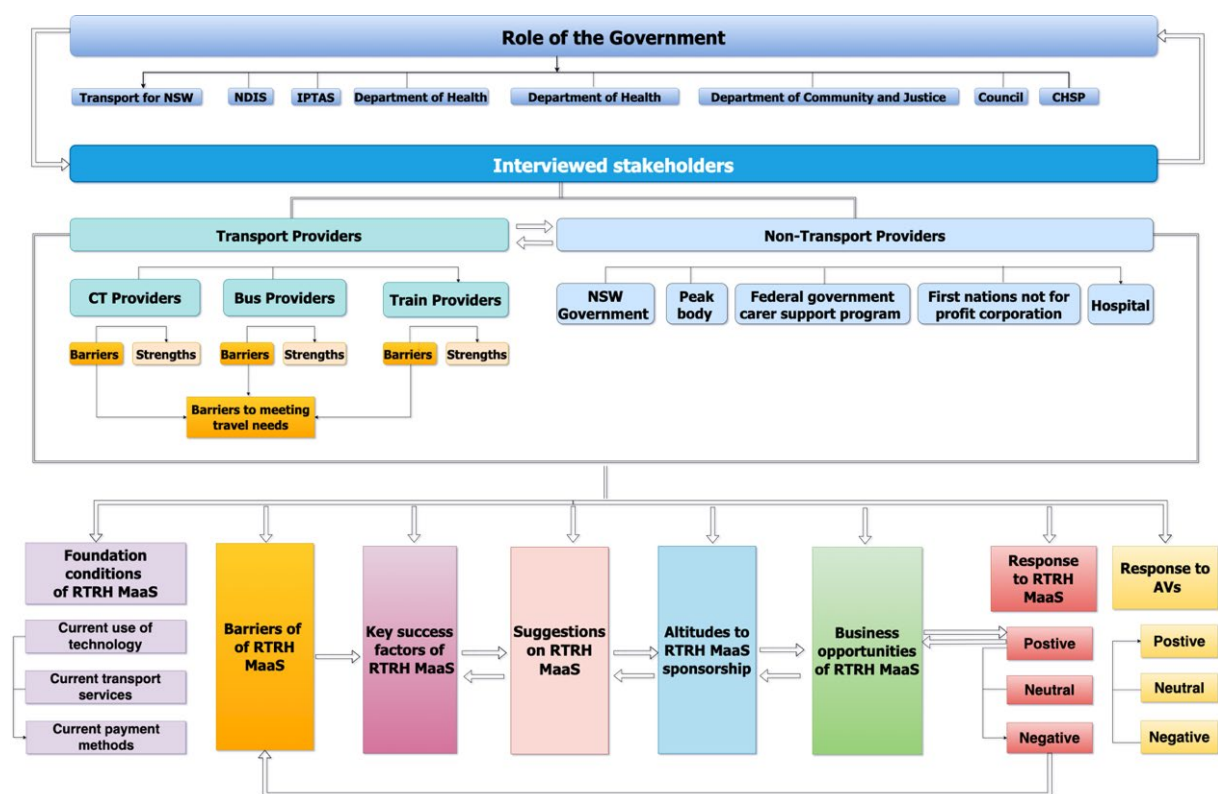
Figure 1. The aims and objectives of the in-depth interviews with key stakeholders

3.2 Method of analysis

Following receipt of Ethics Committee approval, the in-depth interviews were conducted by CaPPRe (under contract to ITLS) in July 2022. A total of 17 stakeholders were interviewed (see Table 2) including non-transport providers such as government, peak bodies, health and Aboriginal organisations and transport providers from the bus, train and Community Transport (CT) sector and included a variety. All the interviewees belong to the management level in their organizations including Managers (8), Senior Officers (3), CEOs (3), Peer Support Partner (1), and Senior Directors (2).

Table 2. List of interviewees

Participant	Work City	Organisation Type
I01	Sydney	Non-Transport provider (NSW Government)
I02	Sydney	Non-Transport provider (peak body)
I03	Nowra	Transport provider (CT)
I04	Dubbo	Non-Transport provider (Federal Government carer support program)
I05	Dubbo	Non-Transport provider (Hospital)
I06	Nowra	Non-Transport provider (NSW Government)
I07	Dubbo	Transport provider (CT)
I08	Dubbo	Transport provider (Bus)
I09	Dubbo	Transport provider (Bus)
I10	Nowra	Transport provider (Train)
I11	Dubbo	Non-Transport provider (NSW Government)
I12	Coffs Harbour	Transport provider (Bus)
I13	Coffs Harbour	Non-Transport provider (NSW Government)
I14	Sydney	Transport provider (Bus)
I15	Coffs Harbour	Transport provider (CT)
I16	Coffs Harbour	Non-Transport provider (First Nations not for profit corporation)
I17	Sydney	Transport provider (CT)

Interview transcripts were coded following a thematic analysis approach to identify thematic categories grounded on the stakeholders' views and experiences of rural mobility. This method has previously been successfully applied to develop psychological understandings of drivers' motives and experiences (Sandelowski; Ezzy, 2013; Anfara Jr, 2002). It is acknowledged that qualitative analysis depends on researchers' interpretations of textual data, and so is potentially open to bias and subjectivity (Ritchie, et al., 2003). Further detail of the analysis method followed is given below in Sections 3.2.1 and 3.2.2.

3.2.1 Thematic analysis

The 17 interview transcripts were created as 17 cases with different attributes of the interviewees such as their gender, location of workplace, organization type, organization name, and position. Then the coding procedure was conducted using Nvivo 12, a qualitative analysis software, to identify salient themes which were reviewed and organised to identify frequently cited and important issues within broader categories. For this analysis, a mixed inductive deductive thematic analysis was conducted. The coders initially became familiar with the content and meaning of the interview transcripts. Once uploaded in NVivo the interview transcripts were 'open-coded' (line-by-line labelling of respondents' statements) without any pre-defined codes. From here, the coded pieces of information (i.e., nodes) were grouped together based on commonality and similarity. For instance, nodes representing statements such as 'word by mouth', 'Search internet', 'Facebook', and 'making a phone call' were combined under the parent node 'Means to know available services.' Nodes were further placed in a hierarchy, e.g., the node 'strengths of different transport services' were combined with 'shortcomings of transport services' under the parent node 'current transport services and features'. This process was continued with each emerging theme. In this study, there are 21 primary codes (see Table 3) with numerous sub-codes to be used in analysis.

3.2.2 Developing coding reliability with rigour

In this study, rigour was ensured through the following five steps, in line with guidelines for rigorous qualitative research practice (Elliott et al., 1999; Mays and Pope, 1995).

First, two expert researchers coded all transcripts, and had frequent discussions of emergent categories and data interpretation to ensure that categories and concepts were credible representations of the data, and that interpretation was valid and shared between coders. Second, illustrative quotes from the data were considered as prototypical and outlier illustrations of each defined category. In this report we include illustrative quotes to demonstrate the validity of our analysis and so 'satisfy the sceptical reader of the relation between the interpretation and the evidence'. Third, these categories were organized into themes which capture something important about the data and represent some level of patterned response or meaning within the data set. It involves combining codes into overarching themes that accurately depict the data.

In the fourth step both researchers independently extracted and classified all references (i.e., sentences or paragraphs) that corresponded to a theme of the analysis grid and preserved the quality of the writings as produced. To ensure the reliability of the coding and classification process, the coding comparison query that enables the comparison of coding done by two experts (both agreement and disagreement) in Nvivo 12 was performed by calculating a Cohen's kappa coefficient. The kappa coefficient is reported in NVivo for each code and file separately and averages are given in the final column of Table 3. The kappa coefficient can range from -1 to +1 (values below 0 meaning agreement is less than chance, values above 0 meaning some level of agreement, and value of +1 indicates perfect agreement between two researchers). The kappa coefficients show a very high level of agreement overall, with a minimum value of 0.821 and a mean of 0.922. Kappa coefficients between 0.81 and 1 represent almost perfect agreement. Each of these themes along with their sub-themes are explained in Section 3.3.

The fifth step is a comprehensive analysis to examine the extent to which the themes contributed to an understanding of the data.

Table 3. Coding Scheme description and Kappa coefficients

	Themes	No. sub-codes	No. references	No. related stakeholders	Average Kappa coefficient
1	Current mobility services available	23	78	12	0.902
2	Current use of technology	16	42	15	0.916
3	Current payment methods	9	35	11	0.914
4	Current means to know about available services	7	12	1	0.915
5	Barriers to meeting travel needs	17	153	17	0.877
6	Barriers to meeting mobility needs of disabled persons	15	41	7	0.868
7	Barriers of CT operators	16	96	13	0.855
8	Barriers of Bus operators	7	26	17	0.816
9	Barriers of Train operators	3	7	8	0.857
10	Barrers to transport in Aboriginal communities	20	72	7	0.842
11	Barriers to implementing regional and rural MaaS	11	57	17	0.884
12	Response to regional and rural MaaS	3	156	16	0.822
13	Impact of disaster and COVID-19 on transport services	3	17	9	0.943
14	Factors influencing the ability to meet needs	11	32	10	0.922
15	Considerations on RTRH MaaS sponsorship	12	20	2	0.824
16	Business opportunities of RTRH MaaS	10	24	5	0.911
17	Key success factors (KSF) of RTRH MaaS	17	131	16	0.854
18	Expected role of the government	16	110	9	0.823
19	Suggestions for the role of government	17	101	5	0.833

3.3 Summary of results

A total of 19 core themes were identified as critical determinants underpinning the acceptance and success of Rural and Regional MaaS, namely:

- Underlying conditions for implementing RTRH MaaS (Section 3.3.1),
    - **Theme 1**: Current mobility services available
    - **Theme 2**: Current use of the technology
    - **Theme 3**: Current payment methods
    - **Theme 4**: Current means to know about available mobility services
- **Theme 5**: Barriers to meeting mobility needs of the general public (Section 3.3.2),
- **Theme 6**: Barriers to meeting mobility needs of disabled persons (Section 3.3.3),
- Barriers for transport service providers (Section 3.3.4),
    - **Theme 7**: Barriers of CT operators
    - **Theme 8**: 2 Barriers of Bus operators
    - **Theme 9**: Barriers of Train operators
- **Theme 10**: Barriers to transport in the Aboriginal community (Section 3.3.5),
- **Theme 11**: Barriers to implementing regional and rural MaaS (Section 3.3.6),
- **Theme 12**: Response to regional and rural MaaS (Section 3.3.7),
- **Theme 13**: Impact of disaster and COVID-19 on transport services (Section 3.3.8),
- **Theme 14**: Factors influencing the ability to meet needs (Section 3.3.9),
- **Theme 15**: Considerations on RTRH MaaS sponsorship (Section 3.3.10),
- **Theme 16**: Business opportunities of RTRH MaaS (Section 3.3.11),
- **Theme 17**: Key success factors (KSF) of RTRH MaaS (Section 3.3.12),
- **Theme 18**: Expected role of government (Section 3.3.13), and
- **Theme 19**: Suggestions for the role of government (Section 5.3).

Each theme has distinctive dimensions, expressed as their sub-themes, that affect and reflect the attitudes of stakeholders, attraction and barriers to implementing MaaS, and the improvements that government could undertake in the development of MaaS. Figure 2 provides a summary of results based on the in-depth interviews.
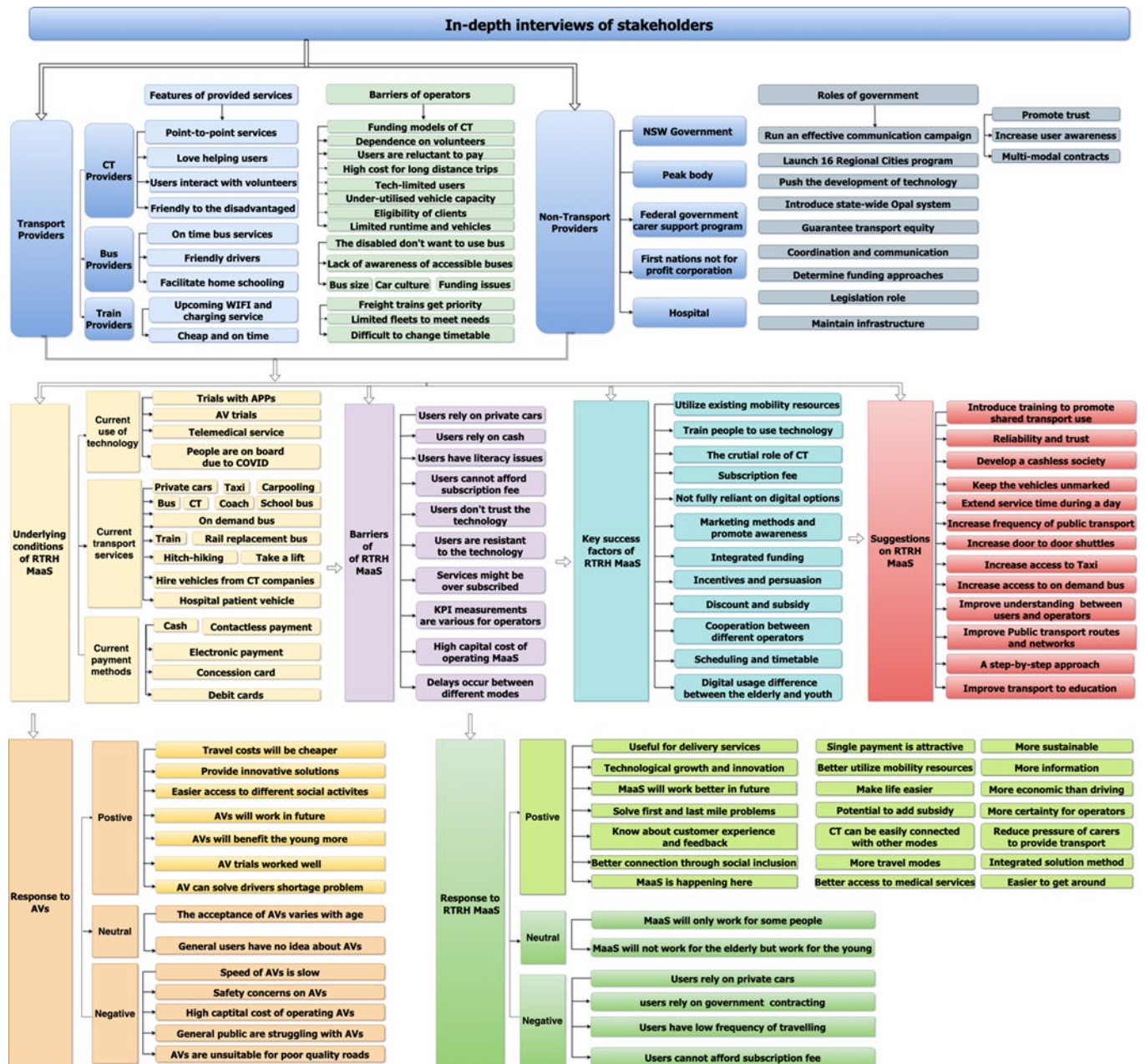
Figure 2: Summary of results obtained from the in-depth interviews

3.3.1 Underlying conditions of mobility services in rural and regional areas

To design a feasible and practical MaaS blueprint, it is relevant to establish the status quo or baseline of the current mobility services in the area of interest, e.g., features of current public and shared transport provision, current availability and use of technology, current payment methods, and means by which available mobility services are communicated to prospective users.

This section provides a summary of the current features of common transport services such as CT, bus, train, taxi services in the RTRH; the current conditions which influence the potential for integrated mobility services (including the role of technology and the impact of COVID-19); and observations on the current role of technology in supporting transport services.

Current mobility services available
Current transport modes and available services reported by interviewees include 'Private car', 'On-demand mini bus', 'Taxi', 'Bicycle', 'Bus', 'Carpool', 'Train', 'Rail replacement bus', 'Ridesharing', 'School bus', 'Club bus', 'Passenger coach services', 'Community transport (CT)', 'Hitch-hiking', 'Take a lift', and 'Hospital patient Vehicle'.

• Features of Community Transport (CT) services
Community transport (CT) operators tended to view their service as a near perfect complement to the existing transport services in terms of connectivity, flexibility, customised fleet and customer awareness. Further, CT companies provide a wide range of opportunities for social activities such as going out for lunch, bingo, or morning tea, which improve the social inclusion of people living in the community. Some of the views conformed with previous studies that CT services have great social impact on the local communities (Mulley and Nelson, 2012). It was evident that CT companies often have good partnerships with various other related organizations (I07[1]).

As mentioned by I14, CT providers often have smaller vehicles that are better suited to navigating narrow streets and challenging road conditions. This can make transport more accessible and convenient for users, especially those who live in areas where larger vehicles are unable to reach. In addition, CT providers often have good local knowledge of the communities they serve, which can be invaluable in providing transport services that are tailored to the needs of users. This can include knowledge of local road conditions, traffic patterns, and the availability of public transport services, which can help ensure that CT services are safe, reliable, and effective in meeting the mobility needs of users (I03).

Findings from the interviews suggested that relying on volunteers could be a two-edged sword. On the one hand, volunteers are considered as one of the strengths of the CT sector since they are motivated to help people and thus can improve the service quality, especially for the disadvantaged. Volunteers enjoy helping people and are friendly to the users, and they like interacting with the users. One CT operator mentioned that one of the reasons why the clients enjoy using CT services is that they have drivers who are not too dissimilar in age and enjoy interacting with clients:

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[1] Interviewees are referred to by their participant codes (e.g I07 is interviewee 7), see Table 2.

I15 (CT service provider): "*So having that volunteer input actually gives us such an advantage in this competitive industry. We've got drivers out there who are doing it because they genuinely love doing what they do for our organisation, we're all about partnering, we're all about sharing...*"

On the other hand, relying on volunteers brings challenges to CT, such as the driver shortage and uncertainty and constraints of volunteers' working time, and thus there is the potential to waste mobility resources and reduce the capacity to deliver more services. This was illustrated by the following complementary comments from two interviewees in the CT and public transport sectors respectively (I03 and I11).

I03 (CT service provider): "*Having the volunteers means that creates a real barrier to us because it means we are completely reliant on where the volunteers wish to work...*"

I11 (Transport authority): "*The Community Transport model is based on volunteer drivers, so they are reduced in their capacity to deliver, depending on volunteer workers… they won't be able to deliver because of that and they can't do weekends and out of hours.*"

• Features of conventional bus services
Conventional fixed route bus services give users visibility of the service. Since the bus has a regular schedule and routes, users can make their plans beforehand with a good degree of certainty. Operators appreciate the changes in regulations relating to pick-up locations by allowing passengers to hail a bus.

I09 (Bus service provider): "*I think the beauty of public transport in general is that they know the bus is coming at a certain time, they can do what they need to do, go to the shops, go to the doctor and whatsoever and then they know that bus is going to be there again at whatever time it is that is required, and they can structure their day that way.*"

• Features of on-demand bus services
On demand services are now more common (Nelson and Wright, 2021) and all seven of the NSW Government's remaining On Demand pilot services in rural and regional NSW were made permanent from 1 July 2022. Operators typically use minibuses in providing on-demand services in rural areas which is more suitable given the demand and road characteristics:

I09 (Bus service provider): "*Our business is called B-Connex and we did that because that's the phone number 13 B-Connex. So it didn't really change, but now we're seeing an increase in the number of people. They are really intrigued by it and it's the reason why we've been awarded a contract in that particular area, so that was a successful trial.*"

• Features of train services
Train services run to a fixed time schedule and offer discounts to concessional card holders. Taking a train is comfortable compared to other modes (although they can be a challenge to access for mobility impaired travellers) and may be used as part of a longer trip which may begin in the local area using a feeder mode. Train operators perceive their value additions in areas like concessionary travel, consistency of service, and facilities like charging and Wi-Fi.

I10 (Train service provider): *"So we have a consistency of service offering. We have price advantageous, especially for your concessional card holders, the retiree type tickets, and people who are on the pension cards. We're going through the process of upgrading….. to enable things like wi-fi and charging for mobile phones and things like that."*

• Features of taxi services
There are almost no taxi services available in some rural areas, for example, it was mentioned that Wellington (near Dubbo) has lost their taxi service and there is no taxi in Gilgandra. Respondents who spoke about lack of service availability for regular public services also commented on the lack of taxis. However other alternatives that are prevalent in more urbanised areas such as carshare and ride-sourcing were also rarely mentioned because these services rely on greater density/demand than can be offered in many rural areas.

I05: *"I come from Gilgandra, we don't have a taxi, there is no taxi in town, the small town further up Gulargambone doesn't have a taxi, Coonamble has one and it's just a plain vehicle."*

Features of current integrated mobility services
Beyond the available travel modes mentioned above, the interviews investigated the potential of integrated mobility services to solve the current transport issues. There are several integrated transport services available in the selected locations, for example, 'connected bus and train services' and 'integrated CT and bus services'. Some interviewees were quite positive in their assessment of integrating train and bus services as illustrated by the following quotes from different transport service providers:

I08 (Bus service provider): *"If you get to Dubbo and you want to go to Broken Hill, Cobar, you jump on a bus. There are six buses that sit at the station at Dubbo, a train comes in people get on their buses and the buses go."*

Other than conventional bus services, 'private bus services' (like a shuttle or limousine service) offering a flexible and reliable service to users could be used to connect with other public transport services. For example, an interviewee indicated that a private bus line could connect with train services to provide an easier access to the hospital, while noting that the fees are higher than the regular bus services:

I06 (Non-Transport provider): *"If you have got to go to hospital in Sydney and you don't have transport, you would then have to catch a train down to Bomaderry and from here you would have to access a private bus line. There are some bus lanes, bus routes where you are paying for a normal private fee, not like a bus ticket."*

However, other interviewees identified the challenges of integrating different services and indicated that not all stakeholders are willing to co-operate with each other. For example, a CT service provider (I03) indicated that *"it's just proven too hard to get different organisations with different priorities and different resourcing levels to be able to put that together."* Another CT service provider (I15) indicated that the bus service providers are not willing to co-operate with them due to the fear of losing market share.

• Other services that emerged from the COVID-19 pandemic
The COVID-19 pandemic had a significant impact in rural areas (Nelson and Caulfield, 2022). For example, CT companies in Dubbo put plans on hold to better use their vehicle resources, through hiring out spare capacity. A CT service operator mentioned: *"we used to provide a fleet of buses available to hire and can cater for groups of 5 to 27 people, with several vehicles offering the latest in wheelchair accessibility."* This service seems to be attractive and useful and might create a win-win situation for both CT service providers and end users. However, another interviewee who has been involved in the CT hiring service project mentioned that these hiring services were hit hard by the outbreak of the COVID-19 pandemic, and hence there has been lack of further progress till now.

I05 (Hospital service provider): *"I was involved in a project where you could either hire a vehicle through Community Transport or have your support workers or family members become volunteer drivers so you could use that vehicle, unfortunately Covid suddenly interfered with it."*

Operators also diversified their activities to help the community by expanding their services to include delivery services. During the COVID pandemic, some transport providers started to provide additional parcel delivery services which could potentially become part of an integrated mobility offer. The following excerpt show how the transport service pandemic influenced services.

I12 (Bus service provider): *"When we had the Covid restrictions at the end of last year and when the schools were closed down, we provided the service not just here but across our whole network in the rural and regional where we would take the bus and the school packs for the school and transport them out to the residential locations where the students were living."*

Where practical, active transport ranks as high priority and improvement should be made for safe biking and walking infrastructure such as accessible footpaths, walkways. Lack of service availability is one aspect of the difficulties in moving around in rural areas. Access to services, and using active travel as an alternative are hindered by poor quality of basic infrastructure in terms of footpaths and bikeways as well as the distances involved, as illustrated by the following quotes:

I15 (CT service provider): *"Simple things like accessible footpaths and walkways are also a big part of this, but I live in a town that just sits a couple of kilometres on the outskirts of town but it's 100-kilometre zone. My kids can't ride to school and back independently because of the dangerous, it's Waterfall Way, so really dangerous stretch of road."*

• Overall features of current RTRH transport and implications for MaaS
Interviewees highlighted several reasons as to why there is low demand for public transport in regional and rural RTRH areas. I01 suggested that since the public transport services are unreliable, have long intervals between services, or do not adequately cover the areas where users live or work, then users may not feel confident in using these services. As a result, they may default back to using their own cars, which can further reduce the demand for public transport services, leading to lower patronage levels. This, in turn, can make it more difficult

for public transport providers to justify maintaining or improving these services, perpetuating the cycle of low usage and poor services.

In contrast to more urban areas, longer-distance public transport services that cross the region and can be accessed by a variety of modes can play a critical role in a MaaS framework (Mulley et al. 2023). Regional and rural MaaS should be seen as spatially diverse and able to deliver, as appropriate, mobility services beyond the boundary of a regional town. Indeed, one of the suggestions includes delivering services that are borderless and affordable (I01). It is observed that in many rural areas, the focus is often on providing transport services to connect communities with larger regional or urban centres, rather than providing intra-regional transport services (I03). An important component of the unmet mobility needs are long distance trips for medical appointments and the ability to travel long distances is extremely difficult for aged and mobility impaired travellers since they can't afford to get a door-to-door service over a long distance (I03, I05).

Advantage could be taken of the range of different vehicles that CT can provide including all wheel drives, small buses, and SUV, etc., CT could provide door-to-door services which will fit well within a multimodal framework by connecting with other transport providers and could accommodate various geographic conditions.

Current use of technology
Figure 3 compares the number of references for the 15 sub-codes in the 'Current use of technology' theme by interviewees with different locations and organization types. The top 3 technology applications mentioned are: 'Trials with Apps' (6 references), 'Autonomous vehicle (AV) trials' (5), and 'Connect up through local champion' (4), with the number of references from interviewees in Dubbo and from bus operators accounting for the largest proportion. The number of references mentioned under each sub-code indicates the significance of a sub-theme. Of relevance, there have been several trials with Apps and AVs conducted, which will pave a way for the implementation of MaaS trials and these are referenced below.
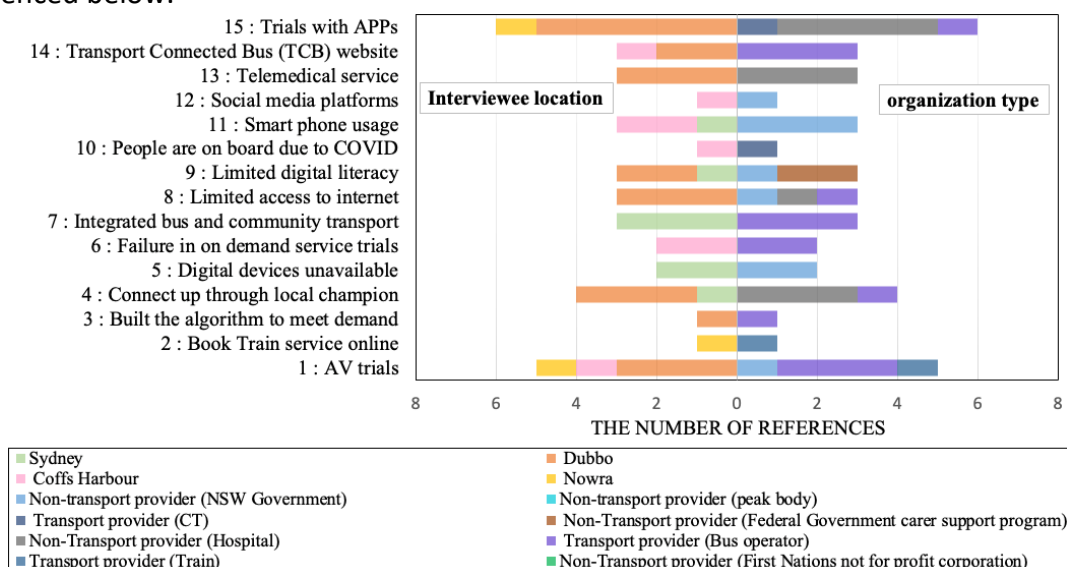
Note: The number of references made indicates the significance of a sub-code.

Figure 3: Current use of technology

• Trials with Apps

There are several popular multi-modal mobility Apps reported by the interviewees. These include:

1) Routematch[2]: The platform integrates various modes of transport, including buses, trains, and ride-hailing services, to create a seamless, integrated transport network.

2) Rome2rio[3]: The platform allows users to compare options for flights, trains, buses, car rentals, and ride-sharing services, and provides detailed information on each option, including schedules, prices, and travel times.

3) RollCall[4]: The platform leverages GPS and other tracking technologies to provide real-time updates on the location and status of vehicles, assets, and personnel, as well as information on traffic conditions, weather, and other factors that can impact operations.

4) Rydo[5] The platform integrates with various transport providers and services, including courier and delivery companies, to provide businesses with real-time information on the status of their deliveries.

5) Liftango[6]: Offerings include carpool management, ride-sharing management, and shuttle bus management tools.

• Autonomous vehicle (AV) trials

Transport for NSW has partnered with industry, researchers, local councils and businesses to develop and co-deliver Automated Ride Share trials in Dubbo, Coffs Harbour and Armidale. The trials focus on customer mobility use cases and the benefits and challenges involved in introducing AV technology to regional NSW. Different 'AV trials' were mentioned several times by different interviewees from Dubbo (I08, I09, I11), Nowra (I06), and Coffs Harbour (I12), e.g., an AV trial from Wilcannia to Dubbo (Project UTE), an autonomous bus service trial in Coffs Harbour[7], an autonomous UTE trial from the airport to the zoo in Dubbo[8], and the Armidale Regional Driverless Initiative (ARDi)[9].

• Connect up through a local champion

Although different types of technology have been developed and used in rural areas, some users are still resistant to the technology. To overcome technology use barriers a local champion, a trustworthy person with good technology and communication capacity, plays a significant role in the local communities to facilitate people to connect up and start with the technology, as noted by the following interviewee:

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[2] https://www.routematch.com/
[3] https://www.rome2rio.com/
[4] https://rollcall.com.au/parents/
[5] https://www.rydo.com.au/
[6] https://www.liftango.com/
[7] https://www.busbot.com.au/
[8] https://www.nsw.gov.au/media-releases/smart-driving-utes
[9] https://www.transport.nsw.gov.au/data-and-research/future-mobility/our-projects/automated-shuttle-trials/armidale-regional#:~:text=ARDi%20is%20a%20collaborative%20partnership,months%20from%202019%20to%202020.

I05: "*What we have done is connected them up with, so they have gone out and lined things up when we are out there so ideally it would be great to have a local champion tap into. Again, you've got to put the work in to make that happen*."

• People are on board due to COVID-19
Several interviewees mentioned that the widespread use of QR codes during the COVID-19 pandemic has led many people to become more familiar and comfortable with using technology, particularly their mobile phones. QR codes have contributed to an increased adoption of technology, as people are becoming more comfortable with using their mobile devices to access information and perform various tasks (I05, I15).

Current payment methods
Figure 4 compares the number of references for the 9 sub-codes in the 'Current payment methods' theme between interviewees with different locations and organization types. The top 3 payment methods are: 'Cash' (11), 'Contactless payment' (7), and 'Opal card' (5), with the greatest number of references from interviewees in Dubbo and from bus operators.
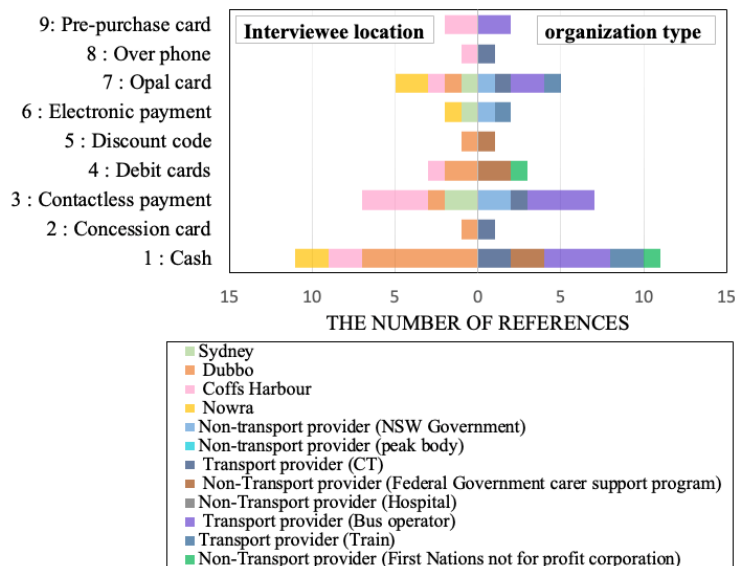
Note: The number of references made indicates the significance of a sub-code.
Figure 4: Current payment methods

It was mentioned that cash has been the dominant payment method prior to COVID, especially for CT, however, users have become more inclined to use contactless payment and Opal card (smart card), where available, is convenient for users as well:

I12 (Bus service provider): *"Prior to Covid we were seeing a mixture of both and again change, introduction, a lot of our passengers were of the elderly and a lot of them didn't have debit cards. With Covid they'd come along and then we would go, everyone would start saying, well we are not taking cash, not handling cash [] for both the safety of the passengers, the drivers and also our staff counting the money."*

It was mentioned that more and more users have identified the advantages and convenience of cashless payment methods and thus will transfer from cash to cashless payment. The change of payment method could be beneficial for MaaS in future.

Current means to know about available mobility services

Figure 5 compares the number of references for the 7 sub-codes 'Means to know available services' theme between interviewees with different locations and organization types. The top 3 mentioned are: 'Word by mouth' (3), 'Search internet' (3), and 'Make a phone call' (2), with the number of references from interviewees in Coffs Harbour and NSW Government accounting for the largest proportion. It can be seen that most of the current means require users to take the initiative to acquire the information, indicating that current transport services in rural areas suffer from lack of marketing. In the future, services could be advertised through newspapers, social media platform (e.g., Facebook and Twitter) and streaming media platforms such as Ticktock, which could play a bigger role, to raise users' awareness of available services.
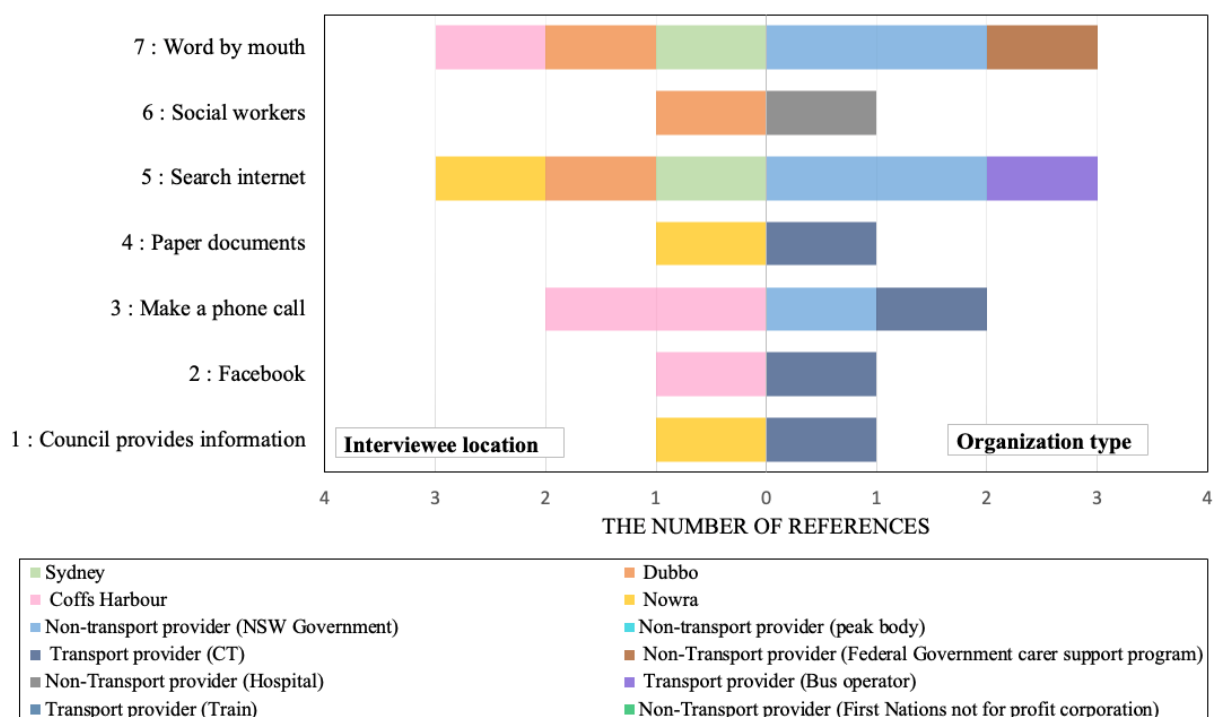
Note: The number of references made indicates the significance of a sub-code.

Figure 5: Means to know available services

3.3.2 Barriers to meeting mobility needs of the general public

There were 17 barriers to meeting travel needs as reported by the interviewees (Figure 6). The most significant barriers to meeting needs identified by interviewees are 'access issues' (38), 'difficult to serve rural hinterland' (22), 'strict contractual obligations' (18), and 'first and last mile issues' (16).
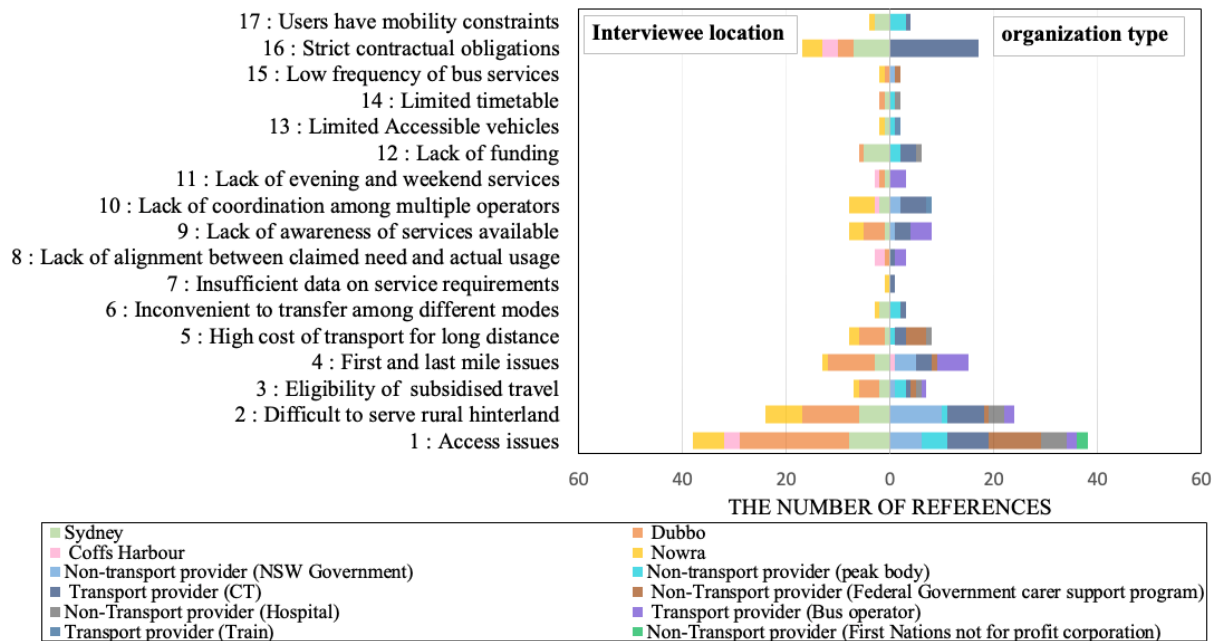
Figure 6: Barriers to meeting travel needs

Access issues
The top 'Access issues' can be divided into the following five categories: access to medical services (14), access to surroundings (8), need help of others (5), lack of footpaths (4), access to bus stop (4).

• Access to medical services
It is an on-going issue that people in rural areas may miss important medical appointments and face higher death rates due to transport issues and financial barriers. The limited availability of transport options, such as only having buses running on Mondays, Wednesdays, and Fridays, also makes it difficult for people to schedule appointments and access medical care (I01, I02 and I11). Interviewees emphasized the cost barrier in accessing medical care in a different town, mentioning that the cost of fuel, meals, and overnight stay can add up, making it difficult for people to make the trips necessary for their medical appointments. As a result, some people are not able to receive the medical care they need and are forced to decline necessary medical care due to the financial burden (I04, I05 and I06). Access to healthcare should be a basic right for everyone, regardless of their location or financial situation. It is important for organizations and governments to work towards improving healthcare access and addressing these disparities (I05, I07).

• Access to surroundings
Limited access to transport in rural areas can have a significant impact on many aspects of life, including access to employment training, healthcare services, and specialized care. This can lead to a lack of opportunities and a decline in the overall quality of life for residents of rural areas (I05, I06). The lack of access to essential services and opportunities in rural areas can drive people to seek them in metropolitan areas. This can result in added stress and expenses

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for people who have to travel long distances and incur transport costs to access basic services (I02). The inability to access necessary medical care or travel to other areas for social and cultural activities can create a sense of isolation and limit opportunities for residents. Improving transport options and infrastructure in rural areas can help address these social and health disparities and improve the quality of life for residents (I16). Limited access to transport can prevent children from participating in after-school activities and hinder their ability to attend training and work. Improving transport options and infrastructure can help increase access to opportunities for young people and improve their overall quality of life (I11).

• Need help of others
Leveraging the support of community members, such as neighbours, friends, and family, can be an effective way to improve transport options in rural areas. Encouraging volunteer drivers to provide transport for those in need, for example, can help fill the gap and provide more accessible and affordable transport options. This kind of community-based solution can also foster a sense of community and support among residents, which can have a positive impact on the overall quality of life in rural areas (I04, I05). However, being dependent on others for transport can be challenging for individuals who value their independence and could lead to feelings of frustration and helplessness. When relying on others for transport, individuals may have limited options in terms of the places they can go, the times they can travel, and the modes of transport available (I06, I07).

• Lack of footpaths
Lack of infrastructure, such as footpaths makes it difficult for people to get to the bus stop and also makes it more difficult to implement new mobility solutions, such as eBikes and eScooters, which are increasingly common in urban areas. This barrier to accessing transport limits the transport options available to people and is a significant disadvantage (I01, I09).

• Access to bus stop
People may have to walk for a kilometre to reach the nearest bus stop, and that presents a barrier for those who have mobility issues. It can be difficult for them to access the bus, which may be the only means of transport available in the area (I09). To address this issue, solutions such as building or relocating bus stops closer to populated areas or improving pedestrian access to bus stops, such as building footpaths, can be considered.

Difficult to serve rural hinterland
The reasons why it is difficult to serve rural hinterland reported by interviewees are 'sparse services' (14), 'long distance with low passenger volume' (6), and 'diverse needs between areas' (2).

• Sparse services
Limited transport services in rural and remote areas make it difficult for people to find a way to get around, sometimes leaving them stranded (I01). The remote and scattered nature of the population makes it challenging to provide transport services in these areas (I17). Additionally, the cost of building and maintaining infrastructure can also be a barrier. There are areas with a limited number of wheelchair accessible vehicles, but many people in rural

areas or small villages don't have access to those services (I05). The availability of taxis in rural areas can be limited, with only 1 ~ 3 taxis available, and all of them may already be in use (I01, I02, I05). There are no bus services that directly connect to the airport, regardless of the time of day in Dubbo (I07). The lack of mobility services in rural hinterlands is likely due to a few factors including low population density, long distances, and limited infrastructure and resources. In these areas, mobility services may not be economically viable for private transport companies to operate, and public transport services such as bus may be limited or non-existent.

• Long distance with low passenger volume
A further issue in rural areas is the long distances between centres. This requires a lot of overlapping services, which may not have high patronage, to provide full network coverage. The lack of public transport in rural areas makes it difficult for people to access important services such as medical appointments, employment and training opportunities, and specialists (I01, I03).

Private transport services, which are the only option in many cases, are focused on making a profit rather than meeting the needs of the community, which exacerbates the problem. The situation is further complicated by the large distances between cities and the lack of public transport options, making it difficult for people, especially older persons, to travel long distances. However, due to a lack of services or long intervals between services and the unreliability of service, as well as lack of opportunities to access them. customers don't use public transport and instead revert to using their cars (I05, I08).

• Diverse needs between areas
There can be significant differences in the travel demands of people living in different regions, rural areas, and cities, which can pose challenges for transport providers and operators in meeting those needs effectively. These differences can be related to various factors such as demographics, local economic conditions, infrastructure, and cultural differences. To address these challenges, transport providers need to take a tailored approach that considers the specific needs and characteristics of each region or area they serve (I01, I04).

Complex contractual obligations
Interviewees expressed conflicting views on funding for CT. On the one hand, some interviewees acknowledge the need for funding to support the asset-intensive nature of transport services (I15), but on the other hand, other interviewees express concern about relying on funding from a single source and the sustainability of that funding over the long term (I03, I07, I17). This is a common challenge in the CT sector, as adequate funding is critical to ensuring the continued provision of vital services but finding a sustainable and diversified funding model can be difficult.

Funding for CT can come from a variety of sources and departments, and it can be difficult to navigate the different funding streams and requirements. As I15 mentioned, much of the funding for CT comes from Transport for New South Wales, which receives funding from the Department of Health. This can lead to a complex web of funding sources and requirements, making it challenging for organizations to secure the funding they need to operate effectively.

Additionally, different departments may have different goals and priorities, which can impact the amount and type of funding available.

I17 mentioned that a focus on community-based outcomes for transport shows a recognition of the importance of working together to achieve shared goals. Interviewee I07 mentioned that NDIS transport can be challenging, but the fee-for-service model offers a solution for transport providers to deliver services to people with disabilities. In this model, the transport services are subsidized for both the participant and the provider, and the transport provider is able to receive the full cost of the service. This approach allows for the expansion of services and the utilization of resources more efficiently, making the transport service financially viable.

It is common for public transport to be subsidized, as I08 mentioned, and not designed to generate a profit. CT is breaking into the market through brokering and aggregation in areas such as the NDIS Home Care Package and aged care, which are underserved in terms of transport. This shows an opportunity for CT to fill a gap in the market. While Transport for New South Wales may not have full visibility into this aspect of the market, there is potential for collaboration and co-operation between the two organizations to provide comprehensive and effective transport services to those who need it.

CT providers currently operate as a point-to-point service, similar to a taxi service, but the vehicles are owned by Transport New South Wales and have priority usage. This creates a tension in scheduling and the providers are not able to operate like a normal business where trips are booked. The rules in place inhibit the use of a taxi-like service (I15). Moreover, I17 mentioned that CT is under different arrangements when it comes to invoicing and payment. Some providers invoice the clients, while others invoice the package provider, who combines the subsidy and the client contribution. The payment process varies based on the type of brokerage service being provided and the service provider. Under the Commonwealth Home Support Programme (CHSP), the client is responsible for paying for the transport, but the transport must be delivered regardless of the ability to pay. However, in rural areas of western New South Wales, the client contribution can sometimes be unaffordable.

Interviewee I03 mentioned that funding for community aged care currently comes from CHSP and is being transferred to Home Care Package providers. The new funding model, called Supported Homes, is a market-based approach that combines the previous funding models into a new system which is similar to the Medicare or NDIS. The shift towards fee-for-service models means that CT providers will only get paid for the trips they provide, instead of block funding. This creates a direct link between the trips provided and the payment received, but also means that if no trips are provided, then no payment will be received. Interviewee I01 suggests that if a market-based model is implemented, it means that the service providers will be paid for the services they provide, and the focus will shift towards providing high-quality and efficient services. However, I17 argued that it is challenging to receive payments from CT users due to their low socio-economic status.

3.3.3 Barriers to meeting mobility needs of disabled persons

Figure 7 summarizes 15 constraints to getting out faced by disabled persons reported by interviewees, among which 'Carers cannot use subsidized transport' (5), 'Ineligibility for CT services' (5), and 'Limited accessible public transport' (5) were most mentioned by interviewees based in Sydney and non-transport provider (peak body).
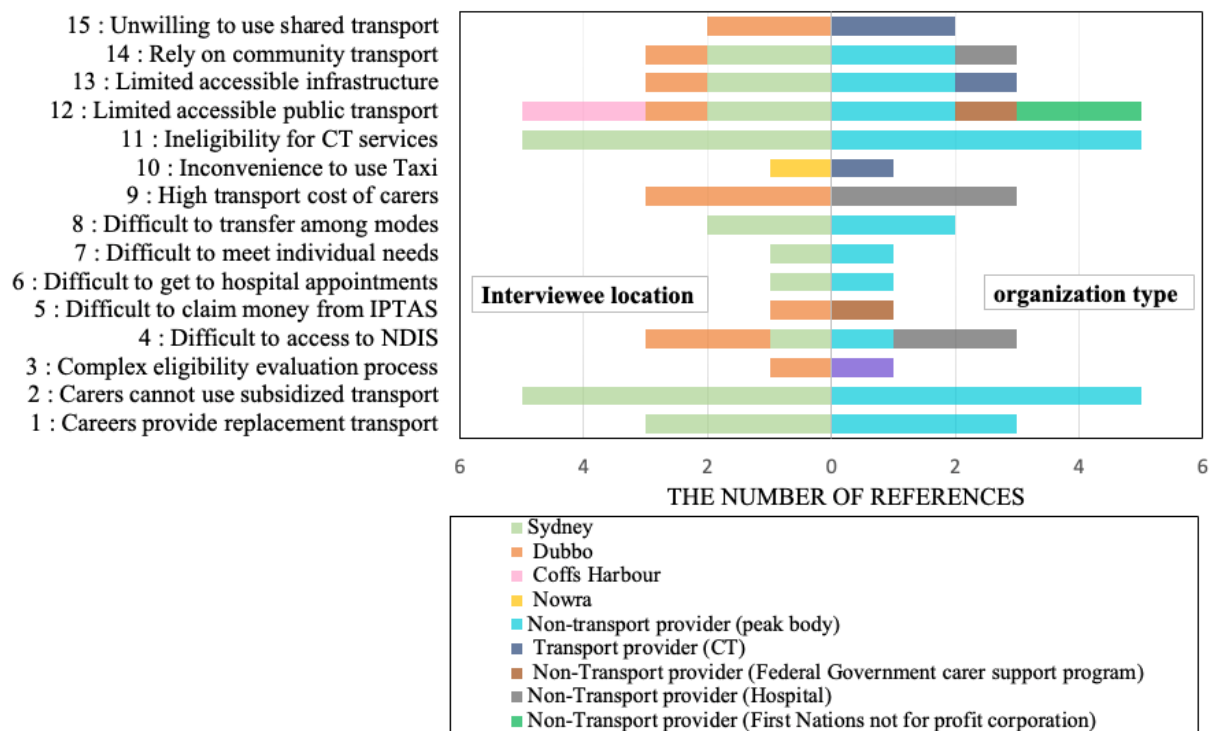
Note: The number of references made indicates the significance of a sub-code.

Figure 7:Barriers to meeting travel needs of disabled persons

Carers cannot use subsidized transport

Several interviewees mentioned that even though carers of individuals with disabilities play a crucial role in providing care for their loved one, these carers do not always meet the eligibility requirements for government assistance programmes, which adds to the expenses and challenges they face in caring for their loved one (I02, I04). This could lead to financial strain and difficulty in providing adequate care. It is important for governments to assess and address these barriers, and to provide support and resources for caregivers who are essential in providing care for those in need.

Ineligibility for CT services

Except for carers, other vulnerable groups, such as young people with a chronic health condition cannot use CT for health appointments since they don't qualify for the NDIS and IPTAS (I07). Moreover, people with other trip purpose such as work, training and schooling cannot use CT, which brings more challenges for disabled persons (I11, I17). It is necessary to expand the eligibility criteria for CT services to include more people, such as those with a chronic health condition or those who need transport for work, training, or schooling, or provide alternative transport options for disabled persons who are not eligible for CT services.

Limited accessible public transport

Improving public transport to make it more accessible and user-friendly benefits not just disabled persons and their careers, but also parents with young children, travellers with prams and buggies, and anyone who uses a wheelchair or mobility aid. An accessible public transport system can improve the quality of life for people in the community, making it easier for them to get around, access services, and participate in daily activities (I02). Accessible vehicles and public transport infrastructure with built-in features to accommodate the disabled and mobility impaired is an important step in creating a more inclusive and accessible society. There has been progress in this area in recent years, with many cities and transport providers investing in accessible vehicles and infrastructure. However, there is still much work to be done to ensure that everyone has equal access to transport, regardless of their abilities (I04, I16). In addition to the benefits for individuals, accessible public transport can also have a positive impact on the wider community by making it easier for people to visit friends and family, attend community events, and participate in leisure activities. Therefore, investment in accessible public transport contributes to a more inclusive and equitable society for everyone.

3.3.4 Barriers for Transport service providers

Barriers to transport provision faced by different transport service providers in the three locations are discussed below.

Barriers of CT operators

Figure 8 shows 16 barriers identified by CT operators. 'Funding models of CT' (22), 'dependence on volunteers' (18), and 'Users are reluctant to pay' (10) are mentioned most by the interviewees who work in Sydney, Dubbo, and Coffs Harbour, respectively.
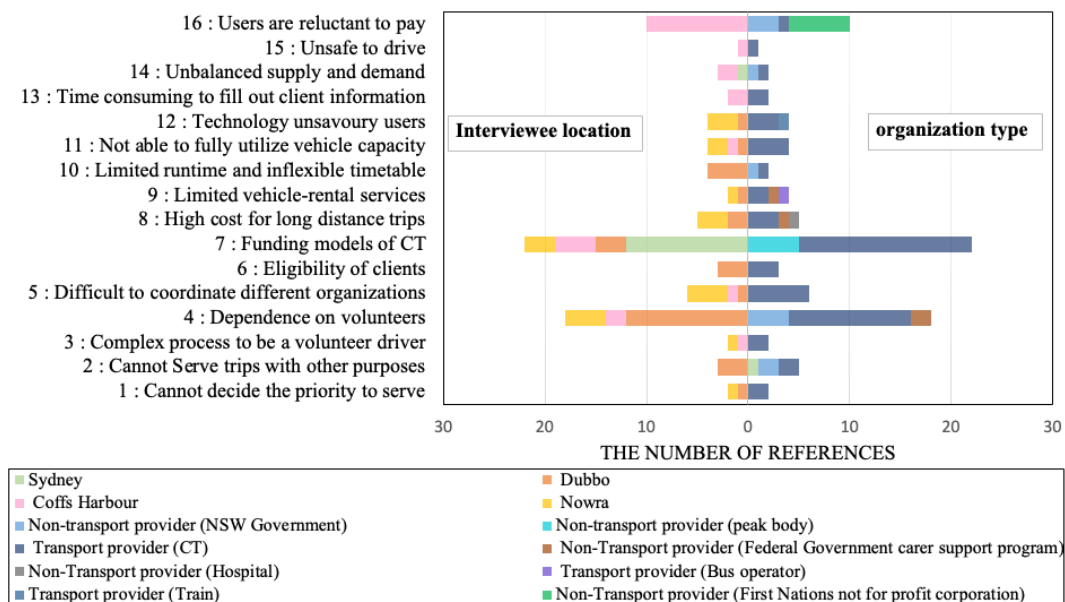
Note: The number of references made indicates the significance of a sub-code.

Figure 8: Barriers of CT operators

• Funding models of Community Transport

Transport for NSW provides funding to community transport operators to provide services under three government programmes; the Commonwealth Home Support Program (CHSP)[10], the Community Transport Program (CTP)[11] and NSW Health's Non-Government Organisations (NGO) Grants Program[12].

During the interviews CT providers argued that the shift in the funding to individualised models caused less funding for vehicles to provide CT. Further, existing funding models seemed to be complex with indirect funding paths such as funding for CT is from Department of Health, but it is distributed by Transport for New South Wales to CT operators, and it was felt to be operated in a roundabout way. This complexity improves with the changes in the eligibility of using CT and charging users. The brokerage arrangements can also change based on the operator's discretion:

I17 (CT provider): "*Some will collect the client contribution separately to the client and just collect the NDIS subsidised or NDIA subsidised portion. As for clients who do homecare packages, the client contribution is paid to the package provider, so the operator will just invoice the package provider for the full cost of the transport. For CHSP you invoice, the client individually they are mandated to deliver the transport regardless of whether the person can pay or not.*"

• Dependence on volunteers
CT relies heavily on volunteers and this has both advantages and disadvantages as mentioned in section 3.3.1. CT providers particularly highlight the issues relating to labour supply. Transport Authorities agreed with this view as people are largely occupied until they retire.

I07 (CT operator): "*we are not being inundated with the people that we were before, now people work in their normal jobs. It's harder to get people to do free things because the cost of living is going up, and time is money.*"

CT operators find that some volunteers won't be able to work on weekends and out of hours since those are typically family times and time for friends and socialising. Therefore, CT operators have to reduce their service capacity to deliver. Further, they commented that it would be much easier for them to manage bookings if they have a schedule of their current staff as it saves a lot of manual handling. Some CT operators suggested that they could negotiate working hours if they could employ paid staff even though this raises concerns

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[10] CHSP provides funding for older eligible individuals and is aimed at supporting individuals in staying independent and in their own home for longer. This funding is for the provision of community transport services via community transport providers. Assessment for eligibility to receive CHSP support is managed by My Aged Care.

[11] CTP assists individuals who are transport disadvantaged owing to physical, social, cultural and / or geographic factors. Individuals who do not qualify for other support programs may be eligible for community transport. CTP is funded by the NSW Government and aims to address transport disadvantage at the local level via community transport organisations.

[12] The NGO Grants Program supports the provision of non-emergency health-related transport programs that enhance access to health care by catering for the travel needs of people who are transport-disadvantaged. Transport for NSW administers the contract management of the NGO Grants Program (on behalf of NSW Health) for community transport organisations that hold a Community Transport Service Contract.

about their profitability. The Transport Authority perspective doubted the benefits of hiring staff due to legislative and sustainability concerns.

I11 (Transport authority officer): "*although some CT operators have started to hire drivers in some communities, but it's 20 hours a week which then verges on under employment and in communities where they rely heavily on government assistance, sometimes it's not even worth to get out of the government assistance to work because it's the same amount of money...*"

• Users are reluctant to pay
The majority of those who live in rural areas are non-employed or in some cases the entire household is dependent on one person's income. Most of the CT operators favoured the view of providing a free service emphasising on the need to prevent social exclusion. A government carer support programme manager suggested that getting from A to B is a user's basic need whatever the circumstance is, and it should be guaranteed by the government.

Barriers of Bus operators
Figure 9 compares the number of references for the 7 sub-codes in the 'barriers of Bus operators' theme. Of these, 'car culture' (8), 'lack of awareness of accessible buses' (7), and 'lack of connections with other operators' (4) are most mentioned by the interviewees who worked in Sydney.
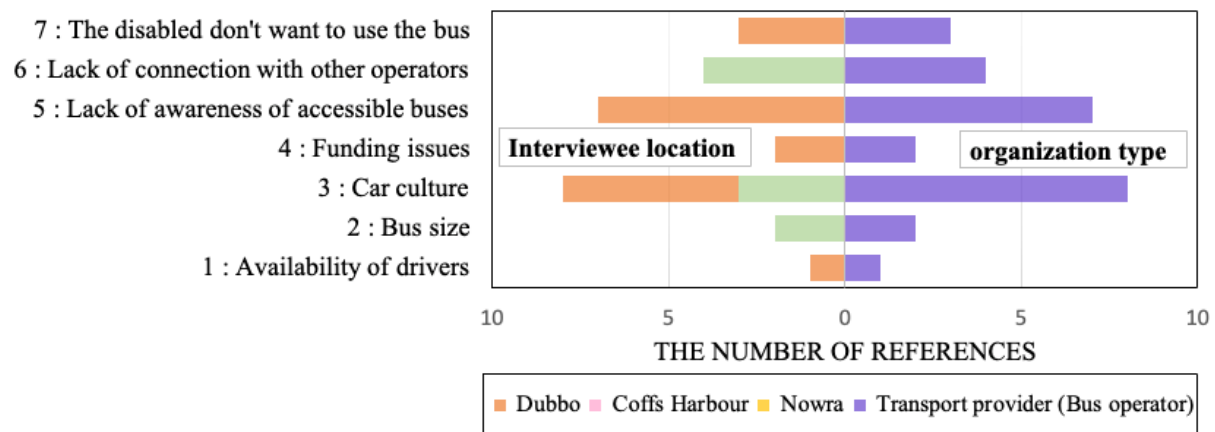
Note: The number of references made indicates the significance of a sub-code.

Figure 9: Barriers of CT operators

• Car culture
There are several reasons why there is low demand on public transport. Since there are a lack of available mobility services in rural areas, people have gradually lost their trust in the reliability of bus services cars. A bus operator (I08) mentioned that it is difficult for users to give up cars and start taking buses:

I08 (**Bus operator**): *"The culture of cars that would be hard to replace, and you will find that it ends up feeding in on itself that well I don't want to catch a bus because it's running late because it's caught in traffic. Well, that's because you like driving a car…"*

To take more market share from private cars, a bus operator (I12) mentioned that they ran a route past the beach areas and provided access and availability to carry things like surfboards on the buses. *"As people have access to a car, they will never catch a bus anymore. And only high petrol prices will make them think about that."*

• Lack of awareness of accessible buses
Several bus operators (I08, I09, I12) indicated that there is a perception gap about the accessibility of current bus services. When disabled users complained about the accessibility of buses a bus operator (I09) explained how they dealt with this situation:
I09 (**Bus operator**): *"After I heard that, I went to a lot of the aged care facilities and brought a bus and showed them, look this is our bus, don't be scared to catch our bus, you can get on, and we go through and train them through the whole process in case they are worried."*

• Lack of connections with other operators
Bus services often lack connections with other public transport providers such as rail and CT. This makes it difficult for users to complete a multi-modal trip. A bus operator (I12) commented: *"In Coffs Harbour, we have two main terminus, departure points, so there is that bus interchange that does occur. But the bus services are not scheduled and timetabled. Therefore, it is difficult to connect with other public transport network such as rails."*

It is expected that the Transport Connected Bus (TCB) App will play a significant role in connecting bus services with other public transport services by allowing customers to plan bus trips and make better informed decisions. The TCB program[13] will provide regional bus customers the information they need to make more informed travel choices; allow customers to use websites and apps to plan their journeys, and via real-time information know when buses will arrive and how full they are; and provide regional bus operators with the right tools to connect with customers, manage operations and keep services running on time.

Barriers of Train operators
The barriers of train operators are summarized in Figure 10 with 3 major barriers identified: 'freight trains get priority' (3), 'difficult to change timetables' (2) and 'availability of fleets to meet needs' (2).

In the case of regional trains freight trains often have priority over passenger trains. For example:

I10 (Train operator): *"For example, we could see that customers wanted to go between Dubbo and Lithgow at 12 o'clock, there might actually be a route of freight services on that time so we would have to work around those things, we would have to engage with those operators and see if they can shift their times, but it's not a simple thing."*

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[13] The Transport Connected Bus (TCB) Program is delivering state-of-the-art vehicle tracking and automatic passenger counting technology across contracted buses in rural and regional NSW. The TCB Program is being rolled out across regional NSW in phases in Bega, Dubbo and Coffs Harbour, etc. https://www.transport.nsw.gov.au/projects/current-projects/transport-connected-bus-program

It was also mentioned that the availability of fleet to meet customer's needs is also an operation barrier. Train operators have been receiving advice on possible changes to coach timetables as well as train timetables to connect with the other modes. However, they have lost the control of timetables:

I10 (Train operator): "*In terms of timetables, we have probably lost some of the control we may have had previously as an operator. The reason for this is that the regional and metropolitan timetabling teams may consider all modes and decide, well, if we make this change, it might better connect with the other modes.*"
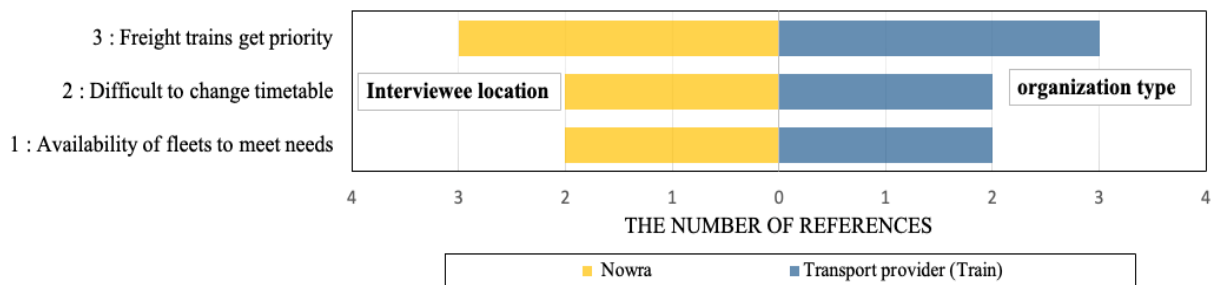
Note: The number of references made indicates the significance of a sub-code.

Figure 10: Barriers of train operators

3.3.5 Barriers to transport in the Aboriginal community

Barriers to transport in the Aboriginal community as reported by interviewees in different locations and organization types have been summarized in Figure 11 with identified 20 barriers. 'Reliable Aboriginal workers' (14), 'Culturally sensitive' (14), and 'Not able to afford transport' (9) were mentioned most frequently by interviewees working in Coffs Harbour and non-transport providers (NSW Government and First Nations not for profit corporation), respectively.
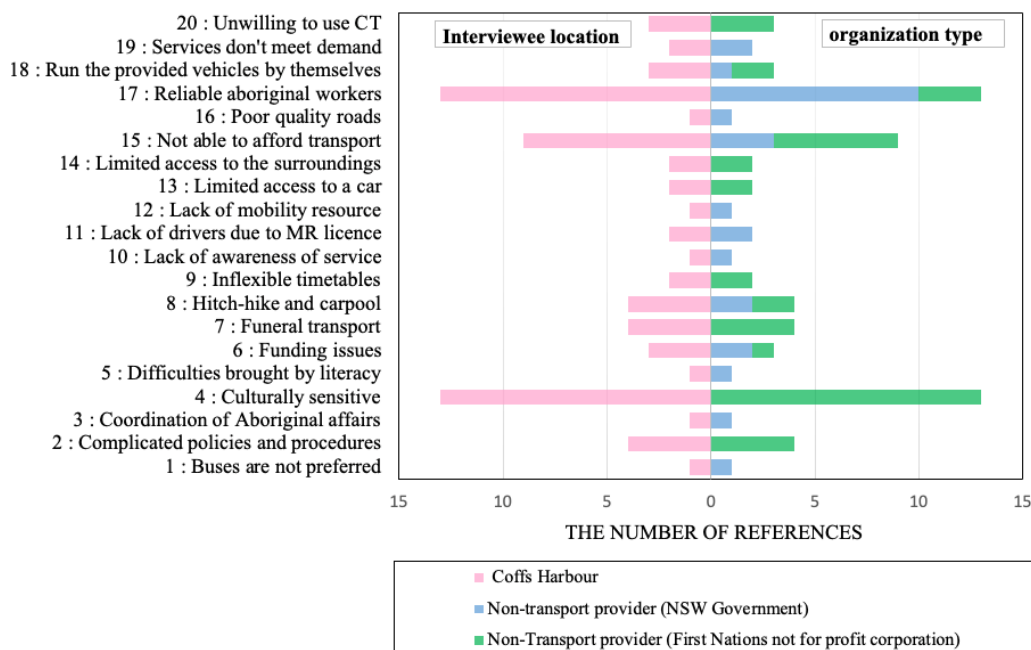
Note: The number of references made indicates the significance of a sub-code.

Figure 11: Barriers of Transport in the Aboriginal community

• Culturally sensitive

A non-transport provider working in a First Nations not for profit corporation (I16) mentioned that cultural sensitivity is important in Indigenous communities and that it's crucial to respect their cultural beliefs and practices when addressing their travel needs. This can help ensure a positive travel experience for Indigenous people and promote cultural understanding between different communities. A non-transport provider working in NSW government (I13) mentioned that incorporating Indigenous art and cultural elements can certainly enhance the appeal and accessibility of a travel website for Indigenous peoples. By showcasing their art, it helps to recognize and celebrate Indigenous culture and can create a sense of connection and comfort for Indigenous peoples. It also helps to promote cultural understanding and create a more inclusive environment. However, it's important to make sure that the art is used in a respectful and culturally appropriate manner, and with the consent of the artists and Indigenous communities.

In Indigenous communities, cultural connections and trust are often built through personal relationships and shared experiences. Interviewee I13 suggested that an outsider without prior connections to the community may find it difficult to engage with Indigenous peoples and build the level of trust needed to effectively address their travel needs. It's important to consider the cultural dynamics and practices of Indigenous communities and to involve individuals from these communities in decision-making processes that affect them. This can help to ensure that the needs and values of Indigenous peoples are taken into account and that their cultural heritage is respected.

• Reliable Aboriginal workers

Having Indigenous workers involved in addressing the travel needs of Indigenous communities can be a crucial factor in ensuring cultural sensitivity and respect. These workers will have an in-depth understanding of their own culture and values, as well as the cultural practices of other Indigenous communities. This can help to build trust and establish connections with Indigenous people and ensure that their needs and values are effectively addressed. Additionally, Indigenous workers can provide valuable insights and perspectives that can inform the development of culturally appropriate travel services. In short, the involvement of Indigenous workers can play a key role in promoting cultural understanding, sensitivity, and respect, and in creating a positive travel experience for Indigenous people.

I13: "*In Tweed where Uncle Dave[14] is, people utilise that service there, because he's been 20 years building up community's capacity to understand it and use it…. He's really supported by the organisation. The organisation values what he brings to the table. Community values what he's doing for them.*"

• Not able to afford transport

Affordability is a major challenge for many Indigenous peoples, including when it comes to accessing transport services. This can lead to difficulties in accessing essential services, such as healthcare and education, and can limit their ability to participate in economic and social activities.

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[14] Uncle David Wandin is a Wurundjeri Woi-wurrung Elder and Cultural Practices Manager at the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation. https://livingcitiesforum.org/dave-wandin.

Addressing these challenges can involve working with transport providers to find solutions that meet the needs of Indigenous communities, such as subsidized transport services or partnerships with local organizations to provide transport assistance. Addressing these challenges is essential for promoting equality and reducing barriers to access for Indigenous peoples.

I13: *If it was a free service, it would capture another portion of people. It wouldn't suit everybody, but it would increase the number of Aboriginal people that are using it, because the financial side to that is definitely a barrier around bus services.*

Interviewee I16 (Non-Transport provider) working in a First Nations not for profit corporation suggested that making a bus service free would likely increase usage among the Aboriginal population, as financial barriers would be removed. However, it's important to note that a free service may not be feasible or sustainable, and there may be other factors (such as the quality of the service, location, or cultural preferences) that still impact usage even if the service is free.

3.3.6 Barriers to implementing regional and rural MaaS

Figure 12 summarizes the 10 barriers to implementing MaaS reported by interviewees, among which 'Users are resistant to the technology' (16) and 'Users rely on private cars' (15) are most mentioned.
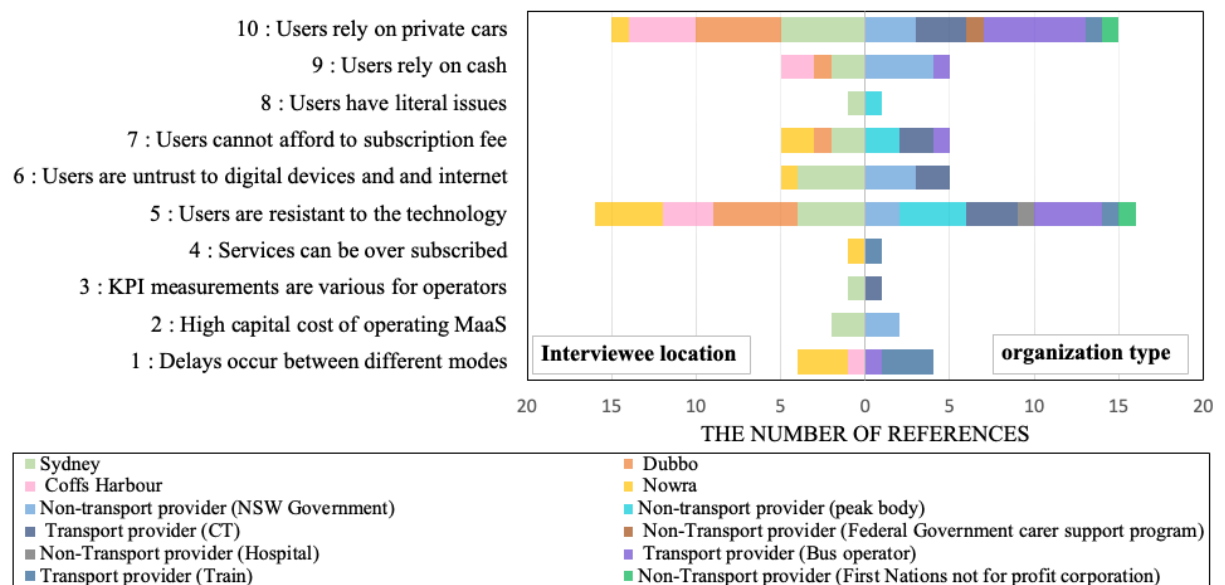
Note: The number of references made indicates the significance of a sub-code.

Figure 12: Barriers of the one-stop-shop solution

Users being resistant to technology and relying on private cars are significant barriers for several reasons: firstly, lack of familiarity: many people may not be familiar with MaaS or the technology that it relies on, such as mobile apps and real-time information systems (I08, I10). This can create resistance and reluctance to adopt these new tools and services. Secondly, comfort and convenience: private cars offer a level of comfort and convenience that many people are not willing to give up. For example, the ability to choose the exact route, destination, and departure time can make private cars a preferred option (I06, I07). Third, cost: private cars may be perceived as more cost-effective, especially for those who make

frequent or long-distance trips. Finally, habits and culture: in some communities, car ownership and use is deeply ingrained and seen as a status symbol. Changing these cultural attitudes and habits can be challenging (I02, I15).

Moreover, the barriers of paying a subscription fee can be a significant challenge in the implementation of MaaS. Figure 13 summarizes these barriers including lack of available services (7), lack of incentive (3), low frequency of travel (1), and low income (12). If the MaaS services available are limited or do not meet the needs of users, they may not be willing to pay a subscription fee for them (I01). For some users, the lack of tangible benefits or incentives for paying a subscription fee can make it difficult for them to justify the cost (I04). For users who only make occasional trips, paying a subscription fee may not be cost-effective, especially if the fee is not adjusted for infrequent use (I05). For those with low incomes, the cost of a subscription fee may be prohibitive, especially if they have limited disposable income (I12).
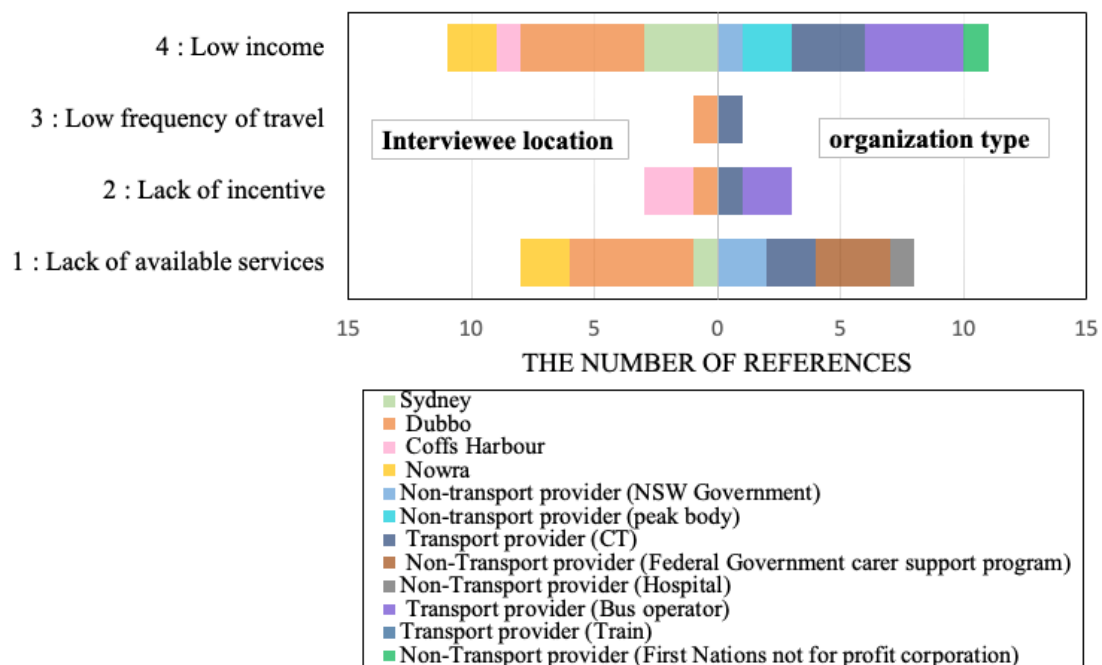
Note: The number of references made indicates the significance of a sub-code.

Figure 13: Barriers of paying subscription fee

3.3.7 Response to regional and rural MaaS
Interviewees provided both positive and negative responses to the concept of MaaS.

Positive response to RTRH MaaS
As shown in Figure 14, the responses to MaaS have been classified into three categories, i.e., positive, neutral, and negative, which are distributed equally between Transport providers and non-transport providers. Moreover, the number of positive responses (80) is twice that of the negative ones (37).

	3 : Positive response
	2 : Neutral response	**Interviewee location**	**organization type**
	1 : Negative response

THE NUMBER OF REFERENCES

- Sydney
- Dubbo
- Coffs Harbour
- Nowra
- Non-transport provider (NSW Government)
- Non-transport provider (peak body)
- Transport provider (CT)
- Non-Transport provider (Federal Government carer support program)
- Non-Transport provider (Hospital)
- Transport provider (Bus operator)
- Transport provider (Train)
- Non-Transport provider (First Nations not for profit corporation)

Note: The number of references made indicates the significance of a sub-code.

Figure 14: Response to RTRH MaaS

The positive responses are summarized in Figure 15 with 26 sub-themes identified MaaS. Figure 15 shows that 'MaaS will work better in future' (9), 'Make life easier' (7), 'Integrated solution methods' (7), and 'Better connection through social inclusion' (6) were mentioned most frequently by interviewees working in Sydney and Coffs Harbour and bus operators and CT operators, respectively.

• MaaS will work better in future
Interviewees are quite positive that MaaS will work better in the future. A non-transport provider working in NSW Government (I13) thinks that there are demographics, even those in their 70s or 80s, who have now started to use smartphones or social platform such as Facebook. CT provider (I15) believes that technology must be developed, and we should adjust the mentality of looking at non-tech-savvy users (Guo et al., 2017). It is not necessary to assume that some users will reject technology, and they will not learn or will not be motivated to learn the technology, although alternative options should be provided. CT operator (I17) thinks that it can work with older persons in the future, that we will move to a completely online service, and that we should be optimistic about the ability of older persons to use the technology in the future:

I17 (CT operator): "*Who knows what sort of capacities elderly people sort have of moving forward, it's going to be all fine when the boomers all retire because they all know how to use mobile phones.*"

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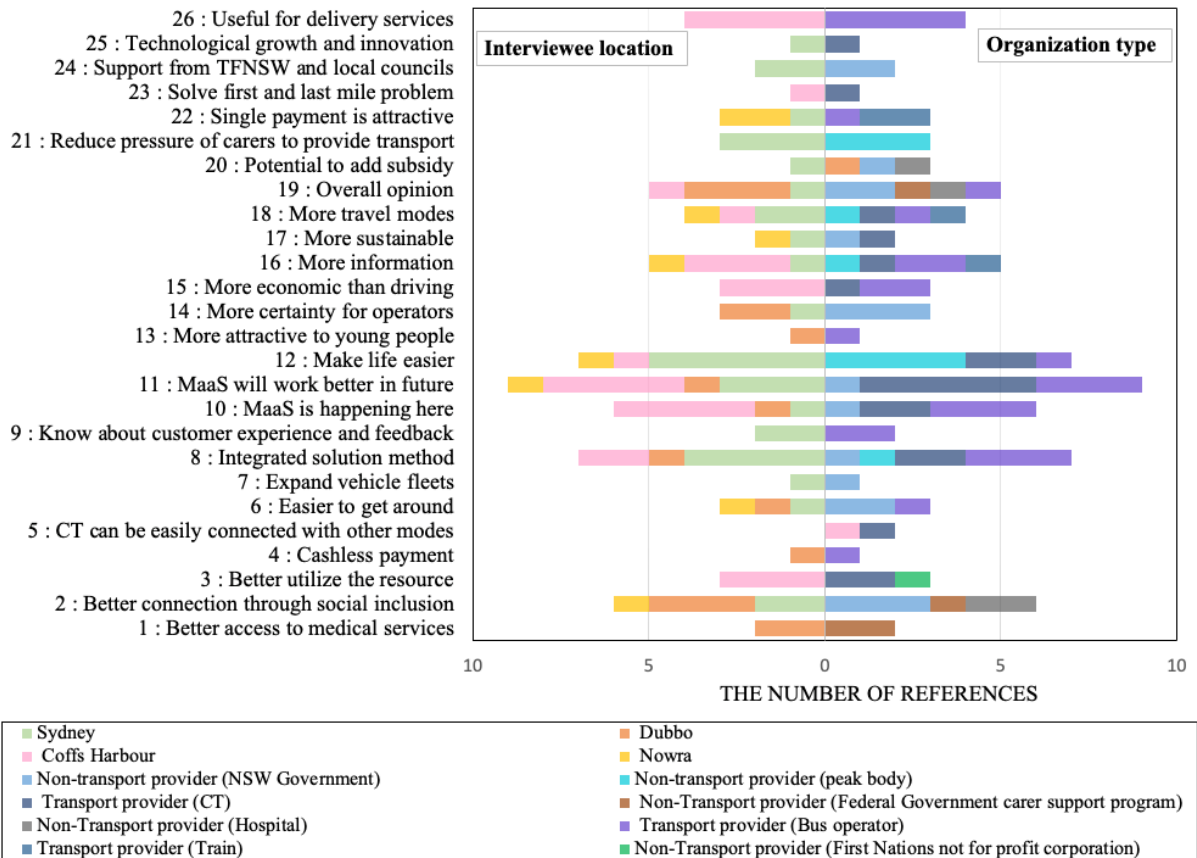
Note: The number of references made indicates the significance of a sub-code.

Figure 15: Positive response to RTRH MaaS

• Make life easier

Interviewees believe MaaS can make life easier for people by offering a more convenient, efficient, and sustainable transport system. By integrating different modes of transport and providing users with real-time information and payment options, MaaS can reduce the complexity of using multiple transport services and make it easier for people to obtain information on available services and take long-distance trips. Additionally, MaaS could improve overall accessibility and mobility for people with disabilities or mobility restrictions. Overall, interviewees believe that MaaS has the potential to make a significant improvement on people's lives in the following ways:

I01 Non-Transport provider (NSW Government): *I think for us, our general recommendations and now value in technology we think is the ways in which MaaS can make people's lives easier.*

I17 (CT operator): *I'm quite keen on the idea of MaaS. Since it's a way of making it work and making life easier to get where they need to go...*

I02 Non-Transport provider (peak body): *What we hear from carers is that they bounce from place to place to place and go from one website to another website to look for information. So anywhere where it's kind of streamlining information and functions to make that as straightforward and user friendly as possible is always a positive thing. I think enablers of MaaS include reducing red tape and complexity, integrating systems, and making life as simple and straightforward as possible.*

I14 (Bus operator): *MaaS provides an easier way for people to get around, more options, more convenience, travel when you want to.*

I03 (CT operator): *I think it would make it easier for the client. I think anything that would make a service easier or more streamlined or more financially stable would be better for clients.*

• Integrated solution methods
The integration of different modes of transport into a single platform can improve access to transport for people with limited options for getting around. Additionally, MaaS can improve opportunities for connectivity between regional cities and rural towns and larger cities, making it easier for people to travel between these areas.

Transport operators think that MaaS could make their lives better by providing a better integrated transport system with different forms of transport:

I14 (Bus operator): "*Having it all in one App would be one of the advantages and being able to, for example I would put it into stories about somebody's day to day. If Don missed his bus and he has to get to the doctor's by 4 o'clock, he could open his App and find a method that could take him to the hospital.*"

I07 (CT operator): *I think MaaS is a good service, because we can get other people to get onto the interconnected services. People may be eligible for a rent ticket, it helps to save our cars doing the up and down the highway, it's cheaper for the passenger and it gets people using public transport. So it sounds like a really good idea.*

It is believed that CT could fit regional and rural MaaS well since CT is a point-to-point service and could easily connect with other services, such as bus, train, car, etc:

I15 (CT operator): "*I think we are placed really well to fit into MaaS, and we've got good local knowledge of our regions of our areas, of our community.*"

• Better connection through social inclusion
According to the interviewees, MaaS will make it easier for people in these areas to access essential services, such as healthcare, education, and employment, and participate in community activities. This could reduce isolation and increase opportunities for social and economic participation. By improving transport options and connectivity, MaaS can promote social inclusion and make a positive impact on the lives of people in RTRH. As noted:

I01 Non-Transport provider (NSW Government): "*I think that would have massive benefits to the First Nations community.*"

A non-transport provider from the Federal Government carer support program (I04) thinks MaaS would improve social access like being able to join and participate more in the community. Other stakeholders expressed their wishes on how MaaS could mitigate the social exclusion in future, for example,

I05 Non-Transport provider (Hospital): *"My husband cannot drive a vehicle due to the disability, and we didn't have an accessible vehicle, the power chair couldn't transport him, so he was completely isolated. That had a huge impact on his mental health. I believe this isolation will disappear when MaaS comes into our life."*

Negative Response to regional and rural MaaS
The negative response to MaaS as reported by interviewees is summarized in Figure 16 with identified 8 sub-themes: 'Users cannot afford subscription fee' (10), 'Difficult for cash users' (7), 'Users rely on private cars' (6) were mentioned most frequently by interviewees working in Sydney and Coffs Harbour and Dubbo.

Legend (Interviewee location)	Legend (organization type)
Sydney	Dubbo
Coffs Harbour	Nowra
Non-transport provider (NSW Government)	Non-transport provider (peak body)
Transport provider (CT)	Non-Transport provider (Federal Government carer support program)
Non-Transport provider (Hospital)	Transport provider (Bus operator)
Transport provider (Train)	Non-Transport provider (First Nations not for profit corporation)
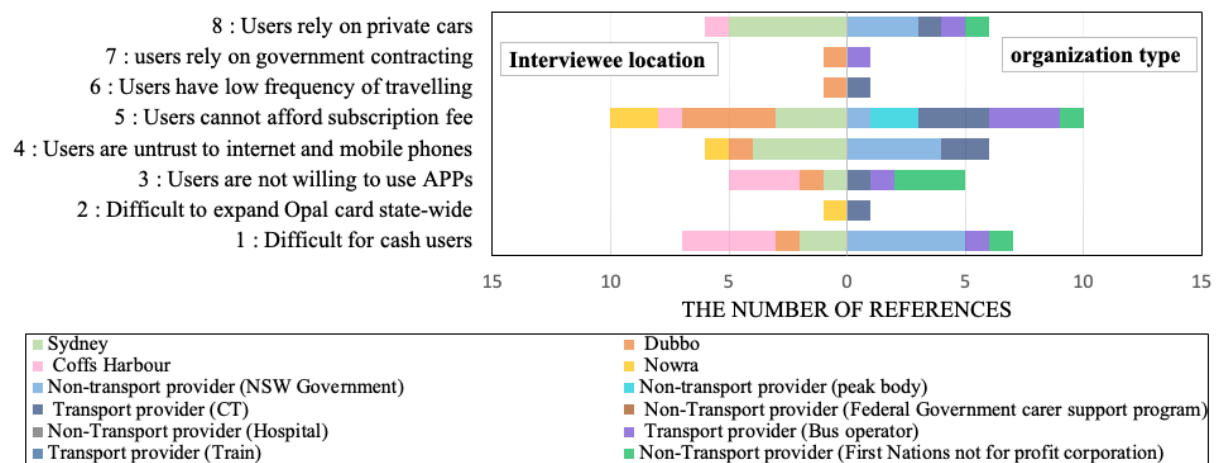
Note: The number of references made indicates the significance of a sub-code.

Figure 16: Negative response to RTRH MaaS

• Users cannot afford subscription fee
Most of the interviewees who express a negative opinion have concern about the affordability of MaaS. One solution to this issue is to look for alternative financing models, such as government subsidies, partnerships with local businesses, or the use of advertising revenue to offset costs. Additionally, providers of MaaS could explore offering tiered pricing plans with different levels of service, to make the offerings more accessible to a wider range of users. Ultimately, the key to making MaaS a success in these areas will be finding a way to provide value to users at a cost that is within their means.

I02 Non-Transport provider (peak body): *"Even with small costs again, when you are living on $400 a fortnight that can still be a significant cost when considering cost of living.... At the moment, they can't access MaaS if they don't have the money to pay for it anyway potentially. A good solution might be looking at a situation where most people pay the subscription and certain groups can access MaaS in a subsidised way."*

A CT operator (I03) mentioned that there are only a very small number of clients (from an estimated 3,000 to 4,000) who travel regularly with them. Some users may not use the service for six months, while others may use it every week and then another user might use it twice a year. The cost of MaaS is likely to be a barrier for some users, especially those who are on a tight budget and are watching their expenses closely. Many people in this demographic may

not be able to afford a monthly subscription fee for a service that they may only use occasionally.

To overcome this challenge, MaaS providers could consider offering flexible pricing options, such as offering different levels of service at different prices. Additionally, partnerships with local businesses or government subsidies could help offset costs and make MaaS more accessible to a wider range of users. Ultimately, the key will be finding a way to make MaaS affordable and accessible to people who are on tight budgets while still offering value and convenience.

• Difficult for cash users
Payment methods can be a barrier for some communities, especially those who are not used to using digital payment methods. In such cases, offering flexible payment options that allow users to add funds to their accounts could be a solution. For example, allowing customers to add a set amount to their account each week, rather than requiring a monthly subscription fee, could make MaaS more accessible to those who are on tight budget :

I11 Non-Transport provider (NSW Government): "*The barrier would be the payment because some of them really push people not to be so reliant on cash but a lot of these communities like the more socio disadvantaged still paid cash with the $2,50 but if that Opal card scenario is, works where they can put an amount on their card or the service provider because they are a customer of that service provider they do get lots of different benefits and they could put $20 a week on a travel card on their account.* "

To overcome this challenge, MaaS providers could consider offering a variety of payment options, such as cash, or mobile payments. Additionally, offering user-friendly and accessible interfaces, such as mobile Apps, could help to make the payment process smoother and more convenient for users. Providers could also consider partnerships with local businesses or government organizations to help educate users about the benefits of using digital payment methods and provide support to those who may need assistance.

• Users rely on private cars
People in rural areas often rely heavily on personal cars for transport due to limited public transport options and long distances between destinations. Cars not only play a practical role in providing transport, independence, and convenience, but also can often symbolize one's status, lifestyle, and personal identity:

I01 Non-Transport provider (NSW Government): "*The car is just so engrained in our culture and its almost a part of a person's persona. Those that have a car, they're wealthy enough so they can pay the fuel fees, and rego and everything and replace the car every 10 years…*"

It is challenging to change people's behaviour and convince them to adopt new transport concepts, especially if they are heavily dependent on their personal cars. It requires a combination of education, awareness, and availability of alternative transport options that are convenient, affordable, and accessible. Incentives and disincentives can also play a role in encouraging behaviour change. Additionally, building a culture of sustainability and promoting the benefits of reducing car dependence, such as improved health, reduced traffic

congestion, and a cleaner environment, could help make the transition to MaaS more appealing.

3.3.8 Impact of disaster and COVID-19 on transport services

CT service providers have faced huge challenges since the outbreak of COVID-19. An interviewee who has been involved in the CT hiring service project mentioned that these hiring services were hit hard by the outbreak of the pandemic, and hence there has been lack of further progress till now. Moreover, some bus shuttle services operated by a CT company had to close and there was severe waste of CT resources due to the capacity restrictions during COVID (I05, I03).

An interviewee from the transport authority (I01) mentioned that COVID-19 has changed people's working and living style and had a great impact on tourism. Some services have emerged due to the change of travel behaviour during the COVID pandemic. Operators has diversified their activities to help the community by expanding their services to include delivery services.

It is interesting to note that COVID-19 has changed users' habits of using technology as well. More and more users have had to adapt to using the smart mobile phone. The following CT service provider is excited about this behaviour change and mentioned that since users have jumped on the usage of smart mobile phones, it would be easier to manage bookings through an App:

I15 (**CT service provider**): "*Covid really shook things up in that way because of the fact that they are QR scanning, and digital certificates and things like that. So it's almost sort of a whole cohort of people who were not interested or didn't want anything to do with technology were forced to, rather than taking their paper certificate and having their details they just had to get onboard and use their phone to scan into places.*"

3.3.9 Factors influencing the ability to meet needs

Figure 17 compares the number of references for the 11 sub-codes in the 'factors influencing the ability to meet needs' theme among which 'Government funding to subsidize services' (6), 'communication between different departments' (4), and 'Reliability and trust' (4) were most mentioned. The number of references proposed by stakeholders from Sydney and Coffs Harbour are the largest proportion in terms of interviewee location while the number of references proposed by CT providers and bus providers are the largest proportion in terms of the organization type.
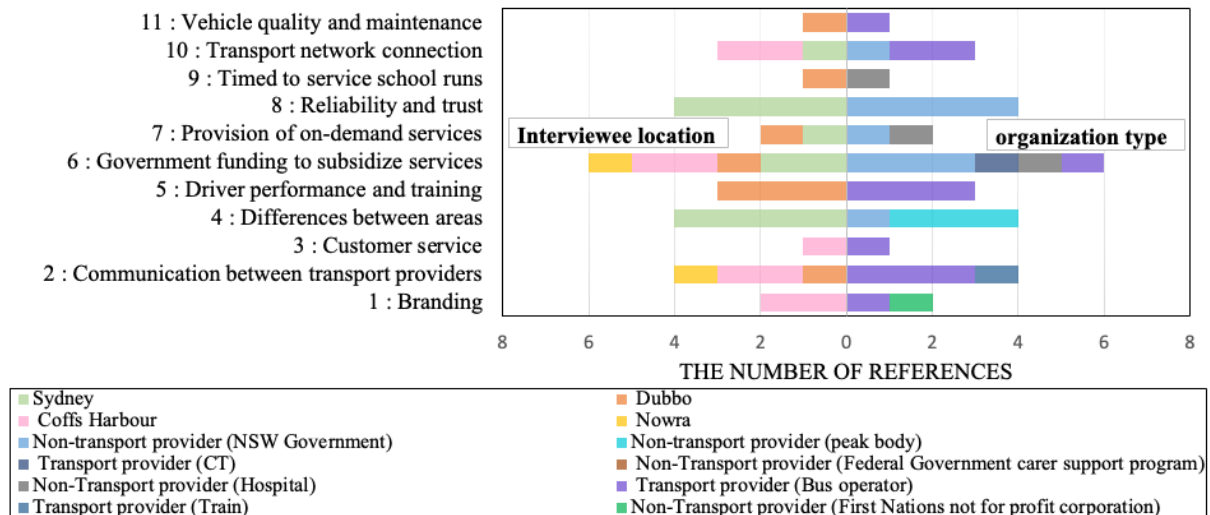
Note: The number of references made indicates the significance of a sub-code.

Figure 17: Factors influencing the ability to meet needs

• Government funding to subsidize services

Several bus operators mentioned that their business model relies heavily on government contracting with Transport for New South Wales, however, the profit margin would have to be realistic for them to bid. A non-transport service provider representing NSW government mentioned that CT companies may receive a subsidy from other funding sources or revenue streams such as non-profit organizations, community grants and fundraising, user charges and voluntary contributions. The interviewee further commented on the implicit ability of the local community in influencing the funding decisions:

I11 Non-Transport provider (NSW Government): "*A director came and met with community people that weren't happy and solved the problems, they switched the funding. So it's like community being able to be embedded in the decision making and how things work.*"

CT operators (I03, I07) highlighted the inadequacy of the funding allocated to CT to support users who are under the age 65, which makes it difficult for them to get to their health appointments. A non-transport service provider complemented this view mentioning that there is a huge proportion of people who wish they could use the services first and then pay the bill later, particularly for those who are on a Centrelink subsidy.

• Communication between departments

A bus operator (I12) suggested that all stakeholders including local governments, state governments, transport, etc., must be engaged to increase the use of public transport and bus patronage given the importance of complementary information that they possess. Another bus operator (I09) mentioned that the public transport operators have become used to sharing their data with the emergence of the tender process, and it is almost as if there are no secrets anymore; each operator is aware of what the other is doing. Conversely a train operator (I10) implied that a higher degree of co-operation and transparency will be required between different transport operators, both private and public, to ensure that there is sufficient integration of transport. They believe that such an integration will ensure customer retention.

• Reliability and trust

Several non-transport service providers mentioned there is no trust in public transport and other government-run services in regional NSW among the users. In the past, certain services had started, remained for a few years, and disappeared. The poor reliability of existing services has made most users rely on private vehicles. Participants indicated that the short-term benefits are only feasible for a small percentage of the population who lack access to a car. They perceived the importance of restabilising the lost faith in public transport as a key to shift people away from cars. The proposal was to leverage on IT solutions and active involvement of government in regulating the services rather than throwing it on the private service providers.

3.3.10 Considerations on RTRH MaaS sponsorship

Sponsorship from other businesses, such as the courtesy buses for clubs, can provide a more constant stream of funding for MaaS initiatives. This type of sponsorship could also help to offset the cost of maintaining the fleet of vehicles and improve the overall sustainability of the MaaS initiative. By diversifying their funding sources, MaaS initiatives can help ensure the long-term viability of their operations and better serve the transport needs of the community.

Figure 18 summarizes suggestions on MaaS sponsorship with 7 suggestions identified, among which 'improve business' (4), 'improve access to multi-purpose trips' (4) were most mentioned.
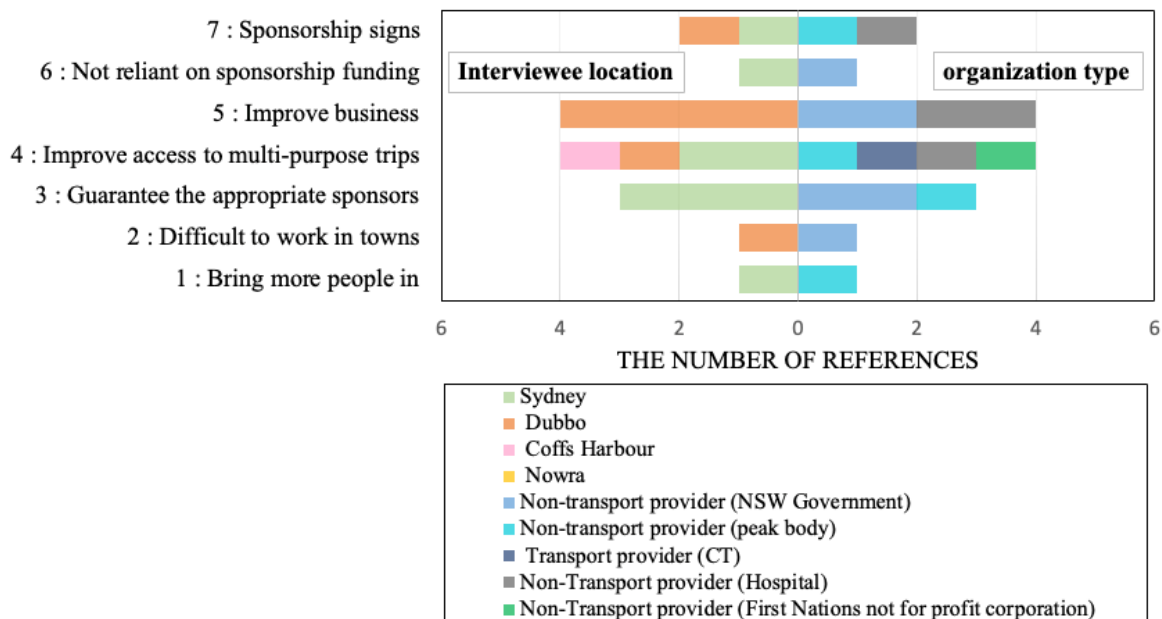
Note: The number of references made indicates the significance of a sub-code.

Figure 18: Suggestions on MaaS sponsorship

On the one hand, stakeholders mentioned that MaaS sponsorship could improve the local business, improve the access to multi-purpose trips and bring more people to the town. Conversely, bus operators suggested that the sponsorship funding would be difficult to work in regional towns since they do not have these facilities or the shops to offer discounts. On the other hand, the need to monitor the services provided by sponsors is emphasised to

guarantee that the services are safe and reliable for customers, and that the services are culturally appropriate. For example,

I01 Non-Transport provider (NSW Government): "*If the services are not run by us, we would need some form of like auditing to make sure that its safe, its reliable for the customers as well, because we'd suggest our customers to use these services. You need to be conscious that you might have children using the service as well, and it will need to be culturally appropriate so for First Nations community.*"

3.3.11 Business opportunities of regional and rural MaaS

Figure 19 compares the number of references for 11 sub-codes in the 'business opportunities of RTRH MaaS' theme between stakeholders with different locations and organization types. Of these 'connect with other transport services', 'provide on-demand services', and 'stimulate regional economy' are the most attractive business opportunities for stakeholders.
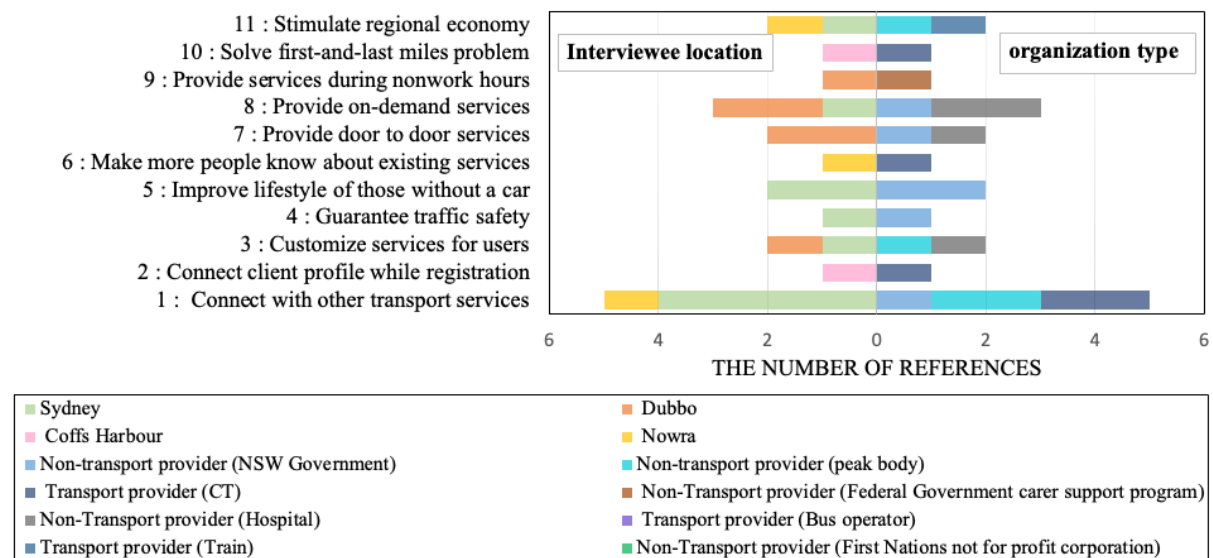
Note: The number of references made indicates the significance of a sub-code.

Figure 19: Business opportunities of RTRH MaaS

• Connect with other transport services
A non-transport provider from NSW Government viewed MaaS as an opportunity for operators to integrate into a larger network. A non-transport provider from a peak body provided a similar view on the ability of MaaS to provide an integrated system where different operators can work together in a seamless manner, making that process more efficient and streamlined. Further, participants commented on the ability of MaaS to simplify the process of charges and payments by directly connecting to aged care funding or NDIS funding. Users could be charged with a one-time payment if they use multiple types of mobility services, rather than paying for different operators. It is a huge selling point that all the information is contained within one App, so that people do not have to navigate to different websites or call different people or waste time in looking information on available services.

One of the CT operators (I07) mentioned that developing ways to connect with the health system is more complex than the technology. Another CT operator (I15) mentioned that if different transport services are integrated into a MaaS system, then there are options

available for users to select from the App. Furthermore, integrated mobility resources could be broken down into resources being made available for point-to-point services, as well as resources being kept separate for the funded CHSP, etc.

• Provide on-demand services

A non-transport provider working in a hospital (I05) mentioned that door-to-door, on-demand services are essential for users to at least get to their medical appointments, if not to shopping or entertainment. A non-transport provider from NSW Government (I01) also expressed his interest in being able to fill in those gaps with on-demand services.

• Stimulate regional economy

A non-transport provider working in a peak body (I02) indicated that there exists an excellent selling point in bringing people into the regional towns and it would be beneficial for the regional economy since businesses might start to invest in bringing more people. A train service operator (I10) mentioned that MaaS would enable a lot more local transport and it will stimulate the regional economy by enabling metropolitan people to travel to regional cities frequently.

3.3.12 Key success factors (KSF) of regional and rural MaaS

Key success factors (KSF) are the critical factors that are necessary for stakeholders to achieve their objectives or goals. They are the factors that, if effectively executed, will lead to success. The KSF of MaaS for stakeholders as reported by interviewees have been summarized in Figure 20 which shows that 17 were factors identified. It can be seen that 'Digital usage difference between the old and the young' (30), 'Marketing methods and awareness promotion' (21), and 'Not fully reliant on digital options' (12) are the most frequently mentioned.
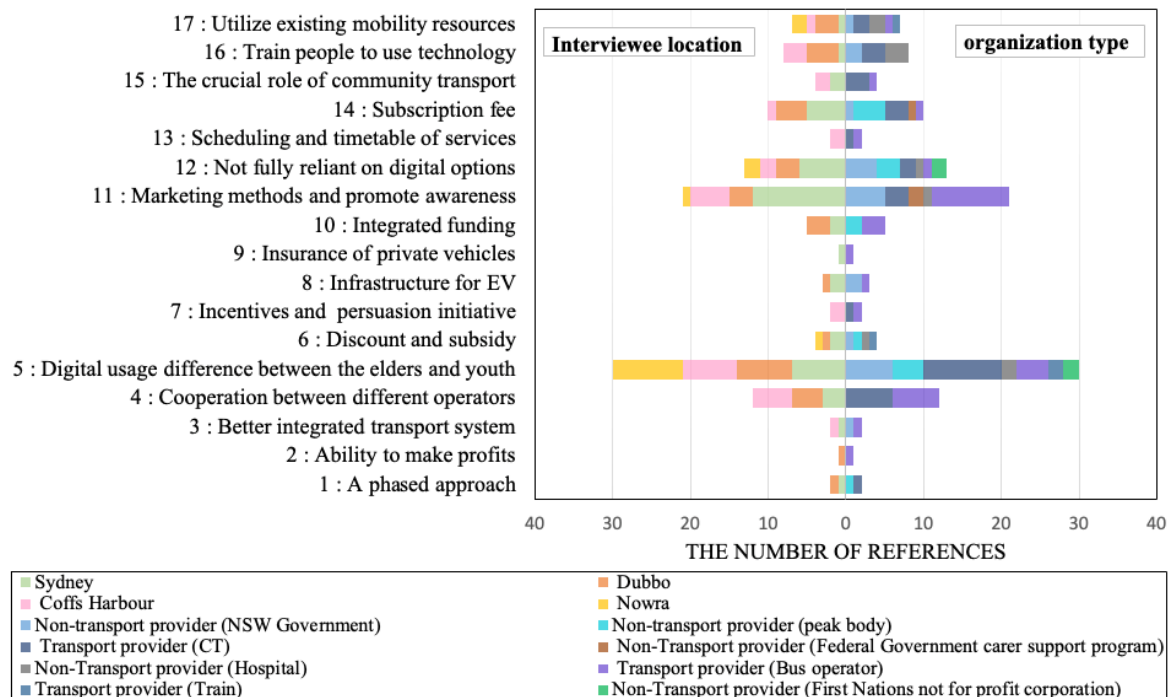
Note: The number of references made and indicates the significance of a sub-code.

Figure 20: Key success factors (KSF) of RTRH MaaS

We next detail the most crucial KSFs of MaaS which were mentioned most frequently by the stakeholders.

• Digital usage difference between the old and the young
As most young people use the internet daily, technology is increasingly recognised as a significant way that mobility services can influence the transport use and lifestyle of young people. However, older people often find it harder to keep up with fast-paced technology, e.g., 9% of those aged 75 or over have severe visual impairments, and 18% have severe hearing limitations in the EU (Eurostat, 2018). Additionally, U.S statistics show that 23% of older adults indicate that they have a physical or health condition that makes reading difficult or challenging (Pew Research Centre, 2014).

Several interviewees mentioned that the young people are tech-savvy while older persons are not, and the difference between the two groups should be considered while designing the MaaS blueprint.

A non-transport provider working in NSW Government (I13) thinks that younger generations are easier to get on board with a MaaS App. A CT operator (I15) felt that more and more young people are used to using Apps, but it will not work for some of the demographic at all.

A non-transport provider working in a peak body (I02) mentioned that carers in regional and rural areas are resistant to technology. The young and the middle-aged group are good at using the technology, but older people are less confident since they may not have an internet connection, or they don't have a smartphone. They observed that even though many older people have a smart mobile device, they have never used it since they are scared of using it. Although some programmes have been launched to facilitate more and more things moving online in the local community and improve older people's digital literacy, people wish that paper-based elements could be kept. They send out a newsletter every quarter and most people want to still receive the paper copy. A CT operator (I03) suggested that it is not feasible for 30% of the current older persons to obtain information, book and pay through an App.

A non-transport provider working in NSW Government (I12) mentioned that people usually ring the CT or Train link to book services, or directly show up to book bus services with the driver, rather than book services online. A bus operator (I12) mentioned that even though they have timetables on buses, people still ring up the depot to know what time the bus is running, and he commented: *"old habits die hard, since they have been used to picking up the phone talking to one of our depot staff to get the answer."* A bus operator mentioned that they used to have an online App for booking and paying as a part of a trial, but no clients used it. Instead of using the App, they would come down to the depot, book their tickets for the next day, and pay over the counter with cash and then go back home.

Although most stakeholders have a concern over non-tech savvy users, there are some stakeholders who are optimistic and suggest that technology will work better for older persons in the future. A non-transport provider working in NSW government (I01) suggested that people are getting more confident digitally especially after COVID. A CT operator (I17) thinks that more and more old people will become tech-savvy users in 15 years when the boomers all retire.

• Marketing methods and awareness promotion
Marketing is another significant KSF which could improve the awareness of users on the available transport services and the advantages of an integrated one-stop mobility solution. The marketing methods frequently mentioned by the stakeholders are 'Marketing using media', 'Face-to-face marketing', 'Government websites', and 'word of mouth'. For example:

I01 Non-Transport provider (NSW Government): *"If a customer knew I just need to go to the Transport NSW website, or use a particular app, then it can remove that barrier of not knowing available resources".*

I12 (Bus operator): "*It was advertised through social media, connections through the local community. We also provided some money to the local schools to place banners*."

A bus operator (I08) mentioned that it needs to be promoted so that there was awareness but also encouragement to help passengers see the benefits of encouraging the usage of MaaS. It would be useful to combine face-to-face methods and local newspapers with social media marking methods. A CT operator (I15) made a similar comment:

I15 (CT operator): *"People may see MaaS on social media, and they go, "Oh cool, there's a way I can get to the bus stop," and they simply download the App after seeing it on Facebook."*

A bus operator (I14) mentioned that they usually partner with councils to reach stakeholders. They sometimes hold joint workshops and invite people along, or work with libraries to distribute information, community notice boards, as well as community organizations such as Rotary and Probus, and it is extremely time-consuming and labour-intensive. CT operator (I15) mentioned that the process would be labour intensive since it would require more than an email or a link to an App, and it would be more effective to have a face-to-face conversation with users, establishing a trusting relationship.

One of the useful methods to release the labour is to market the targeted users. A CT operator (I15) mentioned that they would pick some passengers to provide free morning tea and make them feel special to come along and try to break down those barriers that might stop people from using their services and creating some incentives.

• Not fully reliant on digital options
Further, it is suggested that the implementation of MaaS should not fully be reliant on digital options, but also include the traditional booking methods such as phones, to make non-tech-savvy users adapt it step by step. A non-transport provider working in a peak body (I02) mentioned that the Department of Customer Services have been exploring opportunities associated with digital and technological advancements, system integration, and streamlined processes, but it is inevitable that some people prefer non-digital selections. He has a concern that some users might be excluded from using the MaaS App.

As mentioned by CT operator I17, a tricky problem lies in where older people who need MaaS to improve their transport and social exclusion most might be left behind due to not being tech-savvy, while those who have the ability to access mobile Apps could enjoy the

convenience and seamlessness brought by MaaS. Interviewee I17 suggest that MaaS should not be a completely online service in rural areas, otherwise, it's a very impersonal application:

I17 (CT operator): "*Old people will also get eyesight problems, auditory problems, arthritis in their hands. Aging is a journey that limits our mobility and limits our confidence and limits our independence and all of those things prohibit us from accessing a fast-paced seamless mobility system. If the MaaS is more about tapping and moving and reading screens, it's not a human centric public transport system.*"

A train service provider (I10) thinks it would be difficult for those who have a disability to hold down a job because of a mental health issue to use a MaaS App and that there should be options available for them to phone somebody and book a service:

I01 Non-Transport provider (NSW Government): "*As we are digiting a lot of these trip plannings, it is sort of alienating a lot of these groups. I think there probably are also a phone number that they can ring up.*"

A non-transport provider working in NSW Government (I11) thinks that MaaS still needs to be combined with a phone option at the moment, as well as the offline options. A non-transport provider in a First Nations not for profit corporation (I16) mentioned that older persons like talking to a person, rather than on an app, and that having the computerised voice would create an easier approach for them to be able to access the MaaS App.

A CT operator (I03) made the point that booking a service over the phone is an opportunity for older persons to interact with others and thus we need to keep phone options:

I03 (CT operator): "*What I'm looking for when I'm accessing a service is I want to be able to access a service as professionally and quickly as possible with basically as little interaction since I don't want to waste time to phone somebody up for an hour, whereas that is not true for our old demographic. The reality is that the only interaction they have is to speak with our receptionists, so if we were to take that away from them and turn the 20-minute phone call into a two-minute hack experience, that would absolutely be horrendous to them.*"

• Subscription fee
 "Who should pay for the subscription fee" is another of the factors affecting the success of MaaS, however, it still remains a difficult problem to be solved. A non-transport provider working in NSW Government (I01) mentioned that MaaS will require incentives that can be funded from a wider package of features of the subscription plan, especially for the customer groups that have adopted or don't drive frequently. He suggests that integrating the subscriptions fees into the welfare system might be a good solution to avoid leaving behind customers who are in a poor socio-economic bracket.

3.3.13 Expected role of the government
The role of the government as reported by interviewees is summarized in Figure 21 with 16 identified sub-themes. The most frequently are: 'Role of different departments' (31), 'Coordination and communication' (18), 'Run an effective communication campaign' (11), 'Launch 16 Regional Cities Program' (9), and 'Introducing state-wide Opal System' (8).
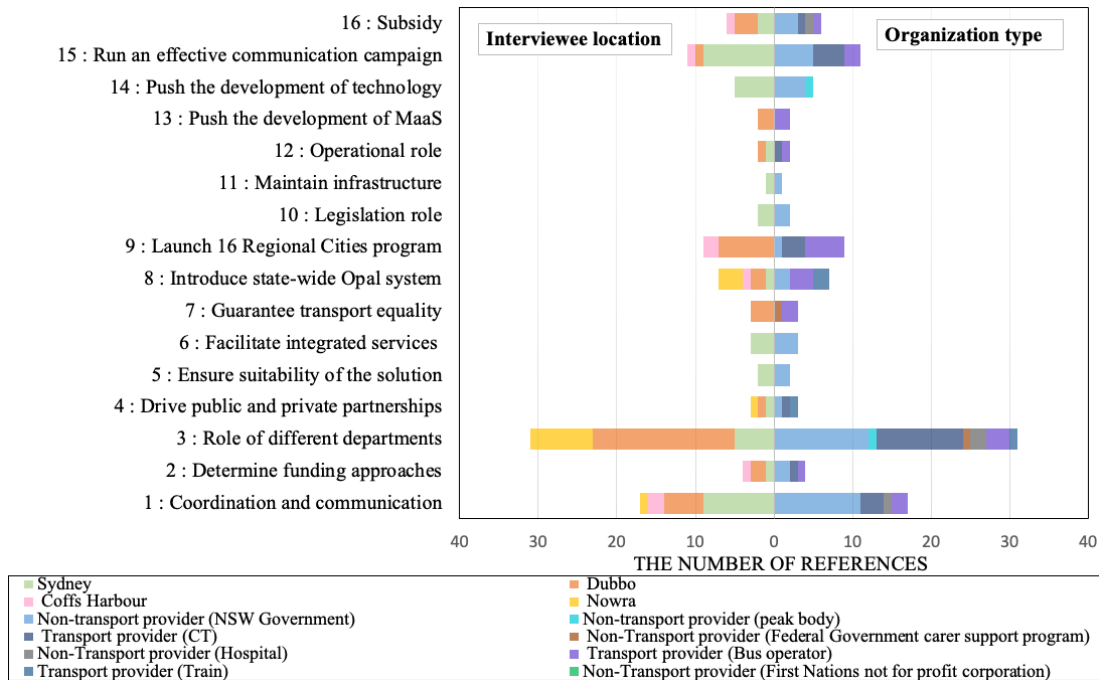
Note: The number of references made indicates the significance of a sub-code.

Figure 21: Expected role of government

• Role of different departments

MaaS is a multi-disciplinary initiative that involves multiple government departments and agencies with a specific role to play in facilitating implementation. For example, Transport for New South Wales may be responsible for providing subsidy, while the National Disability Insurance Agency (NDIA) may be responsible for ensuring that MaaS is accessible to individuals with disabilities. The Department of Health (DOH) and Department of Education (DOE) may be responsible for ensuring that the health and educational needs of individuals are met as part of MaaS. Department of Community and Justice (DCJ) and Councils are expected to participate in the development of MaaS. The expected roles of the government sectors in MaaS as indicated by interviewees are summarized in Table 4.

Table 4: Expected roles of the government sectors in regional and rural MaaS

Department	Expected roles
TfNSW	Connect and communicate with different organizations and stakeholders together to develop strategies.
NDIA	Support a better life for Australians with a significant and permanent disability and their families and carers by better administering the access to the scheme and simplifying the approval procedure for the payment of individualised support packages.
IPTAS	Serve as significant funding source for users who need to travel more than 100km one way or 200km within a week for appointments to the same medical practitioner or health service.
CHSP	Provide transport support for older people who stay at home and closely work with transport service providers to maintain their life independence.
DOH	Provide health related funding to community transport providers
DOE	Provide education related transport funding and start a curriculum about life skills and using public transport to promote awareness on public transport from a young age
DCJ	Oversee disability policy and link how that all fits in in terms of disability type services.
Councils	Councils can oversee a better utilization of assets, resources, and funding across different sectors.

• Co-ordination and communication

The government is often seen as a central player in the co-ordination and communication between different stakeholders and sectors. This is because the government has the resources, authority, and expertise to bring together different groups and ensure effective collaboration towards a common goal. In many cases, the government is also responsible for developing and implementing policies and programmes that support the objectives of the various stakeholders and sectors, so its role is crucial (Taylor, 2000).

The transport agency has a strong position and influence within the government, committees, and regional NSW. By participating in these structures and having strong relationships with service providers, the agency is well positioned to interact with other stakeholders and bring new solutions to the market (I08). The power and resources of a state government agency, combined with effective engagement and partnerships, can help ensure that the transport agency is able to deliver solutions that meet the needs and expectations of the general public. Inter-agency meetings are an important platform for different service providers to come together and co-ordinate their efforts. Inter-agency meetings can help ensure that progress is being made towards shared goals and objectives (I11, I12).

Local governments and councils are significant stakeholders in the transport sector, as they are often responsible for the maintenance and operation of the local road network, as well as other infrastructure such as paths, buildings, and public spaces. Transport for New South Wales has close relationships with local governments and councils to ensure that the transport services provided meet the needs of the local community. Collaborating with local governments and councils is essential in ensuring that transport solutions are aligned with local needs and priorities and can help to drive positive outcomes for the public (I13).

It's important for stakeholders within the transport sector to have a clear understanding of each other's needs and capabilities, and to collaborate effectively to ensure the successful implementation of solutions that meet the needs of the public. Having strong relationships with service providers is a key factor to deliver solutions (I05).

• Run an effective communication campaign

The government is expected to run an effective communication campaign between users to set up their trust, improve their awareness, know about community needs, and incentivize the contract to facilitate the implementation of MaaS (I014, I08).

Promoting the service and raising awareness is crucial to encourage usage and increase uptake among potential customers. By highlighting the benefits of the service, and communicating the value proposition to the public, the government can help to build interest and motivate people to start using it. Effective promotion and marketing can be key in driving adoption and increasing the reach of the service and can help to ensure that it is accessible and relevant to the needs of the community. Incentivizing the desired outcome through contracts is an effective way to encourage collaboration and drive better outcomes. When providers are rewarded for working together to meet a common goal, they are more likely to put in the extra effort needed to achieve that goal. This can lead to improved quality of care and better outcomes for clients (I06).

It is suggested that a top-down approach from the government may not always be the most effective solution, especially in the context of aged care reforms and transport for vulnerable individuals. A more effective approach might be to involve the community in the decision-making process, considering their needs and preferences. This can be done through community consultations, surveys, or focus groups, where stakeholders can voice their opinions and suggest solutions (I05).

Additionally, involving the providers themselves in the decision-making process can lead to more efficient and practical solutions. They can offer insight into the challenges they face and suggest solutions that will work best in practice. Ultimately, a combination of government policy, community input, and provider collaboration is likely to lead to the most efficient and effective solutions. By working together, all stakeholders can ensure that the needs of older persons and the vulnerable are met in a way that is sustainable and efficient (I15).

While the government does play a crucial role in setting policies and regulations, it is important to note that their involvement alone may not be enough to ensure the success of a MaaS program. The adoption of MaaS requires the collaboration of multiple stakeholders, including private companies, transport providers, and the public, with the government playing a facilitative role in bringing everyone together.

• 16 Regional Cities Service Improvement Program
To provide improvements to regional bus services, including providing better connections to where customers need to go for work, education, health and social and recreational activities, the NSW government is rolling out the 16 Regional Cities Service Improvement Program[15] as part of a commitment to improving bus services throughout regional NSW. As one bus operator notes:

I09 (Bus Operator): "*It's an improvement program that TfNSW has brought in, and they are working with 16 regional cities across NSW to improve the services. Now with the 16 Cities program it's been fantastic and through this six of our towns are part of this, we are able to do a network review and where there are areas require extra services, we put them on, ..., we run to 9PM a couple of days a week and we're running on Saturdays, running more services and the frequency has improved.*"

However, despite the increase of the extra services, resources are still not being fully utilized:

I15 (CT operator）: "*What they did is they just created two extra services on a weekend and one earlier in the morning with the current bus services. The current bus services are travelling around with oxygen in them, no passengers half the time.*

This suggests that the government should consult with users before launching any public transport network improvement programme. This will allow them to understand the real needs and issues of customers, gather feedback, and raise awareness about the available services.

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[15] https://www.transport.nsw.gov.au/projects/programs/16-regional-cities-services-improvement-program

• State-wide Opal System

It is suggested that the state government should extend the smartcard ticketing system (Opal card system) used to pay for travel on public transport in Sydney, the Blue Mountains, Central Coast, the Hunter and the Illawarra into regional areas so that it is state-wide. This would provide a convenient and consistent payment method for all public transport users:

I08 (Bus operator): *"We need a rural and regional approach for ticketing so that users can travel seamlessly without purchasing tickets from point to point. I think that is something that government really need to bite the bullet on and come up with a state-wide, rural, and regional ticketing solution."*

I10 (Train operator): *"I think it would enable like I guess our metropolitan and outer metropolitan customers to travel regionally more readily."*

I06 Non-Transport provider (NSW Government): *"I think that Opal is great. If you can get, because you can get possession cards on Opal, It's really a great step up for people on benefits."*

I12 (Bus operator): *Opal definitely has its advantages and is multimodal across the whole public transport network.*

Extending the opal card system into regional areas would pave a way for the payment method of MaaS since a smart card system would allow for easy and seamless payments for various modes of transport, such as buses, trains, and possibly even bicycles and electric scooters.

3.3.14 Summary

The results of in-depth interviews show that users in the RTRH areas have been experiencing long-term transport disadvantage while stakeholders have been facing barriers to meeting users' mobility needs. It is acknowledged that there is a gap between users' unmet mobility needs and the transport services and solutions provided by stakeholders. Knowledge of this gap is informed by a comprehensive analysis of the transport systems and services currently available, as well as the needs and preferences of users. The next section of this report reports on the outcome of end user surveys which provide insights into the experiences of users, including the extent of transport disadvantage they experience, the types of transport they use, and the barriers they face when trying to access transport services.

4. End-user surveys

This chapter begins by recapping the aims and objectives of the end user surveys (Section 4.1), and the methodology adopted (Section 4.2), before discussing the qualitative results of end-user discussion groups and surveys in Dubbo, Coffs Harbour and Nowra and quantitative results from the NSW state-wide online survey in the 16 regional cities (Section 4.3).

4.1 Aims and objectives

The end user surveys were designed to collect information about the mobility requirements of citizens and their attitudes towards MaaS-like solutions. An overview of the scope of the end user surveys was given in MS5.

The aims of the qualitative analysis of the *group discussions* and "paper & pencil" survey seeks to explore current transport needs and experiences among regional and rural dwellers in terms of how they access their surroundings, what constraints they face, and how to address barriers; and to ascertain the nature and extent to which travel can be eased, and behaviour changed by better integration of different forms of transport and the availability and use of supporting technology.

The aims of the quantitative analysis of the *online survey* seeks to elicit users' long- and short-distance behaviour and their preference for different mobility plans with both mobility services and non-mobility services; and to generalise the findings from the three selected locations (Nowra, Coffs Harbour and Dubbo) to a wider regional NSW context.

4.2 Methodology

A summary of the methods adopted and approach to analysis is given in Table 5.

Table 5: Summary of qualitative and quantitative study in analysing end-user survey

	Qualitative study	Quantitative study
Type of data	Group discussions of 6 groups with 45 participants in the selected 3 locations	Online survey of over 1000 respondents of NSW state-wide
How data is collected	Observations, interviews, and textual analysis	Measuring and counting things
How data is analyzed	Text analysis; grouping data into meaningful themes or categories	Statistical analysis
Level of analysis	In-depth, local phenomena; more subjective	Large-scale, generalizable
Type of findings	Informative, understanding the why or how about stakeholders' barriers and altitudes towards RTRH MaaS	Elicit the probability of choosing different mobility plans and quantify the preference for different mobility services

4.2.1 Qualitative analysis for end user group discussions

Group discussions with representatives of end users were conducted in Dubbo, Coffs Harbour and Nowra and were completed in August 2022. CaPPRe conducted 6 discussion groups after the pilot test of the survey (each group was recruited by a professional agency using a screening questionnaire) with 45 participants in Coffs Harbour, Dubbo, and Nowra, and each group comprised up to 9 participants for the 2-hour duration. Participant consent was sought at the start of each discussion group. The discussion guide and a copy of the survey are provided in MS5. The qualitative study emphasises "sense-making" or understanding the attitudes of different stakeholders and barriers to implementing Rural and Regional MaaS,

rather than predicting or explaining. A creative and investigative mindset is needed for qualitative analysis based on a participant-in-context attitude, and a set of analytic strategies.

Demographic information of the 45 participants across 6 groups in the selected locations (Dubbo, Coffs Harbour, and Nowra) and characteristics of participants are summarized in Table 6.

Table 6: Demographics of 45 participants across 6 group discussions in the selected locations

Gender	35 x **Female;** 10 x **Male**
Age	**2** x 20-34 years; **16** x 35-54 years; **24** x 55-74 years; **3** x 75-83 years
Socio-Economic Status (SES)	**13** x In paid work (FT, PT, S/E, casual. N.B. Low-income) **9** x Unemployed; **8** x Retired; **1** x Student **14** x Did not answer (likely a mix of volunteers + unemployed)
Cultural Association	**26** x Australian born, not as First Nations **12** x Australian born, as First Nations **4** x Born overseas; **3** x Not answered
Location	**12 x** < 5kms from town centre **24 x** 5-10kms from town centre **9 x** 11-30km from town centre
Drivers/Non-drivers	**26 x** Drivers: **15** x Also provide lifts to non-household contacts >1 x pw **11** x Also use PT **19** x Non-drivers**: 14** x Private car passengers + PT Users **4** x PT only **1** x Walking only **1** x e-bike rider
Concession Cards	**Number: 22** x Multiple**; 10** x Single; **13** x None **Type: 21** x Seniors card/travel voucher **19** x Centrelink (**18** x Health care card) **13** x RED Ticket **5** x TTSS **2** x NSW Companion card **5** x Mobility Parking Permit
Disabilities	**24** x None / undisclosed **21** x Single / multiple **9** x Physical **7** x Mental **4** x Sensory **1** x Unspecified

4.2.2 Quantitative analysis for online survey

Understanding the preferences of end users is significant for designing the MaaS blueprint. The detailed design and considerations for the online survey are provided in MS5. Alternative subscription plans are generated with attributes such as community-based transport using electric vehicles, community-based transport using petrol/diesel vehicles, Taxi/Rideshare, local bus, car club/car subscription services, on-demand bus, home delivery goods, shopping goods, media streaming services, and subscription fee. The method involves asking individuals to state their preference over hypothetical alternative mobility services. The responses of end users will be used to determine whether preferences are significantly influenced by the attributes and also their relative importance. Results can be used to determine the significance of the attributes that describe the MaaS subscription plan and the extent to which users are willing to trade one attribute for another, and the information on

the relative importance of the selected attributes can be useful for designing the MaaS blueprint and setting mobility resource allocation priorities in the regional and rural context.

4.3 Summary of results
This section summarizes the results of end user discussion groups (Section 4.3.1) and paper & pencil survey (Section 4.3.2) in the three locations (Dubbo, Nowra and Coffs Harbour) (Section 4.3.1), the implications for the online survey (Section 4.3.3) and the descriptive results of the online survey (Section 4.3.4) and modelling results of the online survey (Section 4.3.5).

4.3.1 Results of end user group discussions
This sub-section conducts qualitative analysis on themes that were developed in the group discussions, namely: the methods of knowing about, booking and paying for mobility services, constraints on getting out, barriers to meeting mobility needs, impact of transport disadvantage on vulnerable groups, prosocial aspects of regional and rural MaaS, users' response to MaaS, the expected gold standard in regional and rural transport, and reasons why public transport fails.

Methods of knowing about, booking, and paying for mobility services
Knowing about both current and future methods of getting information, booking, and paying for mobility services can provide a comprehensive picture of the current state and future trends of mobility services. It could help identify gaps and opportunities for improvement in the current methods and help inform the development of new and innovative solutions to meet the changing needs of users. This information can be used to identify potential challenges and barriers to adoption and to develop strategies to overcome them, leading to an overall better user experience and increased usage of mobility services.

Figure 22 summarizes the methods of knowing about, booking, and paying for mobility services. Specifically, current transport modes mentioned by users include airplane, Maxi Taxi, On-demand bus, "rickshaws", school bus, wheelchair, bike, Community Transport, E-bike and E-scooter, lift from others, local bus, train, taxi, courtesy buses, drive, and carpooling. The current methods of getting information on available services include both online (e.g., google map, social media platform, word-of-mouth, print media, local radio, official websites, search engine) and offline (e.g., timetable on bus, over the phone). The suggested future methods of getting information on available services include both online (e.g., Apps, streaming platform, councils' websites, audio version information platform for the hearing impaired) and offline methods (e.g., advertising on TV and newspapers, Email and mail, city wide texts, send timetable to each address, send paper leaflets). The current methods of booking transport include online (e.g., booking through websites, Apps) and offline (e.g., face-to-face, over the phone). The suggested future methods of booking transport include online methods (e.g., automatic speech recognition, websites) and offline methods (e.g., dial numbers listed in yellow pages, ticket vending machine). The current methods of paying for transport include online (e.g., PayPal, Opal card, Tap&go) and offline (e.g., NDIS package, concession card, credit card, cash). The suggested future methods payment methods include online (e.g., payment gateway, App) and offline (e.g., credit card, state-wide opal card).
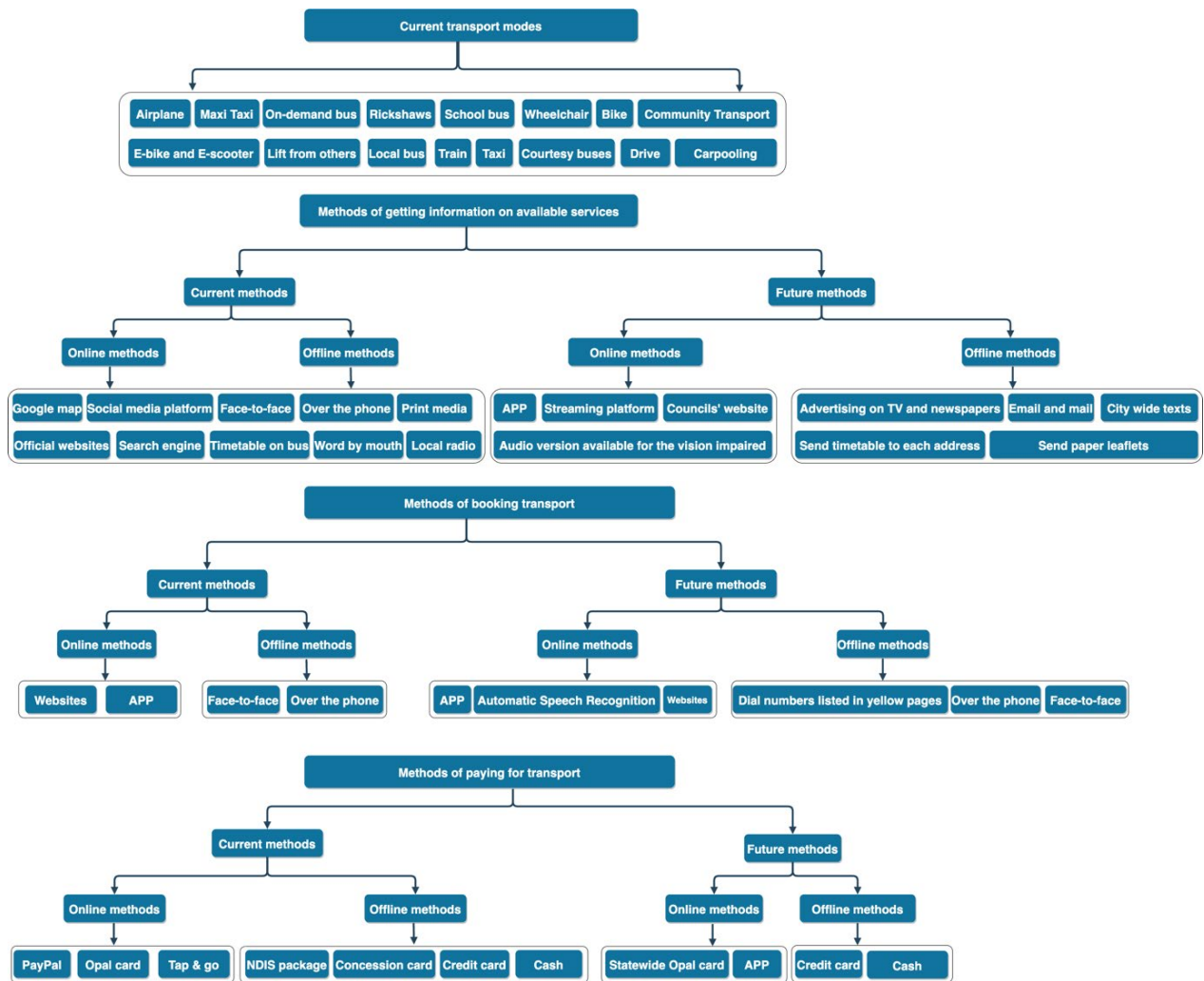
Figure 22: Methods of knowing, booking, and paying for mobility services

Table 7 summarizes the current and future booking methods of transport based on the number of references mentioned by end users. The results of the crosstab conducted between the sub-codes and location shows that offline booking methods (87%) comprise the majority of current booking methods and online only 13%. However, concerning the future booking methods, the percentage of offline (55%) and online methods (45%) are quite similar. Three of the most frequent current booking methods are landline (25%), non-smart phone (25%) and map (13%). Three of the most frequent future booking methods are over the phone (27%), automatic speech recognition (27%) and face-to-face (24%). These results suggests that in the future online methods are expected to become more widely used.

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Table 7: Current and future booking methods

		Dubbo	Coffs Harbour	Nowra	Total
Current methods of booking	Offline	87%			
	Face-to-face	100%	0%	0%	12%
	Landline	0%	29%	100%	25%
	Map	0%	14%	0%	13%
	Non-smart mobile	0%	29%	0%	25%
	Smart phone	0%	14%	0%	13%
	Online	13%			
	Website	0%	14%	0%	13%
	Total	100%	100%	100%	100%
Furture methods of booking	Offline	55%			
	Face to face	43%	0%	0%	24%
	List all transport in yellow pages	0%	20%	0%	4%
	Over the phone	29%	80%	0%	27%
	Online	45%			
	APP	14%	0%	0%	9%
	Automatic Speech Recognition	0%	0%	100%	27%
	Websites	14%	0%	0%	9%
	Total	100%	100%	100%	100%

Table 8 and Table 9 summarize the current and anticipated methods of finding out what services are available to end users based on the number of references provided by end-users. Online methods account for a greater proportion (64%) than offline methods (36%). The three most mentioned current methods are searching the internet (29%), social media (21%), and print media (20%). Most Coffs Harbour users mentioned searching online (67%). From Table 9, integrated mobility Apps (28%), a local App providing information on all modes of transport (17%), and sending paper leaflets (11%), are the most frequently mentioned future methods. Most frequently mentioned by users in Dubbo was consulting with the council over the phone (11%).

The information in Table 8 and Table 9 shows that online methods are currently more commonly used by end-users to find out about available transport services compared to offline methods, with searching the internet being the most mentioned method. In the future, it is expected that integrated mobility Apps and local Apps providing information on all modes of transport will be the most used methods. The data also shows some regional differences, with users in Coffs Harbour mentioning a higher usage of online methods, while users in Dubbo mentioned consulting with the council over the phone as a future method. This information highlights the importance of considering both online and offline methods when providing information about transport services and the need to be accessible to all users, including those who may not have access to the internet.

Table 8: Current methods of knowing about available services

	Dubbo	Coffs Harbour	Nowra	Total
Offline		36%		
Bus timetable on bus	7%	0%	0%	4%
Face-to-face	0%	0%	0%	0%
Local radio	7%	0%	0%	4%
Over the phone	0%	0%	25%	4%
Print media	33%	11%	0%	20%
Word by mouth	7%	0%	0%	4%
Online		64%		
APP	7%	0%	0%	4%
Search online	7%	67%	25%	29%
Google map	0%	11%	0%	4%
Social media	27%	0%	50%	21%
Websites	7%	11%	0%	7%
Total	100%	100%	100%	100%

Table 9: Future methods of knowing about available services

	Dubbo	Coffs Harbour	Nowra	Total
A local APP covering all transport	0%	22%	0%	17%
Advertisements on TV and radios	0%	0%	50%	8%
Advertising in the paper	0%	0%	0%	0%
Audio version available for the vision impaired	0%	0%	17%	3%
City wide text	33%	0%	0%	3%
Consult the council over the phone	67%	7%	0%	11%
Email and mail	0%	7%	0%	6%
Integarated mobility APP	0%	37%	0%	28%
Make timetables more understandable	0%	7%	0%	6%
Published through Council's website	0%	4%	0%	3%
Send paper leaflets	0%	15%	0%	11%
Send timetable to every house	0%	0%	0%	0%
Streaming platform	0%	0%	33%	6%
Total	100%	100%	100%	100%

Constraints on getting out

Table 10 shows some quotations from users on constraints of getting out:

Table 10: "Constraints on getting out" mentioned in end user group discussions

Sub-themes	Quotations
bad service of trains	*"I'm not going to catch the train now. It's awful."* [Coffs Harbour participant]
bypass	*"Bypass has been happening for the last 50 years, and it hasn't eventuated."* [Coffs Harbour participant]
difficult to find public transport information	*"You can't work out, there is no way to show you how to get somewhere. I think [name of operator] does sort of information but potentially out of their website."* [Dubbo participant]
difficult to get to the train station	*"To get to a train station, I have to get a taxi."* [Nowra participant]
lack of bus services	*"If you choose to get the 10 o'clock bus you are not getting back until 5 o'clock in the afternoon. we should be able to have like three or four buses to Huski a day from Nowra being the town centre."* [Nowra participant]

Lack of Uber services	*"We need buses, we need Uber to come down here. Yes, look every restaurant has Uber Eats, Deliveroo, Door Dash but there are no Uber drivers to drive you."* [Nowra participant]
no lights at night	*"At night time, there is no lights at the bus stop, so you know how dangerous it is. I put on my torch on my phone, so he can see me to stop because there is no button, there is no light around.*" [Coffs Harbour participant]
difficult for school kids to use transport	*We lived in Worrigee and my daughter went to Terara but she'd catch it from Worrigee to Shoalhaven High School and then it would go via Nowra Primary and St. Michaels, past Nowra High and then back to Terara. …, and they're going the longest route ever.* [Nowra participant]
timetable is inflexible	*"I'd have to catch the bus. The bus is okay but then they've only got 3 or 4 a day. You've got 9:15, 11 o'clock. You've got to fill that time in with a cup of coffee or something"* [Nowra participant]
affordability and safety of services	*"Safety issue in Dubbo – one would rather get out of bed to give friends a lift home from the pub in the middle of the night than worry about them not being safe as it is too hard to get home affordably (taxi too expensive, courtesy buses not always available, CT not running after hours, buses unreliable)*" [Dubbo participant]
cannot afford to long distance medical trips	*"I was rushed through to Wollongong and had surgery on the Sunday, they took me up in an ambulance. they said, "Come Wednesday, you can go home now". I've got no way home, since I can't afford $250 for a taxi."* [Nowra participant]
service time of CT is limited	*"CT are rarely available at times it is needed. I have had to change medical appointments when CT is not able to pick them up early enough to get to appointment – rely on volunteers who don't start until 9am."* [Dubbo participant]
waiting time is too long	*"Getting into Nowra is fine but getting to Worrigee for appointments, doctors and getting to South Nowra is impossible and taxis are very difficult. You can wait up to an hour just to get a taxi to come."* [Nowra participant] *"To get a taxi home, I had to wait an hour and a half."* [Nowra participant]
expensive overnight accommodation	*"You have got to make it for like a 2 o'clock appointment because you can't get there before that and then you've got to stay overnight before you can come home again and there's another $150."* [Dubbo participant]
large bus cannot go on small streets	*"… there is hardly any people on big buses, where if they had like the smaller buses that more reduced in size that they could zip around between the areas and get you to where you need to go."* [Coffs Harbour participant]
lack of taxi services	*"Taxis are unreliable and take long wait times (up to 2 hours on weekends). Particularly hard for anyone to get a taxi at weekends and school pick up and drop off times morning and afternoon as taxis are tied up dropping off/picking up some school children."* [Dubbo participant]
cannot afford to Taxi services	*"I've got a family of six all up, we can't even get a normal taxi, we've got to rely on one of the big ones, they charge a fortune, we walk everywhere."* [Nowra participant]
walking distance to the stop is too long	*"My daughter has to walk over a kilometre right down to Wheelers Lane to get the school bus and back again."* [Dubbo participant]
high cost of transport	*"I don't have any concession. If you've got a concession, then you can do things. Even catching the train."* [Nowra participant] *"The fares are expensive in general; I have a full time job and I still can't afford to pay it."* [Dubbo participant]
lack of bike lanes	*"One used an e-bike but had an accident and needs on-going treatment for injuries. This participant mentioned that there are not enough bike lanes.*" [Dubbo participant]
poor pathway conditions	*"I don't have a footpath to where I've got to catch a bus."* [Dubbo participant] *"I can't walk on it because it is dangerous, you can't even ride a bike on it because it's not safe, and there is no side of the road."* [Nowra participant] *"…it's really difficult to walk on the paths like that…"* [Coffs Harbour participant]

The constraints in Table 10 indicate several issues with the current public transport system and infrastructure, including poor service quality, lack of information, inflexibility, affordability, and accessibility. The issues of poor train and bus services, limited service hours, long waiting times, and high cost, create barriers for people trying to access destinations via public transport. In addition, the lack of lighting at night and poor pathway conditions makes it unsafe for people to use public transport, particularly for those with mobility difficulties. The difficulty of finding public transport information and the inflexibility of the timetable create additional barriers for people trying to use the system. The difficulties faced by school children and people needing to access medical care highlight the importance of ensuring that public transport is accessible and affordable for everyone. The constraints related to the lack of bike lanes and poor pathway conditions highlight the need for infrastructure improvements to support alternative modes of transportation. To address these constraints, it is necessary to improve the quality and accessibility of public transport services, provide better information and support to users, and invest in infrastructure improvements to make public transport safer and more accessible.

Barriers to meeting mobility needs
Based on the results of the group discussions, the identified barriers to meeting mobility needs have been summarized in Table 11. It can be seen that 'Inadequate infrastructure design and maintenance' (21%), 'poor path conditions' (19%), 'limited awareness of available services' (15%), and 'infrastructure does not match geography' (13%) were most frequently mentioned by end users across three locations. The crosstab between barriers to meeting mobility needs and the three locations shows that 'limited awareness of available services' (32%) 'poor path conditions' (45%), and 'maintenance of infrastructure/infrastructure does not match geography' (22%) are the most significant barriers reported by users in Dubbo, Coffs Harbour, and Nowra, respectively.

Table 11: Barriers to meeting mobility needs

Barriers to meeting mobility needs	Dubbo	Coffs Harbour	Nowra	Total
CT reply on vulunteers	9%	0%	0%	3%
Inadequate civil infrastructure design and maintenance	6%	50%	22%	21%
Inadequate routes	9%	0%	0%	3%
Inadequate traffic management infrastructure	0%	0%	13%	8%
Infrastructure does not match geography	0%	0%	22%	13%
Lack of funding support	0%	0%	4%	3%
Lack of linkage between different services	0%	0%	9%	5%
Limited awareness of available services	32%	0%	9%	15%
Personal e-scooters remain illegal on NSW roads	0%	0%	4%	3%
Poor path conditions	31%	45%	4%	19%
Shortage of drivers	9%	0%	0%	3%
The elderly are not familiar with technology	3%	5%	13%	8%
Total	100%	100%	100%	100%

These barriers reflect a range of challenges faced by those trying to meet their mobility needs. The unreliability of bus services, shortage of drivers, and inadequate bus routes can make it difficult for people to get where they need to go in a timely and reliable manner. The reliance on volunteers for CT services and the limited awareness of available services highlight the

need for better support and outreach to ensure that these services are accessible to everyone who needs them. Personal e-scooters remaining illegal on NSW roads, and the lack of funding support for transport initiatives, limit the options available for people to meet their mobility needs. The lack of linkage between different transport services, such as bus and train networks, can make it difficult for people to get from one place to another using multiple modes. The challenges faced by older persons in using technology, and the inadequate infrastructure design and maintenance, highlight the importance of ensuring that transport infrastructure and services are accessible and user-friendly for all, regardless of age or ability.

The results from the group discussions suggest that inadequate infrastructure design and maintenance, poor path conditions, limited awareness of available services, and infrastructure not matching geography are the most frequently mentioned barriers to meeting mobility needs. These barriers are impacting users in different ways, with limited awareness of available services being a significant concern in Dubbo, poor path conditions being a major concern in Coffs Harbour, and maintenance of infrastructure and infrastructure not matching geography being significant issues in Nowra. It is important to note that these results may be influenced by the specific locations and populations being studied. Nonetheless, they provide valuable insights into the challenges faced by people in trying to meet their mobility needs and can inform the development of strategies and initiatives to improve transport services and infrastructure in these areas.

Impact of transport disadvantage on vulnerable groups
Figure 23 highlights the three layers of impact that transport disadvantage can have on vulnerable groups. These include:

1) **Emotional impact**: This refers to the impact on a person's emotions and well-being. It includes factors such as stress, anxiety, and frustration caused by difficulties in accessing transport.
2) **Social impact**: This refers to the impact on a person's social life and relationships. It includes factors such as isolation, loneliness, and reduced opportunities for social interaction and community involvement.
3) **Functional impact**: This refers to the impact on a person's ability to carry out daily activities and access essential services. It includes factors such as difficulty accessing education and employment, medical appointments, and shopping for necessities.

It is important to consider these three layers of impact when addressing transport disadvantage and developing solutions to improve access to transport for vulnerable groups. This will help to ensure that solutions are comprehensive and address not just the practical challenges, but also the emotional and social impacts of transport disadvantage.

• Functional impact
Functional impact denotes the symptoms of a mental or physical health condition that impedes the ability to facilitate the basic mobility needs of users. Examples of functional impact on users reported in this study have been summarized in Table 12.
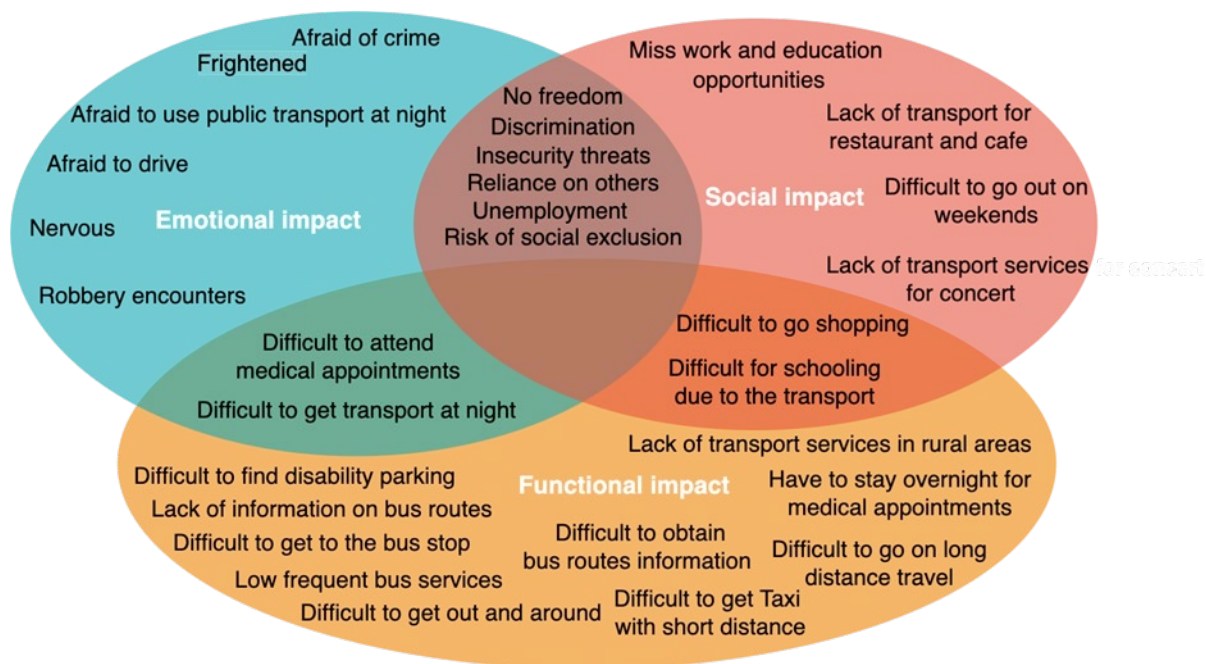
Figure 23: Impact of transport disadvantage on vulnerable groups

Table 12: Examples of functional impact on end users

Sub-themes	Quotations
Difficult to attend medical appointments	*"… when I had to go to Nepean hospital for a brain surgery last year, I had to catch the XPT, because I had five days to get there from Coffs by myself, get to the Sydney Central and get on another train, catch that out to Western suburbs, get off, walk a mile up to the hospital, walk around for an hour trying to find where I am."* [Coffs Harbour participant]
Difficult to get out and around	*"What we want to try and do is make sure that if they do try and make public transport easier, especially if you've got the situations like medical appointments out of the area, when you have to take someone with you and stay a couple of nights, that you don't have to run around asking, so to avoid having to pay an absolute fortune, so that the information is proactively getting to you."* [Dubbo participant] *"It's only 15 minutes from one side of Dubbo to the other side. So it's not a large distance, but it's just hard to get where you need to go when you need to go."* [Dubbo participant]
Have to stay overnight for medical appointments	*"…if you have an appointment in Sydney, you leave here at 2 pm you get to Sydney at 9 so you have to stay the night. The XPT leaves the next morning at 7 am so you have to stay another night, so it requires a two-night stay in Sydney."* [Dubbo participant]
Difficult to get a taxi service with short distance	*"If I went shopping and I only had a short distance to go home, the taxi won't pick you up, they will reassign it because it's a short trip and you can wait, I waited one afternoon for an hour and a half in the cold waiting for a taxi and it was dark."* [Dubbo participant]
Difficult to get services at night	*"…they don't have enough drivers to service the needs of the community at the times, and people are out at night …"* [Coffs Harbour participant] *"I find it backwards that we cannot get a cab at any hour of the day and night in 2022, it's ridiculous and I've been stuck at places because I can't get home until the next day. "* [Coffs Harbour participant]
Difficult to find disability parking	*"Parking is an issue in Dubbo. Especially disability parking."* [Dubbo participant]
Difficult to Obtain bus routes information	*"When you are waiting for the buses and it tells you all the different buses, there is no network information. So I don't even know where it's going what direction they are going to either. It's happened to me a couple of times, I didn't know what bus to get on, I don't know where such street is."* [Coffs Harbour participant]

Difficult to get to the bus stop	*"I live far away from the bus stop and have to walk over 30 min to get to the bus stop".* [Nowra participant]
Difficult to go on long-distance travel	*"I had a friend who used to commute between Dubbo and Melbourne and if you just punch in how to do it by train it will make you go to Melbourne, Sydney waiting nine hours and then to Dubbo where in fact you can catch a train to Cootamundra."* [Dubbo participant]
Waiting time is too long	*"Sometimes I will wait up to an hour and if they still haven't turned up you have missed if you did have an appointment. We went to go and see something at the theatre, missed the opening times and it sort of put you of from doing things like that."* [Dubbo participant] *"I got a taxi out there, but to get a taxi home, I had to wait an hour and a half, they were that stretched, they just didn't have enough taxis or transport."* [Nowra participant]
Low frequent bus services	*"Difficult to get to work as buses aren't frequent enough and bus schedules are based around school pick-up and drop-off times. I show up 1.5 hours early for work as the next bus does not come for hours and would make her late."* [Dubbo participant]
Difficult to go out on weekends	*"It's difficult if you want to go somewhere especially on weekends. I was using Communities transport all the time and as long as it was before 4 o'clock, you would not have it after 4pm."* [Nowra participant] *"If I had a vehicle I'd be going to Shellharbour every weekend. Now I don't have a vehicle, I'm limited to where I can walk. Personally, I walk as far as the top of Bomaderry and as far south as South Nowra, but otherwise I'm limited to be here."* [Nowra participant]

• Social impact

Social impact means any significant or positive changes that solve or at least address social injustice and challenges, and the typical indicators of social impact measure employment, and absolute and relative income, levels of education, health, housing, and other social services; as well as social integration. The identified social impact of transport disadvantage on vulnerable groups in this study is summarized in Table 13:

Table 13: Examples of social impact on end users

Sub-theme	*Quotations*
Social exclusion	*"People had wheelchairs and things and they couldn't get into buildings because they had steps."* [Nowra participant] *"One thing about all this, in other words, better services would stop a lot of isolation in our community."* [Coffs Harbour participant]
Difficult to go shopping	*"Sometimes if I don't get home, I want to go somewhere else, I want to go and do some shopping, I need to get things, go to Woolworths. I can walk from where I am, but I have done my ankles I can't walk very far, so I use buses if it's a very short trip. But yes, if it got dark, I would probably put it off until the next day, if I could get away with it."* [Coffs Harbour participant]
Miss work and education opportunities	*"I live in rural area without work and education opportunities, and due to the limited public transportation options, I have difficulty commuting to a job or educational facility in other cities."* [Nowra participant]
Reliance on others	*"I have disability and cannot walk at all. My carers have to provide transport for me if I wish to go out, I cannot go anywhere without the help of others."* [Dubbo participant]
Lack of transport for restaurant and cafe	*"I have difficulty traveling to areas with dining and cafe options, and we don't have that life quality."* [Dubbo participant]
Lack of transport services for concert	*"I cannot go to a concert or something since there are not available transport."* [Nowra participant]
Unemployment	*"I cannot go to another city to work due to the community issues, and there it is impossible to find a job in the place where I live, thus I have been in unemployment for several years."* [Coffs Harbour participant]

Difficult for schooling due to the transport	*"My kids go to Campbell Public School, they have to catch three different buses to get home, they have to catch different buses, different services, because some services won't cross the river, some do and we're basically told, "No, you've got to send them to a different school". I mean my son's got a disability, he needs to stay where he is."* [Nowra participant].

• Emotional impact

Emotional impact denotes the feelings of inspiration, connection or fun create an inner resonance, memory, and desire, that the transport disadvantage evokes in vulnerable groups that have true and lasting impact. The identified emotional impacts of transport disadvantage on vulnerable groups include anxiety, frightened, afraid to use transport at night, afraid of crime, afraid to drive, discrimination, lack of freedom, nervous, insecurity threats, robbery encounters, etc. Table 14 provides some examples of each sub-theme as reported by the participants.

Table 14: Examples of emotional impact on end users

Sub-theme	Quotations
Anxiety	*"I nearly had an anxiety attack at a Sydney hospital because the CT driver rang me and said he's getting pressure on him that he needs to [have] left here by 2 o'clock to be back at a reasonable hour at 4. I can't help that when I got there, they said I needed to have all these tests... I was having anxiety, I nearly started to cry because I was thinking, 'I either walk away and don't have these things done, and I don't know how I'm going to get home".* [Nowra participant]
Afraid of crime	*"We were the highest unemployment, highest alcohol, highest domestic violence, highest children's deaths under 12 years old."* [Nowra participant]
Afraid to use public transport at night	*"I live in Coffs Harbour and its way is too dark. I wouldn't let my girls get the buses at night or anything like that on their own."* [Coffs Harbour participant]
Afraid to drive	*"Because I drive all the time but I get anxious to drive out of my comfort zone I won't go to Woolgoolga, I'm a bit nervous to drive there nowadays."* [Coffs Harbour participant]
Discrimination	*"I was told by the guy who runs the booking centre that I should always put in my bookings that I have a guide dog so that the drivers can choose whether to pick me up or not. It's completely illegal. I've had legal people speak to them."* [Dubbo participant]
Nervous	*"When I'm standing at night to get the bus when it's dark in winter, I'm a little bit nervous. If it's a group of people coming up, oh no it's not to be sneezed at you are still weighing them up. I can't see them, it's too dark, I don't really know what they are going to do."* [Coffs Harbour participant]
Insecurity threats	*"I'm part of a disability group and there is a guy in there that was, during the middle of the day he got bashed at his local park, he has disabilities, but the police told him he shouldn't go to his local park."* [Nowra participant]
Robbery encounters	*"Straight up there is a guy that got stabbed just around the corner a couple of months ago at 4 o'clock in the morning, stabbed in the middle of the street."* [Nowra participant] *"I've had clients robbed there a couple of times while waiting for buses…"* [Coffs Harbour participant]
Frightened	*"I remember ringing one taxi to get home and someone jumped in my cab, must have hailed it or something and jumped in it. I stood out and get really frightened."* [Coffs Harbour participant]

Table 15 summarizes the impact of transport disadvantage on vulnerable groups based on the number of references mentioned by end users in each location. It can be seen that functional impact occupies the largest proportion (56%), followed by social impact (23%), and emotional impact (21%), respectively. Three of the most significant impacts mentioned by

users across all locations are "difficult to attend medical appointments" (12%), "difficult for schooling due to the transport" (8%), "waiting time is too long" (8%). The most significant emotional, functional, and social impacts across all locations are "insecurity threats" (6%), "difficult to attend medical appointments" (12%), and "difficult for schooling due to the transport" (8%)". After analysing the crosstabs conducted between the sub-codes of the three layers of impact and the locations it is shown that users in Coffs Harbour reported the highest levels of functional impact and users in Dubbo reported the highest levels of emotional impact, while users in Nowra reported the highest levels of social impact. It is appropriate to focus resources and efforts on addressing the specific needs and impacts experienced by users in each location. For example, support for functional impact could be prioritized in Coffs Harbour, emotional impact in Dubbo, and social impact in Nowra.

Table 15: Impact of transport disadvantage on vulnerable groups

	Dubbo	Coffs Harbour	Nowra	Total
Emotional impact		21.0%		
Afraid of crime	0.0%	0.0%	2.9%	1.0%
Afraid to use public transport at night	0.0%	2.1%	0.0%	1.0%
Afraid to drive	0.0%	4.2%	0.0%	2.0%
Discrimination	5.9%	0.0%	0.0%	1.0%
Freedom	0.0%	0.0%	1.0%	1.0%
Frightened	0.0%	6.3%	0.0%	3.0%
Insecurity threats	0.0%	6.3%	8.6%	6.0%
Nervous	0.0%	2.1%	0.0%	1.0%
Robbery encounters	0.0%	4.2%	8.6%	5.0%
Functional impact		56.0%		
Difficult to attend medical appointments	11.8%	15.7%	5.7%	12.0%
Difficult to find disability parking	5.9%	0.0%	2.9%	2.0%
Difficult to get Taxi at night	0.0%	10.5%	0.0%	6.0%
Difficult to get out and around	5.9%	0.0%	0.0%	1.0%
Difficult to get to the bus stop	0.0%	0.0%	1.0%	1.0%
Difficult to get transport at night	0.0%	4.2%	0.0%	2.0%
Difficult to go on long distance travel	5.9%	0.0%	0.0%	1.0%
Difficult to go shopping	0.0%	2.1%	0.0%	1.0%
Have to stay overnight for medical appointments	17.7%	8.3%	0.0%	7.0%
Lack of information on bus networks	0.0%	2.1%	0.0%	1.0%
Lack of transport services for medical trips	5.9%	6.3%	5.7%	6.0%
Lack of transport services in rural areas	5.9%	4.2%	7.6%	6.0%
Low frequent bus services	11.8%	4.2%	2.9%	5.0%
Waiting time is too long	23.5%	4.2%	5.7%	8.0%
Social impact		23.0%		
Difficult for schooling due to the transport	0.0%	2.1%	24.7%	8.0%
Difficult to go out on weekends	0.0%	6.3%	8.6%	6.0%
Lack of transport for shopping and cafe	0.0%	0.0%	5.7%	2.0%
Lack of transport services for concert	0.0%	2.1%	0.0%	1.0%
Miss work and education opportunities	0.0%	1.0%	0.0%	1.0%
Reliance on others	0.0%	1.0%	1.0%	2.0%
Social exclusion	0.0%	0.0%	5.7%	2.0%
Unemployment	0.0%	0.0%	2.9%	1.0%
Total	100%	100%	100%	100%

Prosocial aspects of regional and rural MaaS

An effective prosocial intervention relies largely on the ability to identify the presence of a negative state and determine the cause of the negative state. Figure 24 illustrates the general prosocial aspects of MaaS, namely, availability and affordability, integration and sharing, comfort and convenience. Moreover, each of these three varieties of behaviour is elicited by a unique negative state related to functional, social and emotional needs respectively. The motivation behind MaaS is to fill in the unmet mobility needs with more available transport services, which can be characterised by availability and affordability. In view of the unequal access to mobility resources, MaaS aims to distribute mobility resources equally and provide services for different trip purposes, which can be characterised by integration and sharing. RTRH MaaS aims to alleviate disability stress from the perspective of comfort and convenience after recognizing the negative emotional states of end users. Individual differences affect the various forms of prosocial behaviour differently depending on how they influence the underlying mobility constraints.
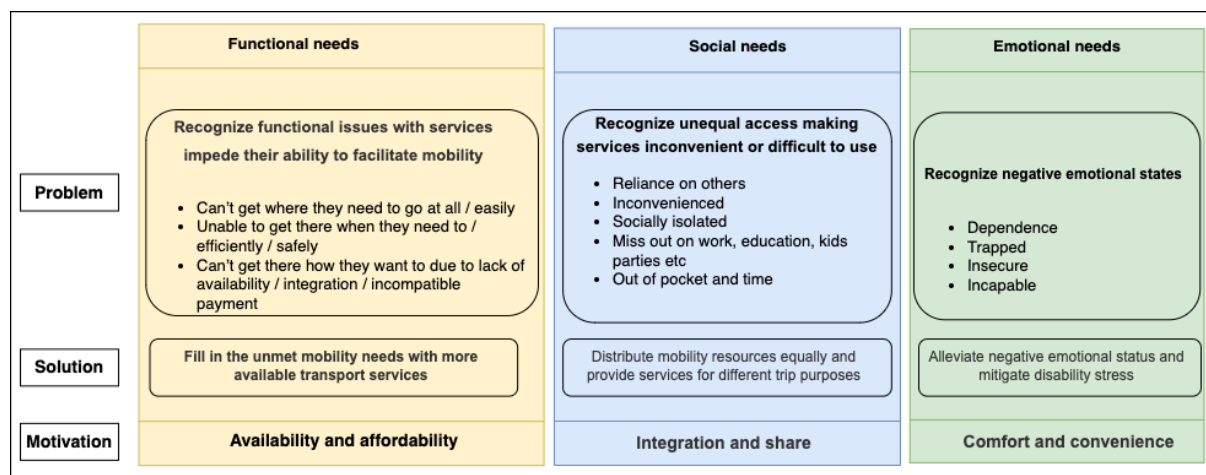

Figure 24: Prosocial aspects of RTRH MaaS

Users' responses to regional and rural MaaS

Figure 25 summarizes users' responses to MaaS. If implemented properly, MaaS presents a significant opportunity to connect multiple needs, and therefore, improve transport services. In addition to customer-service orientation, MaaS also helps transport disadvantaged individuals feel more capable, safer, makes it easier to travel anywhere, save time and money, and reduces the transport disadvantage gap. It may mitigate vehicular emissions, provide one pass covering all modes, improve the quality of life for the most vulnerable, and reduce dependence on cars.

There is a positive response to MaaS that is available via mobile applications such as providing one-stop shopping, convenient payment methods, customized services, travel opportunities, convenient price checks, connectivity between multiple services, delivery services, integrated information, and various routes. Moreover, young people are comfortable with the use of mobile applications. Negative responses to MaaS include a refusal to use the App from non-tech-savvy users, lack of trust and reliability of Apps, and the inability to use it by visually impaired and blind individuals.

In response to the concept of a MaaS subscription, on the one hand, MaaS via mobile applications has received positive responses due to its one-stop shopping feature, convenience in payment methods, customization of services, travel opportunities, ability to check prices easily, connectivity with multiple services, delivery options, integrated information, and multiple route options. Additionally, young people are receptive to using mobile applications for MaaS. On the other hand, a subscription based MaaS business model has faced criticisms such as affordability issues and low frequency of usage leading to reluctance in subscribing.

This positive and negative feedback highlights the challenges in making MaaS affordable, convenient, accessible, and appealing to all segments of the demographics.
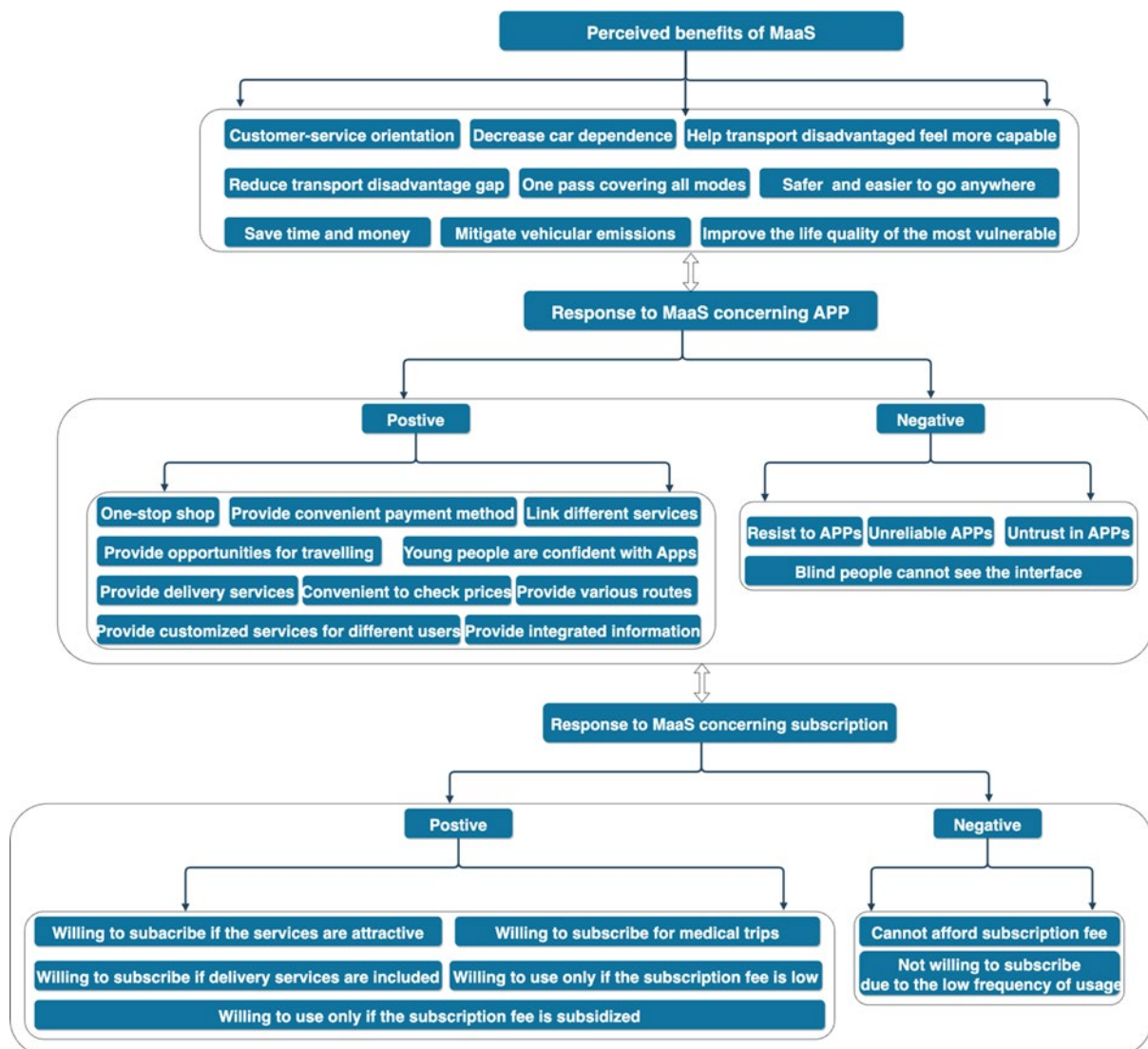
Figure 25: Users' positive and negative response to RTRH MaaS

Table 16 summarizes the results of crosstabs conducted between sub-codes of "response to MaaS via App" and the three locations. It shows that positive response to MaaS via App (75%) is greater than the negative response (25%). The most significant negative response comes from "resist to Apps" (14%), followed by "lack of trust" (5%) and "unreliability" (4%). The most frequently mentioned positive response includes "provide delivery services" (37%), "provide

integrated information (9%)", "convenient to check price (5%)", "link multiple services (5%)", "provide various routes (5%)", "one-stop shop" (45%), and "provide opportunities for travelling" (4%).

Table 16: Response to MaaS concerning App

Subthemes	Dubbo	Coffs Harbour	Nowra	Total
Negative response to MaaS concerning APP		25%		
Resist to APPs	0%	46%	9%	14%
Unreliablity	0%	8%	5%	4%
Lack of trust	9%	0%	5%	5%
Blind people cannot see the interface	0%	0%	5%	2%
Postive response to MaaS concerning APP		75%		
Convenient to check the price	0%	0%	14%	5%
Link different services	0%	0%	14%	5%
One-stop shop	0%	0%	9%	4%
Provide convenient payment method	0%	8%	0%	2%
Provide customized services for different users	0%	0%	9%	4%
Provide delivery services	82%	23%	0%	37%
Provide integrated information	0%	8%	18%	9%
Provide opportunities for travelling	0%	0%	9%	4%
Provide various routes and services	5%	8%	5%	5%
Young people are confident with Apps	5%	0%	0%	2%
Total	100%	100%	100%	100%

The expected gold standard in regional and rural transport

The expected gold standard in transport, as described and drawn (see Figure 26) by end users, can be summarized into four categories as shown in Figure 27: better infrastructure; integration; safety, comfort and convenience; and availability, affordability and flexibility.
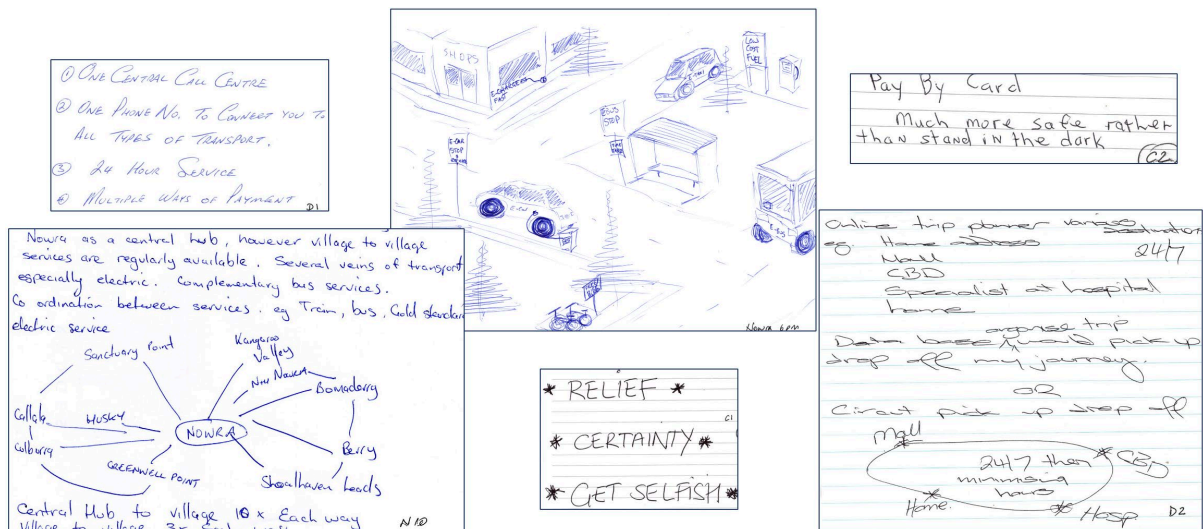

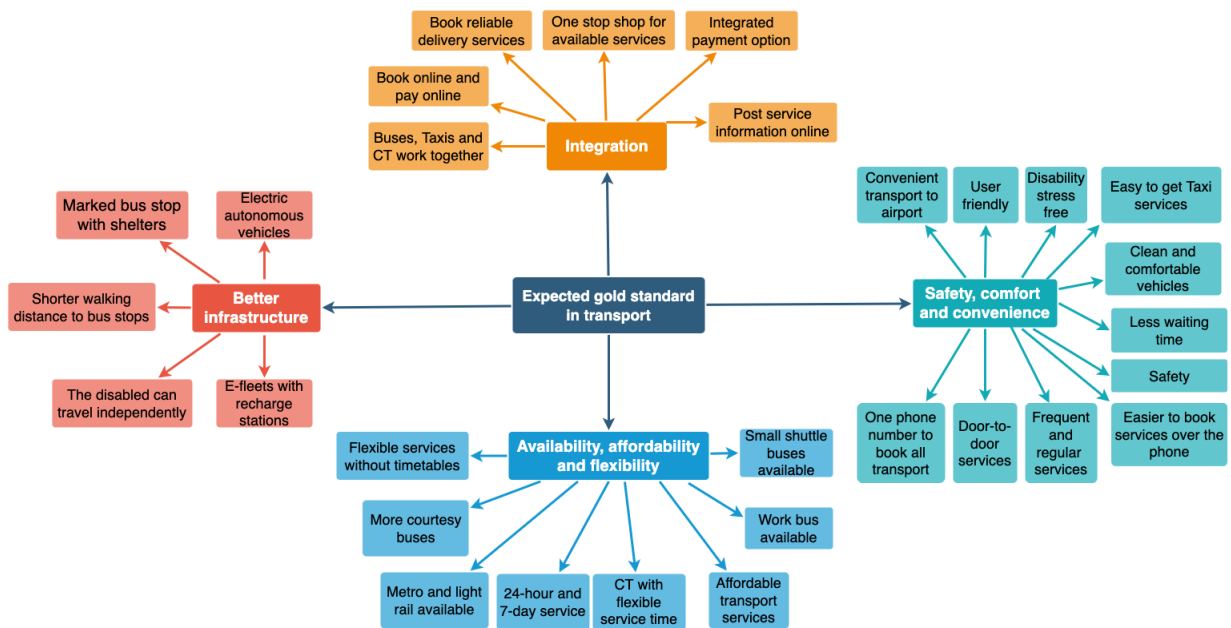**Figure 26: Expected gold standard in transport using their own words**

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Figure 27: Expected gold standard in transport

Reasons why public transport fails in regional and rural areas

According to the results of the in-depth interviews with stakeholders (Section 3.3), it is identified that few users are willing to give up using their personal cars. Thus, we investigated the reasons why alternatives to car fail in the end user group discussions (Table 17). It reveals that "lack of available services" (25%), "public transport takes longer time" (17%), "car culture" (14%), "unreliable bus and taxi services" (10%) "limited accessibility" (10%), "difficult to find bus stops" (7%), incompatible payment systems (4%), restricted service areas, personal risks (2%), unaffordability (2%), and disability (1%) are the major reasons reported by users as to why alternatives to car fail. Moreover, the crosstab between the sub-codes and locations show that "public transport takes longer time" (30%), "lack of available services" (38%), and "unreliable bus and taxi services" (23%) are the most crucial reasons as to why alternatives to car fail in Dubbo, Coffs Harbour, and Nowra, respectively.

Table 17: Reasons why alternatives to car fail

	Dubbo	Coffs Harbour	Nowra	Total
Car culture	17%	10%	17%	14%
Difficult to find bus stops	0%	16%	6%	7%
Disabilities	0%	2%	1%	1%
Incompatible payment systems	5%	4%	4%	4%
Inconvenience	0%	0%	7%	2%
Lack of available services	20%	38%	20%	25%
Lack of personal security	0%	15%	0%	5%
Limited accessibility	18%	0%	13%	10%
Personal risks	2%	3%	0%	2%
Public transport take longer time	30%	8%	13%	17%
Restricted service areas	6%	0%	0%	2%
Unaffordability	1%	1%	0%	1%
Unreliable bus and taxi services	1%	7%	23%	10%
Total	100%	100%	100%	100%

4.3.2 Results of the "paper & pencil" survey

Participants in the discussion groups are also completed a "paper & pencil" survey (see the MS5 report for a description). Four themes are addressed: types of transport people are currently using, booking and payment methods (Figure 30); barriers to getting out; response to integrated mobility services; and suggested improvements. Due to the small samples, the research findings are indicative rather than definitive.

Status quo of mobility services in RTRH
In line with the analysis for in-depth interviews described in Section 3.2, we first analysed the status quo of mobility services such as types of transport that users are currently using, methods of knowing about available services, booking, and paying for them.

Figure 28 shows that private car as a driver (60%, 50%) and private car as a passenger (55%, 46%) are the most popular means of transport reported by users in Dubbo and Nowra, while Taxi/Uber (69%) and walk (69%) are most popular in Coffs Harbour. Bus is more popular in Coffs Harbour (54%) than n Dubbo (33%) and Nowra (29%), while train is less popular in Coffs Harbour (9%) than in Dubbo (28%) and Nowra (48%). Patient transport service and age care service are least used by people due to the availability and eligibility. These findings suggest that to improve the usage of transport options, it may be helpful to address the issues affecting availability and eligibility of patient transport and age care services. Additionally, promoting public transport could help reduce reliance on private cars. Encouraging active modes of transport, such as walking and cycling, through the provision of infrastructure such as bike lanes and pedestrian walkways can also be beneficial.

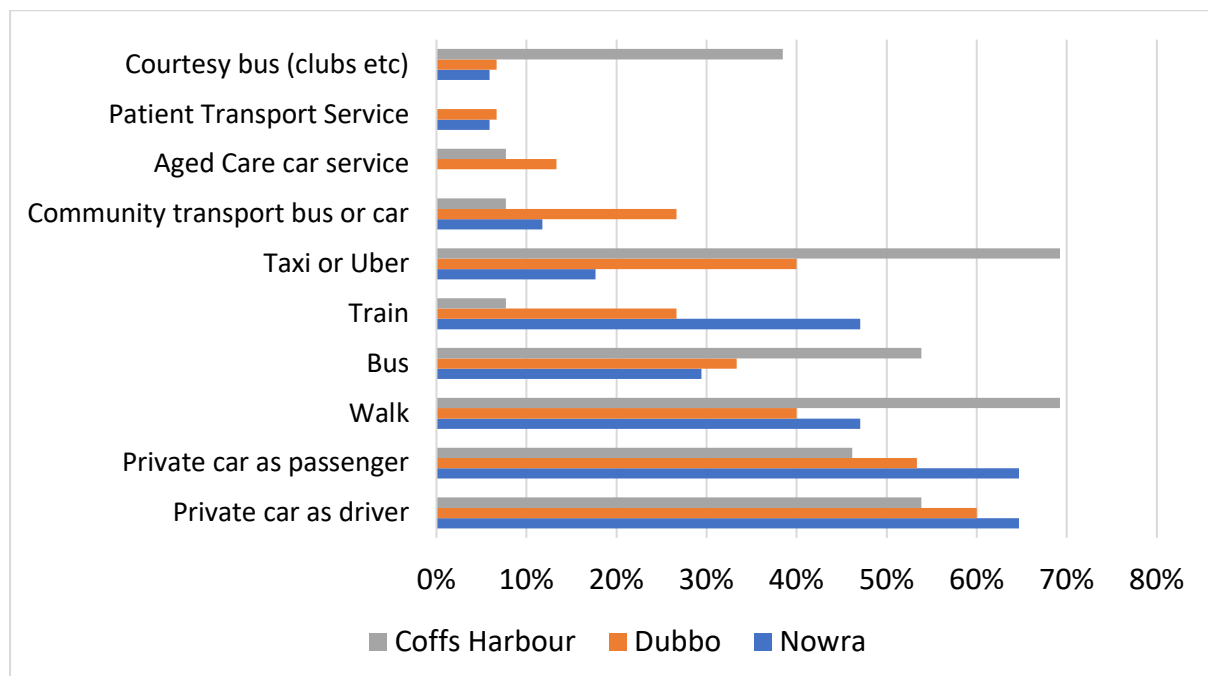**Figure 28: Types of transport people are currently using**

The most popular method of booking transport in Coffs Harbour, Dubbo, and Nowra is via a mobile phone with percentages of 78%, 80%, and 48% respectively (Figure 29). Booking through a website is less popular, accounting for less than half of those who book over the phone. Getting someone else to arrange the booking is the least popular method in Dubbo

and Nowra. To improve the booking experience for users, it may be helpful to focus on improving the user experience for booking through a website. Additionally, it may be worth exploring other methods of booking, such as through a dedicated App or through voice-activated assistants like Siri or Alexa, to better meet the needs of users.
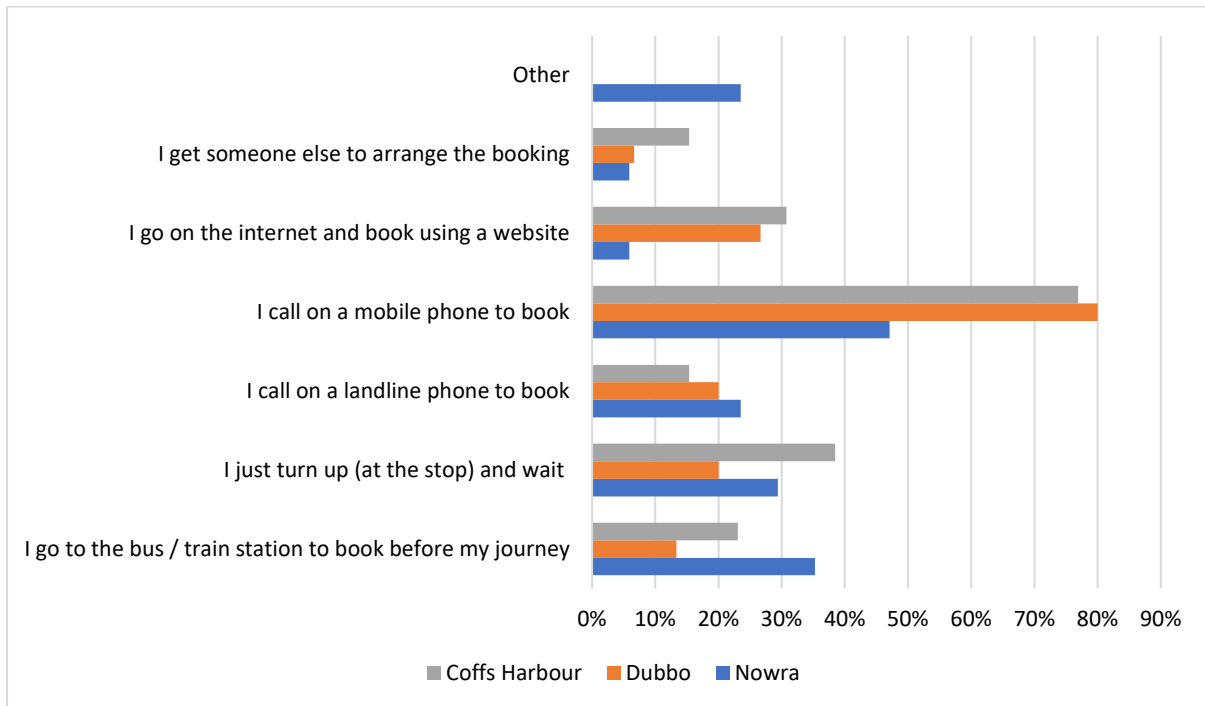

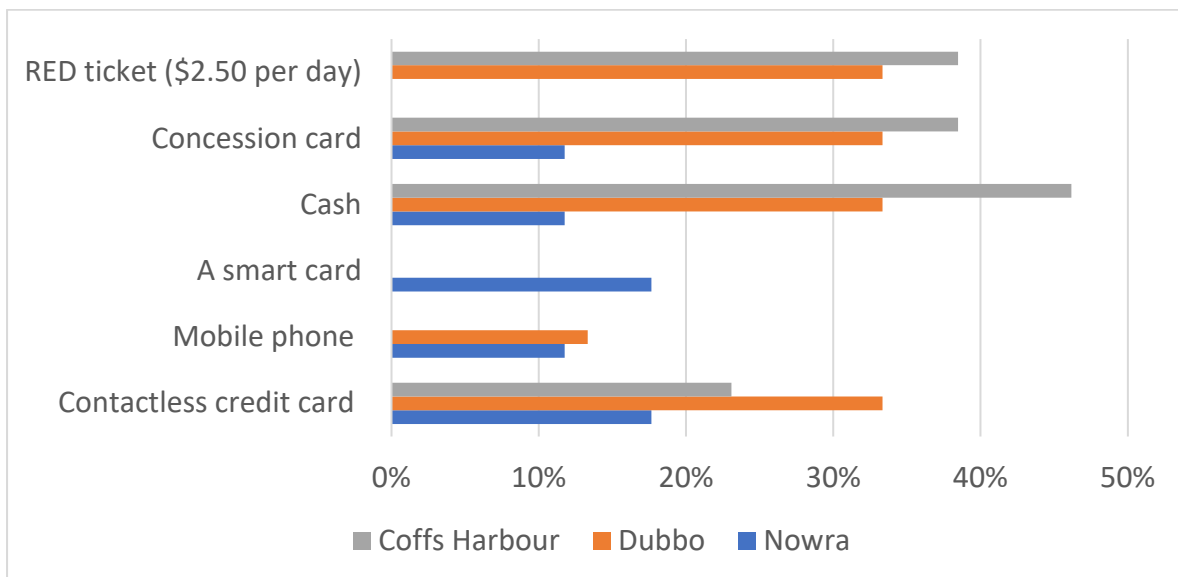**Figure 29: Methods of booking transport**

Figure 30: Payment methods

Figure 30 shows that for people in Dubbo using the RED ticket ($2.5 per day), concession card, cash, and contactless card all occupy the same proportion (33%). People in Coffs Harbour reported using cash (46%), followed by those using RED ticket and concession card (39%) and

contactless credit card (23%). Most people in Nowra reported using smart card/ contactless credit card (18%), followed by concession card/cash/ mobile phone (12%).

To improve the payment experience for users, it may be helpful to increase the availability of the most popular payment methods in each location, and to make it easier for users to understand and use these methods. This could include providing clear information about the different payment options, as well as offering training or support to help users get started. Additionally, exploring alternative payment methods, such as mobile phone payments or digital wallets, could help meet the changing needs and preferences of users over time.

Barriers to getting out
As shown in Figure 31, the greatest barrier reported in Nowra is disability (48%), followed by unsafe, uneven, or lack of pathways (41%), lack of transport services that suit needs (35%), and difficult to get in/off vehicles and the cost of public transport (12%), etc. The greatest barriers reported in Dubbo is don't have a valid driver licence (33%), followed by disability (28%), cannot afford a car (14%), and need for a carer (7%), etc. The greatest barriers reported in Coffs Harbour are: cannot afford a car and uneven, or lack of pathways (38%), followed by the cost of public transport, lack of transport services that suit needs, the cost of public transport, and disability (31%), etc. Overall, discussion groups in Nowra and Coffs Harbour reported more barriers of getting out than those in Dubbo. To address these barriers, some potential solutions could include providing more affordable and accessible public transport options, including transport services that meet specific needs and partnering with local organizations to provide carers for those who need them.
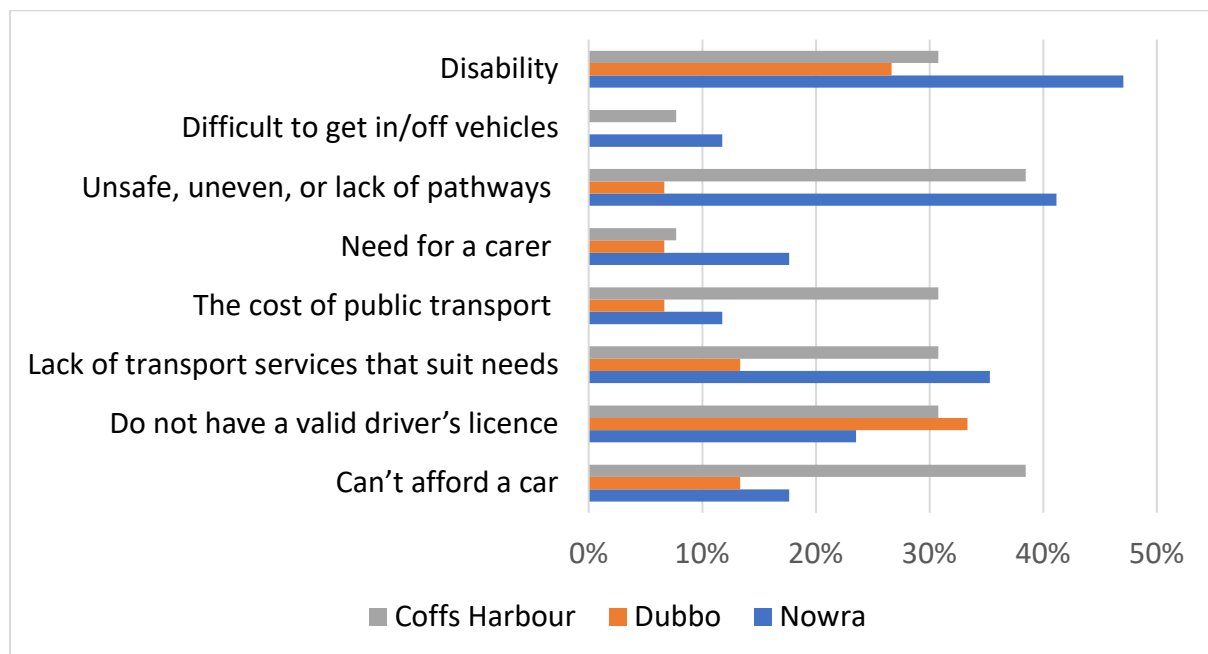

Figure 31: Barriers to getting out

Response to integrated mobility services
There is growing interest in finding ways to make travel planning as easy as possible and to make trips themselves as seamless as is realistically feasible. While private cars offer relatively

quick door to door travel, many people do not have access to one. While organisations such as CT can offer a variety of vehicles, including cars, it is challenging to be able serve the many requests they receive. Additionally, while taxis and Uber are very convenient (where available), they are expensive for those who don't have certain concession cards or subsidies. The survey made a first attempt to explore the attractions of different integrated services to users if these services were available in their areas. Respondents were asked which of the following services (see Table 18) would be attractive to them.

Table 18: Services that people would be interested in using if they were available in their areas

Services that respondents are currently use or would be interested in using if they were available in the three locations	Nowra	Dubbo	Coffs Harbour
Public transport			
Walk to bus stop, take regular bus, and walk to your destination; full or concession fare (depending on entitlements)	71%	67%	69%
Book an on-demand bus, walk to pick up point, travel on the on-demand bus, walk from bus to your destination	53%	53%	85%
Book on-demand bus, take on-demand bus to train station, take train and walk to destination	59%	40%	62%
Walk to train station, take a train, and then walk to your destination; full or concession fare	35%	27%	54%
Bookable Car share in advance (at least 5 hours' notice):			
If just for you: pay the same as you do for a bus, picks you up from home and drops you at your destination. Guarantees return trip at booked time	76%	60%	69%
Sharing with other people you know: Each pays the same as they would for a bus. Picks you up at your chosen location (e.g. home, agreed meeting point) and drops you off at your chosen location (e.g. home, agreed meeting point).	76%	60%	77%
Sharing with other people you don't know: Each pays the same as they would for a bus, picks you up at your chosen location, drops you at your destination and guarantees return trip at booked time	47%	47%	46%
For just you: take you to train station, pick you up from station, and drop you at destination	76%	40%	54%
Sharing with other people you know pick everyone up, take them to train station, pick them up at station, and drop everyone off at their destinations	59%	47%	54%
Sharing with other people you do not know take everyone to train station, pick everyone up at station, and drop everyone off at their destinations	35%	27%	38%
Bookable Taxi:			
Book taxi anytime on concession entitlement or subsidy	82%	87%	77%
Bookable Go-get or Car- next door:			
Book and use Go-get or Car- next door	53%	27%	38%
e-scooter/bicycle			
Use personal e-scooter or e-bike all the way from "anywhere to anywhere".	29%	20%	38%
Use shared e-scooter or e-bike all the way from a pick-up point to destination	24%	7%	31%
Use e-scooter or e-bike to bus stop and take on bus	18%	7%	23%
Use e-scooter or e-bike to bus stop and take on train	24%	7%	8%
Walk:			
Walk the entire trip	29%	40%	62%
Non-mobility services:			
The ability to be able to use an App to order your shopping, take away food and other needed items such as a medicine, grocery, wine etc., and have it delivered to your home	71%	67%	54%

Table 18 shows that bookable taxi is the most attractive service for users (82%, 87% and 77% in Nowra, Dubbo, and Coffs Harbour), the integration of walk and regular bus is also attractive for users (71%, 67% and 69% in Nowra, Dubbo, and Coffs Harbour), bookable car share service with known persons is quite attractive for users, while bookable car share service with

strangers is much less attractive for users. Moreover, users have a great interest in using an App to order shopping and then have it delivered to home, with a percentage of 71%, 67% and 54% in Nowra, Dubbo, and Coffs Harbour. It is noticeable that active modes including e-scooter/bicycle, and walk are less attractive for the discussion group users.

These results indicate that RTRH MaaS could focus on improving and promoting bookable taxi and integrated walk and bus services. Additionally, the delivery services should be embedded into the MaaS App to enhance the value addition of MaaS.

Suggested improvements in regional and rural transport
A total of 22 suggested improvements proposed by the discussion group participants during the "paper & pencil" survey have been summarized in Figure 32. It can be seen that higher frequency of bus services is proposed twice more than other suggestions. Addressing these suggestions could potentially help address functional, social, and emotional impacts they are experienced. To determine the best course of actions, it would be helpful to gather additional information about the specific needs and preferences of users, as well as any operational or logistical constraints that may impact the feasibility of these changes.
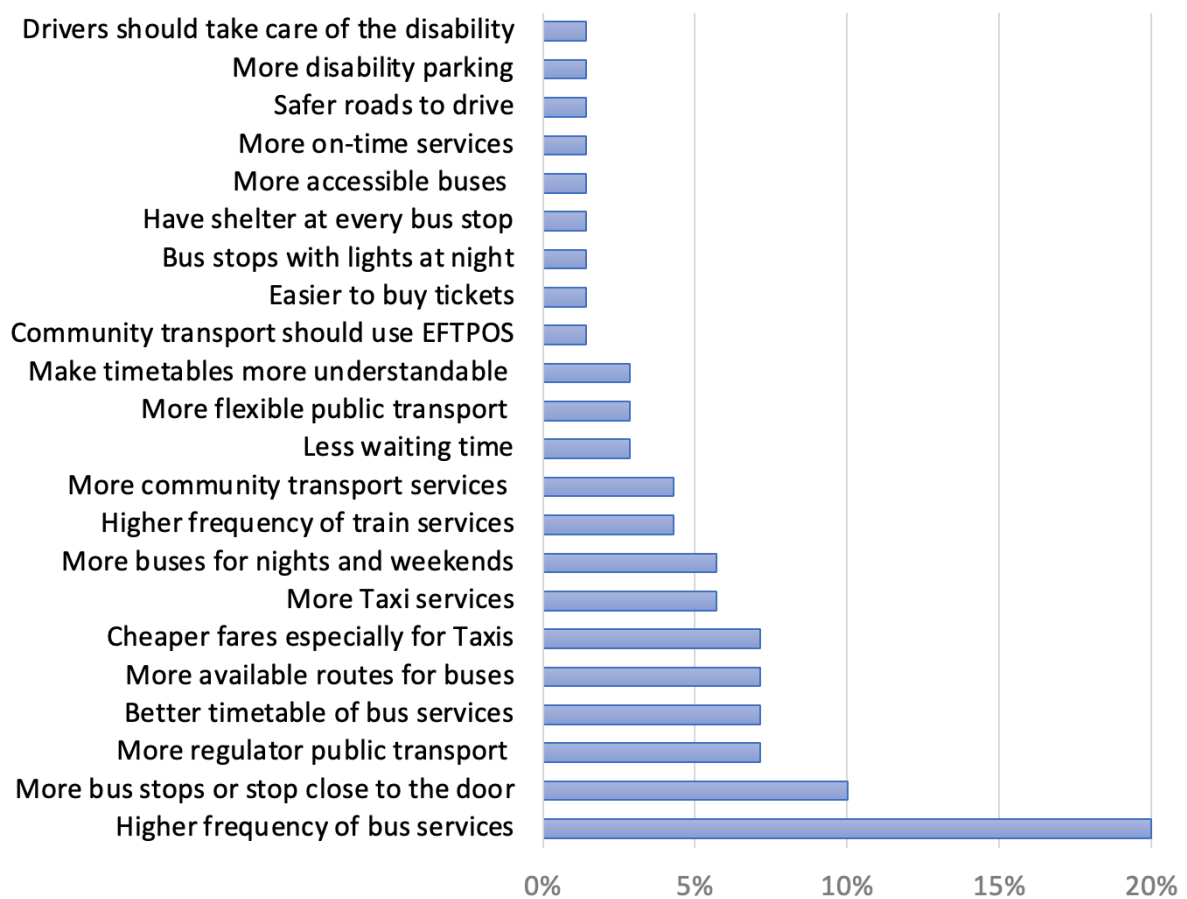

Figure 32: The frequency of the suggested improvement from "pencil & paper" survey

4.3.3 Highlights of end user group discussions and implications for online survey
The qualitative analysis of the group discussions and survey has provided valuable insights into the pain points faced by NSW regional and rural residents. The results have identified

barriers to meeting the mobility needs of vulnerable groups and the current transport conditions, as well as users' positive and negative responses to MaaS offering in regional NSW. The findings (Table 18) have also provided preliminary knowledge on the types of mobility services that are attractive to users. It has been shown that in the three locations studied, the focus is often on providing transport services to connect communities with larger regional or urban centres, rather than providing intra-regional transport services.

Insights obtained from the qualitative study were used to design an online survey targeting residents living in the regional 16 Cities in NSW[16]. We decided to widen the study areas to cover the 16 Cities so that a larger sample size can be achieved for the purpose of generalising the findings from the qualitative phase. Widening the study areas is also important for obtaining quantitative evidence on local and long-distance travel demand of regional NSW residents; both are crucial for the design of RTRH MaaS blueprint that could be applied to all regional NSW. The insights gathered from the focus group discussions and paper and pencil survey have shed light on the mobility challenges faced by vulnerable groups. By understanding the barriers that they face in meeting their mobility needs, the current transport conditions, and their responses to MaaS through an App and subscription, the state-wide online survey has been designed to address these issues and better understand the users' expectations for a "gold standard" transport system.

4.3.4 Descriptive results of the online survey

This sub-section presents descriptive results from the online survey on sample size and survey structure, sample profile, long-distance trips, and local travel.

Sample size and survey structure

The online survey design was reported in the MS5 report and approach to analysis described in Section 4.2.2. The survey was piloted in early November 2022, followed by a full launch on the 21st November after a one-week pause to check the data quality. Residents living in the 16 NSW Regional Cities and their hinterland areas were recruited via the Pureprofile online panel. The online survey was closed on the 13th December 2022 with a total sample size of 916 respondents, spread nicely across the 16 Cities (see Table 19).

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[16] https://www.transport.nsw.gov.au/projects/programs/16-regional-cities-services-improvement-program

Table 19: Distribution of the online survey sample by residential location

Regional cities	#Respondents
Tamworth	60
Armidale	20
Port Macquarie	68
Coffs Harbour	56
Grafton	49
Lismore	49
Nowra - Bomaderry	55
Canberra - Queanbeyan	101
Albury - Wodonga	74
Wagga Wagga	72
Griffith	47
Bathurst	49
Orange	62
Dubbo	54
Parkes	10
Tweed Heads	91
Total	**916**

The survey includes eight sections, with the first two aiming to collect spatial and socio-demographic information of the respondent (such as age, gender, residential postcode) and their use of various transport means and payment methods. Section 3 of the survey focuses on long-distance travel, defined as trips that are outside their RTRH area shown on a map for each respondent. Section 4 focuses on local travel within the RTRH area, including questions on travel purpose, number of trips taken by mode and purpose in the last 7 days and average cost per trip. This aims to understand existing user choices of mobility services for the purpose of designing a MaaS offering within an experimental setting of Stated Preference (SP) choices that follows in section 5. Section 6 seeks feedback on subscription plan while section 7 contains a set of attitudinal questions on transport services. The survey ends with optional questions on income group, employment status, cultural background, and booking methods when using on-demand transport such as taxi, rideshare, and on-demand bus.

Sample profile
This sub-section provides a descriptive analysis of the sample profile to shed some light on the representativeness of the sample. Table 20 shows the split of respondents by occupation and some key socio-economic characteristics including age, gender, and income. Females were over-represented (76.4%) and the sample average age was 42. The most common occupations were Professional followed by Clerical and Administrative Worker, and other occupation.

Table 20: Online survey sample profile

Characteristic	Average (standard deviation)
Occupations	
Clerical and Administrative Worker	20.4%
Community and Personal Service Worker	9.1%
Labourer	3.3%
Machinery Operators and Driver	2.4%
Manager	9.7%
Professional	23.9%
Sales Worker	10.2%
Technicians and Trades Worker	4.4%
Other occupation	16.8%
Other socio-economic characteristics	
Female	76.4%
Age (years)	42.41 (16.72)
Personal annual income (AUD$000)	60.17 (41.53)
Have a smartphone	100.0%

Figure 33 displays the age distribution the sample. Respondents in the 25-34 age group account for the largest proportion and this percentage reduces gradually with age.
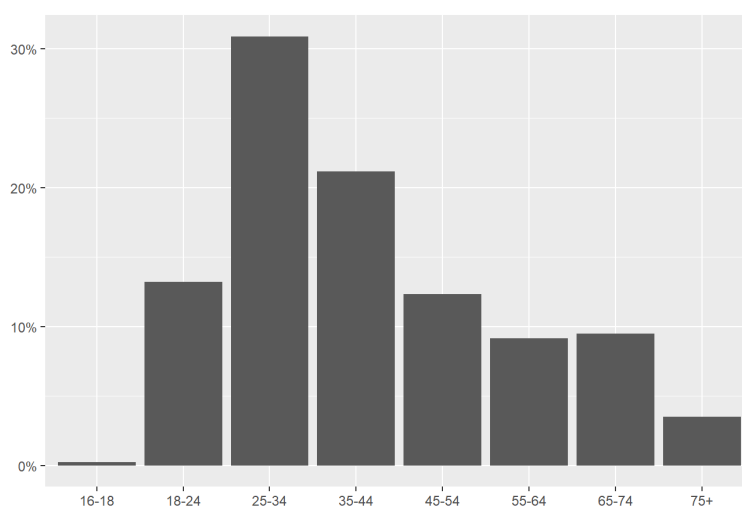

Figure 33: Sample distribution of age: RTRH MaaS online survey Dec 2022

Figure 34 shows different methods the respondents currently used to pay for public transport. A credit card is the most popular method of payment (47%) but other "smart payment" methods such as smartcard, smartphone, and Opal card are also heavily used by the sampled respondents. By contrast, cash is used by slightly more than one-fifth (22%) of the respondents. Note that in many of the 16 cities, the Opal system has not been rolled out yet. Note also that a respondent may use multiple methods of payment for public transport, and hence the percentages sum to more than 100%. These statistics suggest that regional NSW residents are familiar with smart payment methods. An implication is that regional NSW

would welcome a smart payment option if MaaS for the RTRH were to offer payment integration. What form this payment integration should take will depend on the rollout of a smart ticketing system for regional NSW; however, it appears that smartphone payment is not a good starting point because only 16% of the respondents have used smartphone as a payment method while all respondents have a smartphone (see Table 20). This reflects the differences in digital literacy between urban and regional residents. Thus, MaaS for RTRH should take a different form than MaaS in urban areas.
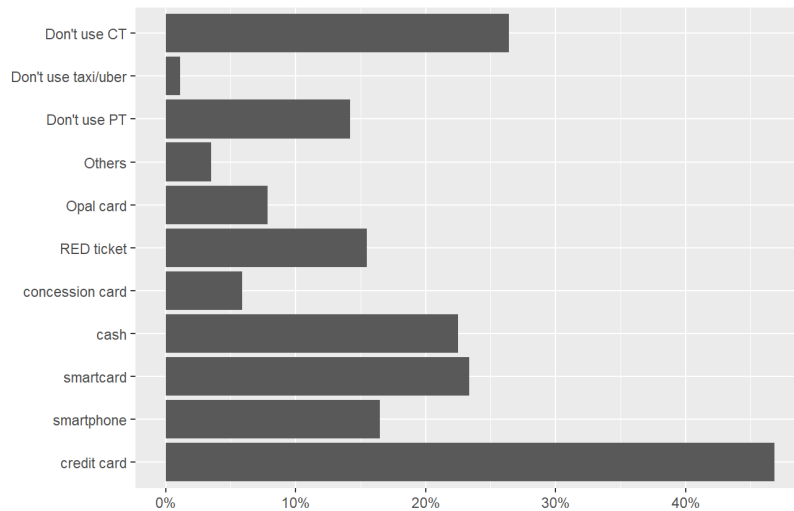

Figure 34: Payment methods for public transport in regional and rural NSW

Long-distance trips

This sub-section provides a descriptive analysis of long-distance travel by the sampled respondents.
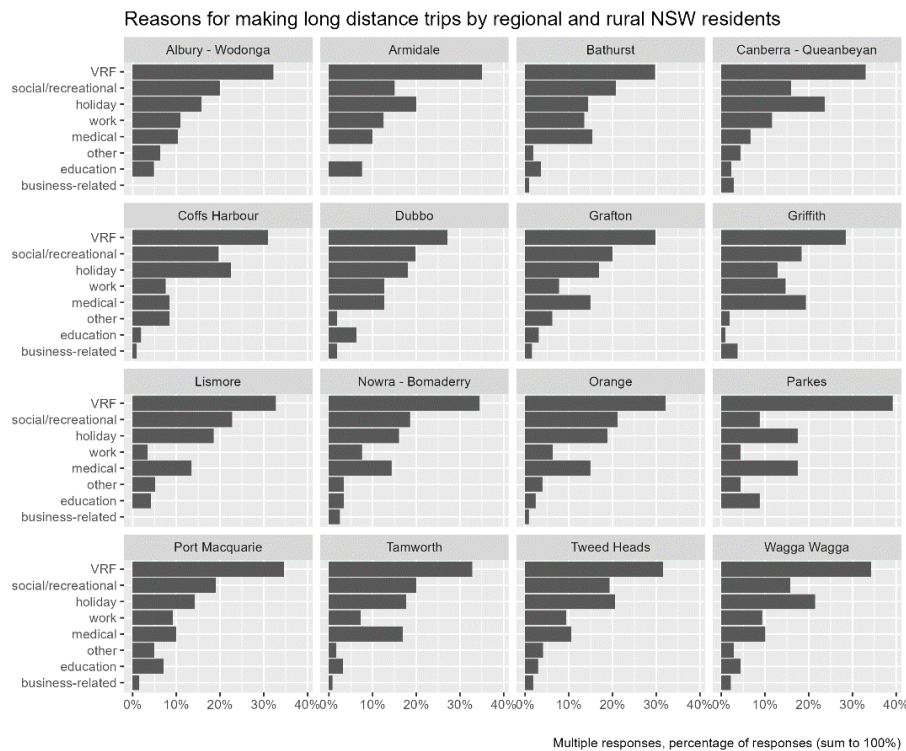

Figure 35: Reasons for making long-distance trips by regional and rural NSW residents

Figure 35 shows the reasons for long-distance travel in the last 3 months, segmented by the city the resident lives. Across all the 16 cities, visiting relatives and friends (VRF) is the most popular reason for making long-distance trips. By contrast, business-related and education/training are the least popular purposes for long-distance trips. While the incidence (or probability) of making a long trip outside of the regional town differs slightly across the 16 cities, the pattern is remarkably similar, with VRF being the most popular reason, followed by leisure, holiday, medical and work.

Pooling data from all 16 cities, Figure 36 shows the frequency of long-distance trips made by regional residents over the last 3 months. On average, a resident living in the 16 cities made about 16 long distance trips to visit their relative and friends over 3 months. The equivalent statistics for holiday, social/recreational, medical, and work are 9, 5, 3.5 and 3.2 respectively. Regional residents appear to make much fewer long trips for other purposes (education/training, employer's business, or others) with the average long-distance trip rate over 3 months being less than 2 for each purpose. An implication is that if MaaS for RTRH were to improve long distance travel via, for example, providing better connection to inter-regional transport hubs, it should focus on people travelling for social (including leisure, VRF, and holiday) and medical purposes.
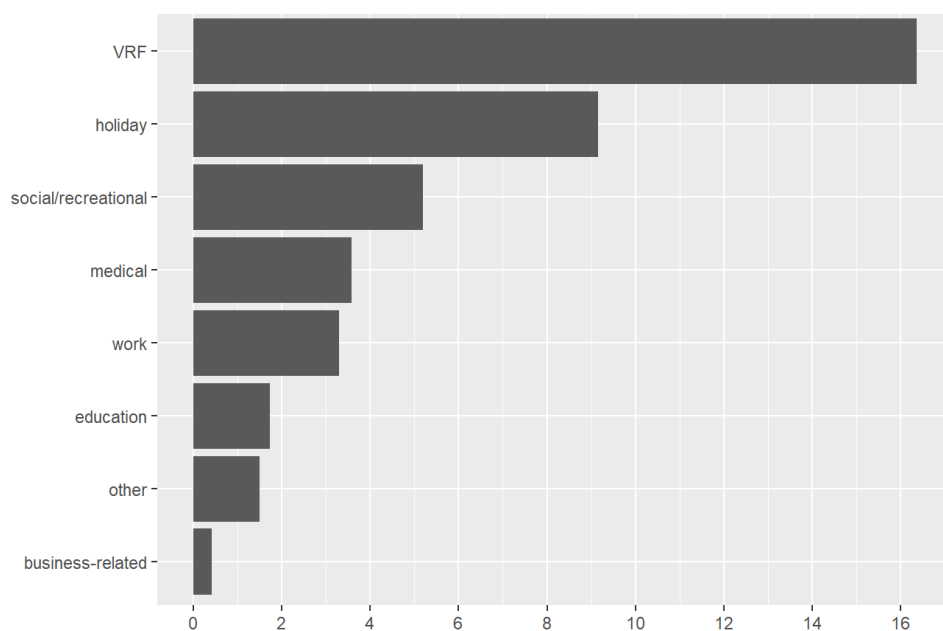
Figure 36: Average long-distance trips over the last 3 months by NSW regional and rural residents

Figure 37 slices the data further to shed some light on the transport modes the regional residents currently use for long distance travel. Unsurprisingly, regional NSW rely heavily on the private car when they made long distance trips; however, regional NSW also use other means of transport, particularly for social/recreational and medical purposes. Community Transport (CT) appears to play a bigger role for social/recreational travel while plane is more popular for medical purposes.

Figure 37: The average number of long-distance trips by mode and purpose over 3 months taken by regional and rural NSW residents

Local travel

This sub-section provides descriptive analysis on local travels by the sampled respondents. Local travels were defined in the online survey as trips within the regional town and rural hinterland. Generally, RTRH covers an area that can be reached within 40 minutes driving from the town centre.
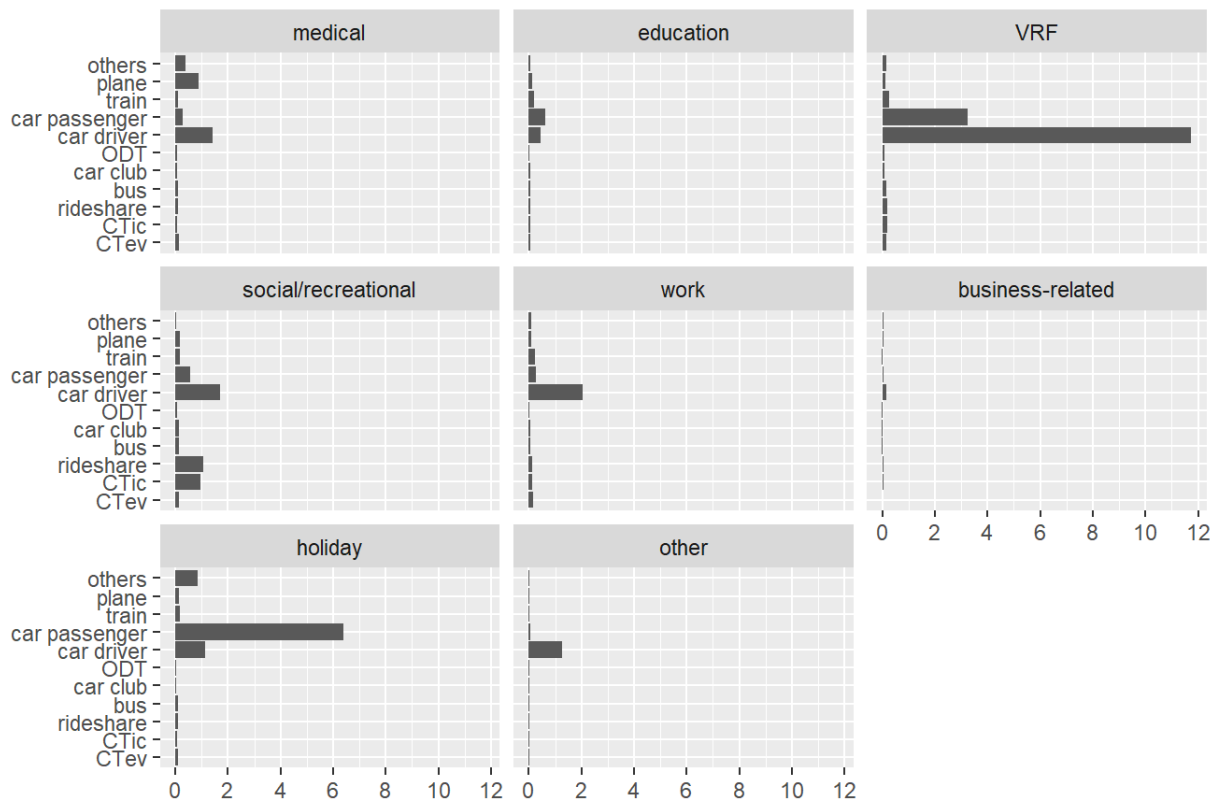
Figure 38 shows the trip purpose share of local travel by regional and rural NSW residents. Shopping is the most popular purpose of local travel, accounting for 28% of all trip purposes. This is followed by social/recreational activities (20%), work (20%), VRF (15%), health/medical appointments (12%), and education (8%). This information can provide valuable insights for policymakers and transport service providers, as it highlights the primary reasons for which individuals take short-distance trips and the potential areas for improvement in transport services. For example, if MaaS for RTRH aims at serving shopping trips, then it should provide more convenient and accessible transport options for shopping destinations.
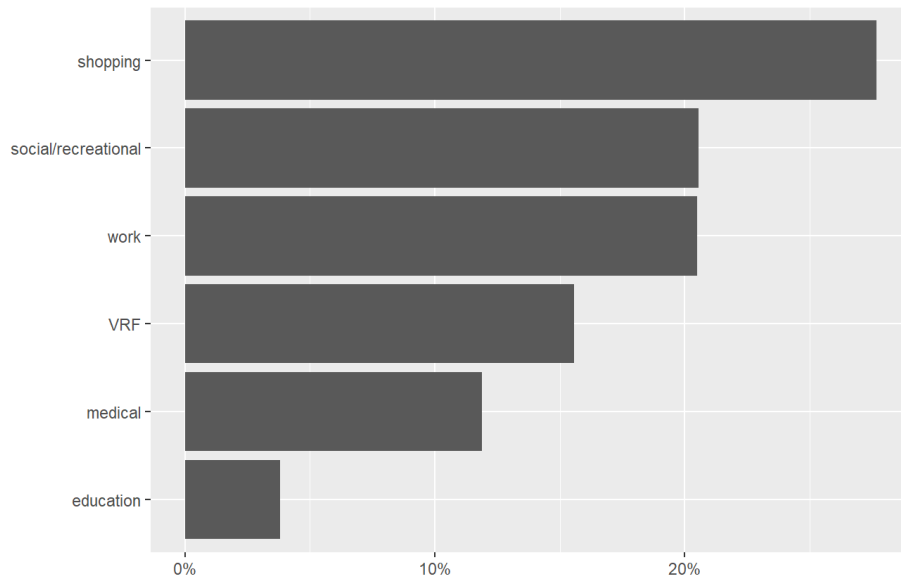
Figure 38: Trip purpose share of local travel by regional and rural NSW residents

Figure 39 shows that regional NSW residents made most of their local trips by the private car, mainly as a driver but also as a passenger. An average regional resident makes about 20 car trips per week while the number of trips made by other means of transport is much fewer, totalling to around 4 trips per week. This suggests that MaaS offerings in RTRH should somehow include the private car because the combined market share of all other means of transport is quite small, and hence not scalable.
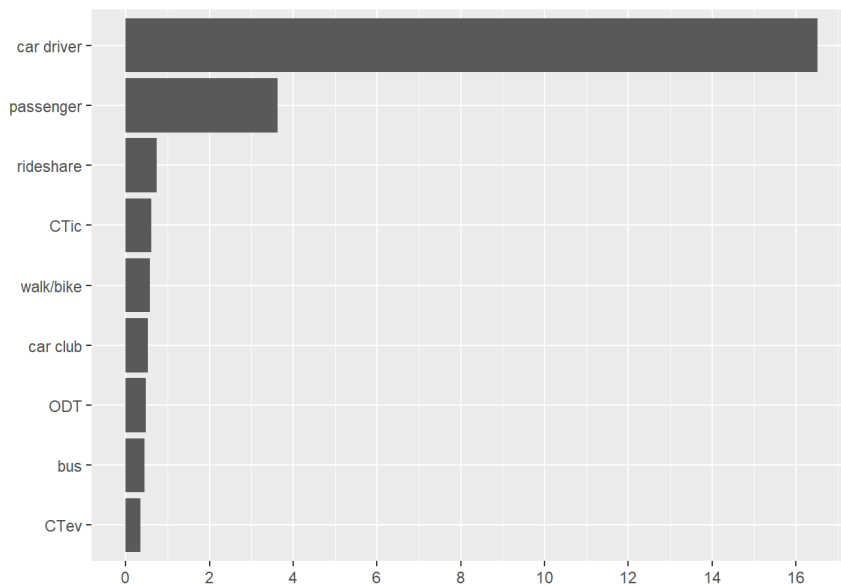
Figure 39: Average weekly local trips by mode by regional and rural NSW residents

Figure 40 shows the mode share for the most popular local travel purposes. Local trips to/from work are made mainly by car, but other travel purposes saw a higher share of active and public transport modes. Community transport, either using an internal combust engine vehicle (CTic) or electric vehicle (CTev) and rideshare appear to be popular for medical and VRF trips within the RTRH area, relative to other means of public transport. Bus and ODT

75

together account for about 7% to 10% of local trips, reflecting the decent role of local bus in regional towns.
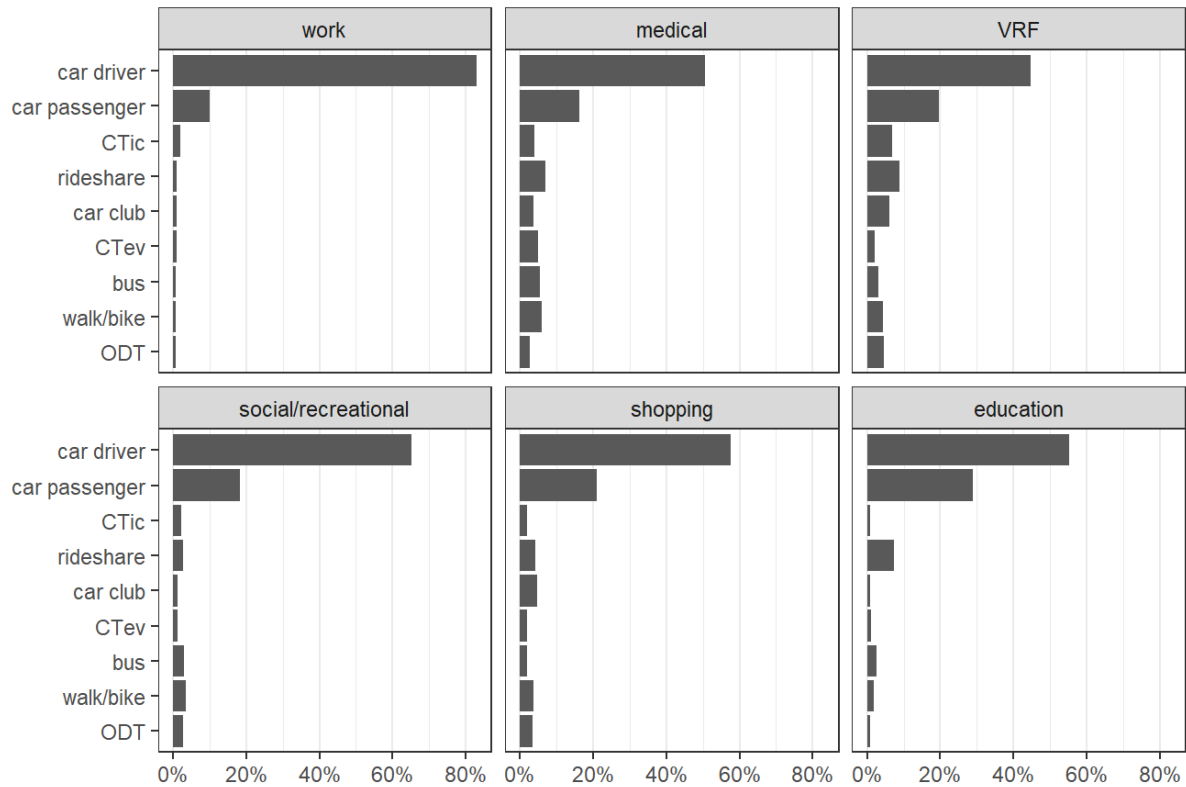
Figure 40: Mode share of local trips by purpose in NSW regional towns and rural hinterlands

4.3.5 Modelling results of online survey

The Stated Preference Experiment

A key feature of the online survey for 16 cities is a stated choice experiment designed to elicit preferences for various MaaS packages. Respondents were shown various alternatives, described by a combination of levels of attributes associated with each mode and non-modal service offers, asked to review them, and decide which one is their most preferred that they would choose if offered in a real market in the future. If none of the offers are appealing, they can simply choose to stay with what they currently do. An example stated preference screen is shown in Figure 41. Each respondent was shown two scenario screens and asked to make a choice in each one. A key objective of the stated preference experiment is to understand what modal and non-modal services open opportunities for improved accessibility that might be integrated into future MaaS products.

Section 5 - Transport and Other Service Offers

In the future, there are likely to be some new initiatives offered that give you more options of travelling. This would be available through subscription plans where, for a small fee you can choose from an extensive set of travel options at discounted prices as well as other services. These offers mainly target the short trips around and beyond the town in the catchment area **but there are also discounts available for longer distance travel if you were to choose a plan for short trips**. There are also benefits not related to your travel such as grocery shopping discounts.

This section shows two different plans to which you could subscribe for a small fee (refer to the last row of the table) in order to take advantage of the discounts. We will ask you to choose your preferred option between these plans or your current travel arrangements, if you do not like either plan.

Choice game example

Add-on Item ◀ All subscription plans also offer a 20% discount on fares and other expenses such as accommodation for long-distance trips.

Weekly Subscription Plans	Current Costs	Subscription Plan A	Subscription Plan B	None of these plans
Transport services				
Community based transport using hybrid/electric vehicles	$1.8/km if you use	20% off fare	25% off fare	
Community based transport using petrol/diesel vehicles	$1.8/km if you use	10% off fare	15% off fare	
Taxi/Rideshare (e.g., Uber)	$1.13/km if you use	0% off fare	50% off fare	
Local Bus	$2.5/trip if you use	20% off fare	10% off fare	
Car club/Car subscription services (e.g., Goget, and Car Next Door)	$0.4/km if you use	20% off fare	15% off fare	
On-demand bus	$1.6/trip if you use	10% off fare	15% off fare	
Discount on other goods and services				
Home delivery goods (including food and beverages ordered and delivered to your home)	you are paying $2 per week	10% off per week	30% off per week	
Shopping goods including click and collect purchased by visiting a store (e.g., grocery and retail)	you are paying $5 per week	5% off per week	10% off per week	
Media streaming services (e.g., Netflix, Foxtel)	you are paying $6 per month	15% off per month	10% off per month	
Weekly subscription fee		$10 per week	$12 per week	

We ask you to review each subscription plan carefully before responding to each scenario, as your choices will help design transport services that can deliver attractive benefits and make it easier to get around. There are no right or wrong answers to these questions. Your preferences and opinions are what matter most.

Although some of the transport and other services listed may not be available where you live today, they may be in the future. So, we want to find out which, if any, you would be interested in using. So, please view this question as an opportunity to tell us about services you would like to see provided, regardless of what is currently available.

You mentioned that you undertake some long-distance trips for making Visiting Family/Friends. All subscription plans also offer a 20% discount on fares and other expenses such as accommodation for long-distance trips besides the offers listed in the subscription plans.

Please click this box to confirm that you understand the context of the scenario.
☐ Yes, I understand that some modes and benefits may not be available now but are important to consider in the plan
Please continue by clicking the "Next" button.

Back   Next

Figure 41: Example stated preference experiment screen

The stated preference experiment was answered by 822 respondents, so in total we have 1,644 choices (two per respondent). A descriptive profile of respondents is presented in Table 21, which shows the characteristics that had a statistically significant influence on preferences towards the MaaS schemes. At the end of the survey, participants were asked if they would intend to take up on the non-modal service offers (home delivery, shopping or media streaming services discounts and benefits). Less than half of participants said they would intend to use the home delivery services, while more than 60% said they would use the shopping or media streaming services.

Table 21: Individual descriptives

Variable	Mean (std dev)
Personal annual income (000AUD$)	59.930 (40.01)
Age (years)	41.619 (16.63)
Drives (1,0)	91.8%
Owns a car and is willing to make it available through CCC[17] (1,0)	79.5%
Intends to take up on the offer of home delivery discounts and benefits (1,0)	43.9%
Intends to take up on the offer of shopping discounts and benefits (1,0)	61.1%
Intends to take up on the offer of media streaming services discounts and benefits (1,0)	63.5%
Located in Griffith (1,0)	4.2%
Located in Coffs Harbour (1,0)	6.2%

The descriptive statistics for the cost variables and bundle fees as presented in the stated preference experiment are shown in Table 22. The experiment design made sure the bundle plans A and B were statistically equivalent, and they presented discounts relative to the current situation, which can be seen in the table. The last column of Table 22 represents, for the transport mode variables, the percentage of respondents revealing use of that mode in the last 7 days or would use the mode if they selected a bundle plan included the mode. For the services, it represents the percentage of respondents currently having a weekly or monthly spending on that service. Overall, around 20% of respondents were using or intended to use local bus and taxi/rideshare, while around 15% of participants used or intended to use community transport and on-demand bus. The lowest percentage was car ridesharing, where only 12% of respondents said they used or intended to use it. As presented in Eq. (1) and Eq. (2), below, the car sharing cost was statistically significant for people that currently drive. The costs for the services appear higher since these are weekly or monthly costs instead of per kilometre.

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[17] A car community club (CCC) matches private car trips between drivers and potential users. The CCC would be based on no fee membership for drivers and residents where safety and security of members can be ensured, and safety of vehicles can be logged. This could be operated under charitable status. Successful matching and expediting will be associated with a donation which will be dispersed to the owner of the CCC and the driver of the private car.

Table 22: Descriptive statistics for weekly costs of multi-services and bundle fee

Variables	Mean (std dev)			
	Plan A	Plan B	Current	Use %*
Cost for electric community transport ($/km)	1.524 (0.18)	1.529 (0.18)	1.970 (0.18)	15.6%
Cost for non-electric community transport ($/km)	1.707 (0.26)	1.710 (0.26)	1.953 (0.26)	13.2%
Cost taxi/rideshare ($/km)	2.041 (0.56)	2.032 (0.55)	2.469 (0.65)	21.1%
Cost local bus ($/km)	3.087 (0.91)	3.121 (0.88)	4.139 (1.00)	19.8%
Cost on-demand bus ($/km)	3.477 (0.84)	3.482 (0.84)	3.977 (0.93)	14.8%
Cost car ridesharing ($/km)	0.566 (0.24)	0.562 (0.24)	0.728 (0.31)	11.8%
Media streaming cost ($/month)	27.380 (35.63)	27.461 (35.97)	33.237 (43.24)	78.0%
Shopping costs ($/week)	109.097 (108.09)	108.771 (107.96)	124.496 (122.95)	82.3%
Home delivery costs ($/week)	28.793 (54.70)	28.667 (54.51)	33.800 (63.52)	39.0%
Plans fee ($)	7.057 (4.91)	7.166 (4.86)	-	-

*Note: *For the transport services, this variable represents the percentage of participants that said have used that mode in the last 7 days or would use if they select a bundle plan. For non-transport services, this variable represents the percentage of participants that said they currently have a weekly or monthly spending on that service.*

Table 23: Descriptives for number of trips before and after bundle selection per mode of transport

Bundles' mode of transport	Number of trips in the last 7 days	Number of weekly trips if bundle selected
Electric community transport	0.227 (1.50)	0.651 (2.68)
Non-electric community transport	0.457 (2.56)	0.475 (2.47)
Taxi/rideshare	0.522 (2.57)	0.904 (3.03)
Local bus	0.296 (1.95)	0.789 (2.81)
On-demand bus	0.247 (1.76)	0.571 (2.21)
Car ridesharing	0.283 (2.00)	0.453 (2.35)

Note: This table allowed for a maximum of 30 weekly trips per mode of transport (4-6 respondents had to be revised for each mode). These numbers were not included directly in the utility functions, so this assumption does not affect in any way the model results or interpretation.

Using the sample described above, a choice and preference model called a mixed multinomial logit model was estimated, which incorporates individual heterogeneity, allowing for different preferences across individuals. Three alternatives were presented to the respondents and included in the models: the first two represent alternative bundle packages and the last one the current travelling pattern of the respondent. The utility functions for the alternatives were formulated as follows:

$$
\begin{aligned}
U_{Plan_m} = &\; \beta_{Plan_m} + \beta_{CTfare} \cdot \left(Cst_{CTE_m} + Cst_{CTNE_m}\right) + \beta_{TRSh} \cdot Cst_{TRSh_m} + \\
&\; \beta_{CSubCMC} \cdot \ln\left(Cst_{CSub_m}\right) \cdot D_{CMC} + \beta_{CSubND} \cdot \ln\left(Cst_{CSub_m}\right) \cdot D_{Non-driver} + \\
&\; \beta_{Bus} \cdot \left(Cst_{Bus_m} + Cst_{OnDBus_m}\right) + \beta_{HD} \cdot \ln\left(Cst_{HD_m}\right) + \beta_{Shop} \cdot \ln\left(Cst_{Shop_m}\right) + \\
&\; \beta_{Media} \cdot \ln\left(Cst_{Media_m}\right) + \beta_{fee} \cdot \exp\left(fee_m\right)/100000 + \beta_{Age} \cdot age + \varepsilon_{plan_m}
\end{aligned}
$$

(1)

$$U_{Curr} = \beta_{CTfare} \cdot \left(Cst_{CTE} + Cst_{CTNE} \right) + \beta_{TRSh} \cdot Cst_{TRSh} +$$
$$\beta_{CSubCMC} \cdot \ln \left(Cst_{CSub} \right) \cdot D_{CMC} + \beta_{CSubND} \cdot \ln \left(Cst_{CSub} \right) \cdot D_{Non-driver} +$$
$$\beta_{Bus} \cdot \left(Cst_{Bus} + Cst_{OnDBus} \right) + \beta_{HD} \cdot \ln \left(Cst_{HD} \right) + \beta_{Shop} \cdot \ln \left(Cst_{Shop} \right) +$$
$$\beta_{Media} \cdot \ln \left(Cst_{Media} \right) + \varepsilon_{curr} \tag{2}$$

where β_{plan_m} represents the plan-specific constant for bundle package m; Cst_{CTE_m} and Cst_{CTNE_m} denote the cost of electric and non-electric community transport under bundle package m, respectively; Cst_{TRSh_m} denotes the cost of taxi/rideshare; Cst_{CSh_m} denotes the cost of car club/subscription; Cst_{Bus_m} denotes the cost of the local bus; and Cst_{OnDBus_m} denotes the on-demand bus costs. Regarding the services attributes, Cst_{HD_m} represents weekly home delivery costs; Cst_{Shop_m} denotes the weekly shopping costs; Cst_{Media_m} denotes the monthly media streaming costs. D_{Driver} is a dummy variable equal to 1 if the participant drives, 0 otherwise; D_{CMC} is a dummy variable if the individual owns a car and is willing to make it available through the Car Community Club (CCC); age represents the age of the individual; and fee_m represents the subscription fee of bundle package m.

Costs were calculated based on the levels presented in the choice experiment and only for those respondents indicating they had intention to use. This intention came from the respondent revealing they had used the mode in the past 7 days or they would use it if available through a bundle; and for the services if they said they plan to take up on the bundle offers.

The model results are presented in Table 24. All parameter estimates are statistically significant at the 90% confidence level or better, except for the mean parameter of the car club/subscription cost. The standard deviation of the car club/subscription cost is highly significant, however. This suggests that there is a high level of divergency in preferences towards the car club/subscription mode for those respondents that drive and who said they would be willing to share their car through a CCC.

Table 24: Model results – mean and t-value

Description	Acronym	Alternative	Mean	t-value
Alternative specific constant	ASCPLAN	Plans	-0.319	-1.890
Cost for community transport (electric and non-electric) if would use it now or in future ($/km)	BCTFARE	All	-0.839	-2.330
Cost taxi/rideshare if would use it now or in future ($/km)	BRSHFARE	All	-1.640	-4.680
Ln(Cost car club/subscription if would use it now or in future ($/km)) for non-drivers	BCSHNDFR	All	-8.277	-1.700
Ln(Cost car club/subscription if would use it now or in future ($/km)) for drivers who are willing to share their car in CCC *- mean*	BCSHCCC	All	0.234	0.170
- standard deviation	NsBCSHCM	All	6.455	3.740
Cost local or on-demand bus if would use it now or in future ($/km)	BBUSFARE	All	-0.363	-3.370
Ln(Home delivery cost if intends to use it in bundle ($/week))	BHOMECST	All	-	-
Ln(Shopping cost if intends to use it in bundle ($/week))	BSHOPCST	All	-1.098	-2.100
Ln(Media streaming cost if intends to use it in bundle ($/month))	BMEDIACS	All	-3.571	-8.690
exp(Plans fee ($))/100,000	BPLNFEE	Plans	-0.0001	-2.350
Age (years)	BAGE	Plans	-0.017	-5.010
Griffith (1,0)	BGRIFF	Current	-0.477	-1.750
Coffs Harbour (1,0)	BCOFFS	Current	-0.674	-3.010
Number of parameters			*13*	
Sample size			*1644*	
Restricted log-likelihood			*-1806.12*	
Log-likelihood at convergence			*-1668.74*	
AIC/N			*2.046*	

Using the model results, we can estimate the point elasticities for each individual *q*, which represent the percentage change in the probability of choosing alternative *i* given a 1% change in the continuous explanatory variable x_{ij}. The direct point elasticity for the linear variable *j* is calculated for individual *q* as follows:

$$E_{x_{ijq}}^{P_{iq}} = \frac{\partial P_{iq}}{\partial x_{ij}} \cdot \frac{x_{ij}}{P_{iq}} = \beta_{ij} x_{ijq} \left(1 - P_{iq}\right) \tag{3}$$

For the log-transformed variable *k*, the direct point elasticity is calculated for individual *q* as follows:

$$E_{x_{ikq}}^{P_{iq}} = \frac{\partial P_{iq}}{\partial x_{ikq}} \cdot \frac{x_{ikq}}{P_{iq}} = \beta_k \left(1 - P_{iq}\right)$$

$$\tag{4}$$

For the exponential-transformed variable *fee*, the direct point elasticity is calculated for individual *q* as follows:

$$E_{fee}^{P_{iq}} = \frac{\partial P_{iq}}{\partial fee} \cdot \frac{fee}{P_{iq}} = \beta_{fee} \frac{fee}{100000} \exp\left(fee\right)\left(1 - P_{iq}\right)$$

<div align="right">(5)</div>

We calculate a probability weighted average point elasticities across the sample. The results are presented in Table 25 in descending order for bundle plans A and B.

Table 25: Point elasticities for bundles plans A and B and current option in descending order

Description	Plan	Mean (std dev)
Media streaming cost if intends to use it in bundle ($/month)	A	-1.418 (1.20)
Media streaming cost if intends to use it in bundle ($/month)	B	-1.400 (1.20)
Plans fee ($)	A	-0.503 (1.84)
Plans fee ($)	B	-0.501 (1.84)
Shopping cost if intends to use it in bundle ($/week)	A	-0.434 (0.38)
Cost car club/subscription if would use it now or in future for non-drivers ($/km)	A	-0.428 (1.54)
Shopping cost if intends to use it in bundle ($/week)	B	-0.428 (0.38)
Cost car club/subscription if would use it now or in future for non-drivers ($/km)	B	-0.411 (1.49)
Cost car club/subscription if would use it now or in future ($/km)	A	-0.301 (1.54)
Cost taxi/rideshare if would use it now or in future ($/km)	A	-0.301 (0.77)
Cost taxi/rideshare if would use it now or in future ($/km)	B	-0.286 (0.73)
Cost car club/subscription if would use it now or in future ($/km)	B	-0.284 (1.49)
Cost local bus if would use it now or in future ($/km)	B	-0.103 (0.27)
Cost local bus if would use it now or in future ($/km)	A	-0.102 (0.27)
Cost for community transport (electric) if would use it now or in future ($/km)	B	-0.086 (0.25)
Cost for community transport (electric) if would use it now or in future ($/km)	A	-0.085 (0.25)
Cost on-demand bus if would use it now or in future ($/km)	A	-0.085 (0.26)
Cost on-demand bus if would use it now or in future ($/km)	B	-0.082 (0.25)
Cost for community transport (non-electric) if would use it now or in future ($/km)	A	-0.076 (0.26)
Cost for community transport (non-electric) if would use it now or in future ($/km)	B	-0.076 (0.25)
Griffith (1,0)	C	-0.022 (0.01)
Coffs Harbour (1,0)	C	-0.014 (0.07)
Cost car club/subscription if would use it now or in future for drivers ($/km)	B	0.127 (0.07)
Cost car club/subscription if would use it now or in future for drivers ($/km)	A	0.128 (0.07)

To obtain a general order for both bundles, we can calculate an average across bundle A and B. These results ordered from lowest to highest are presented in Table 26.

Table 26: Plans average point elasticities ordered from lowest to highest

Description	Mean (std dev)
Media streaming cost if intends to use it in bundle ($/month)	-1.409 (1.20)
Plans fee ($)	-0.502 (1.84)
Shopping cost if intends to use it in bundle ($/week)	-0.431 (0.38)
Cost car club/subscription if would use it now or in future for **non-drivers** ($/km)	-0.420 (1.51)
Cost taxi/rideshare if would use it now or in future ($/km)	-0.293 (0.75)
Cost car club/subscription if would use it now or in future ($/km)	-0.292 (1.51)
Cost local bus if would use it now or in future ($/km)	-0.103 (0.27)
Cost for community transport (electric) if would use it now or in future ($/km)	-0.085 (0.25)
Cost on-demand bus if would use it now or in future ($/km)	-0.083 (0.25)
Cost for community transport (non-electric) if would use it now or in future ($/km)	-0.076 (0.26)
Cost car club/subscription if would use it now or in future **for drivers** ($/km)	0.127 (0.07)

This has been estimated for bundle plans and this shows for a 10 per cent increase in the cost for different modes of transport, the probability of choosing the bundles would decrease between 0.76 and 4.20 percentage points. Given that the bundles offer discounts, we will interpret these elasticities in terms of decreasing the weekly or monthly costs. The order of the most to the least influential modes of transport in terms of the support for bundles are:

1) Car club/subscription for **non-drivers**: if the discount offered meant a 10% decrease in weekly cost of using this mode, it would result in a 4.20% increase in the probability of choosing a plan for non-drivers.
2) Taxi/rideshare*: if the discount meant a 10% decrease in weekly cost of using this mode, it would result in a 2.93% increase in the probability of choosing a plan.
3) Local bus*: if the discount meant a 10% decrease in weekly cost of using this mode, it would result in a 1.03% increase in the probability of choosing a plan.
4) Electric community transport*: if the discount meant a 10% decrease in weekly cost of using this mode, it would result in a 0.85% increase in the probability of choosing a plan.
5) On-demand bus**: if the discount meant a 10% decrease in weekly cost of using this mode, it would result in a 0.83% increase in the probability of choosing a plan.
6) Non-electric community transport**: if the discount meant a 10% decrease in weekly cost of using this mode, it would result in a 0.76% increase in the probability of choosing a plan.

However, the differences between the elasticities for the taxi/rideshare and local bus are not statistically significant with a 90% confidence level and shown in the above list by *. In addition, the differences between the elasticities for the on-demand bus, electric and non-electric community transport are not statistically significant with a 90% confidence level, shown in the above list by **. This means that it is not possible to distinguish between taxi and mode share on the one hand and the different community transport vehicles and on-demand bus.

It is also relevant to add that the elasticity for car club/subscription for **drivers who are willing to share their car in a CCC** has an opposite sign but the mean estimate was not statistically significant with a 95% confidence level although its standard deviation was highly significant suggesting that on average, drivers who are willing to share their car through CCC have significant divergence in terms of their valuation of the discount offered for car club/subscription. Simply put, some drivers prefer a higher discount, while others prefer a lower discount. This suggests that the latter drivers might associate a higher discount with receiving a lower percentage of their trip cost back to them when sharing their car.

In terms of services, the order from the most to the least influential in terms of the support towards the bundles are – for all only considering those individuals that currently use these services:

1) Media streaming: if the discount meant a 10% decrease in its monthly cost of media streaming, it would result in a 14.1% increase in the probability to choose a plan.
2) Shopping: if the discount meant a 10% decrease in its weekly shopping cost, it would result in a 4.3% increase in the probability to choose a plan.
3) Home delivery: it was not statistically significant in the model with a 95% confidence level, suggesting it does not have a substantial influence on the decision to choose a bundle plan.

The table of results also includes elasticities for the two location variables of Griffith and Coffs Harbour: residents from these towns are 2.2% and 1.4% more likely to choose a bundle plan than the other locations, respectively. As expected, the plan fee has a negative elasticity, and it has an exponential transformation. Figure 42 shows the changes in the fee elasticity relative to different plan fees shown in the experiment. When the plan fee falls below $15, the elasticity is almost 0, showing that respondents are not very sensitive towards the plan fee if it offers good modes and services discounts (as discussed above). However, when the plan fees are high (above $15) then the elasticity increases exponentially.
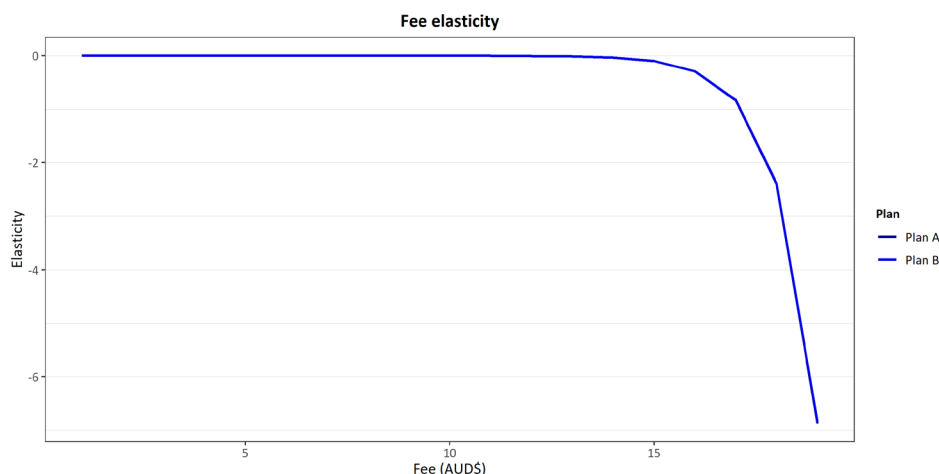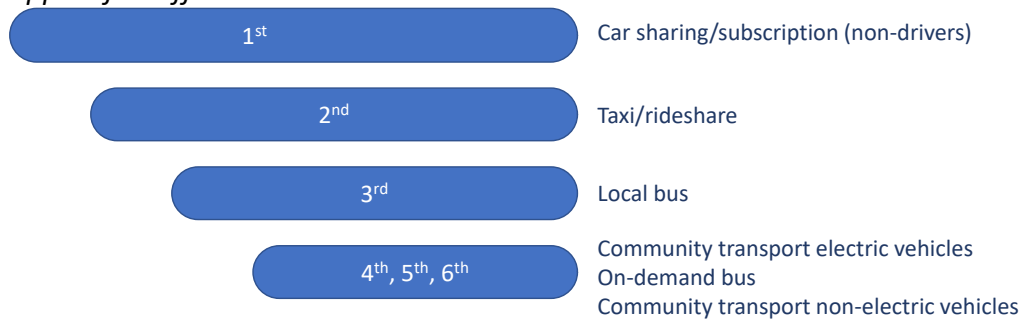

Figure 42: Simulated fee elasticities

The modelling explores the appetite of respondents in the survey to bundling of different modes, in different packages and at different bundle prices (Figure 43). Overall, it suggests

offering bundle discounts can be an effective way to encourage individuals to choose certain services but that it is important to note that different respondents exhibit different preferences in terms of the level of discount offered. Transport service providers and policymakers should take this into account when designing MaaS bundle offers.

Support for different modes

1st	Car sharing/subscription (non-drivers)
2nd	Taxi/rideshare
3rd	Local bus
4th, 5th, 6th	Community transport electric vehicles On-demand bus Community transport non-electric vehicles

Support for different services

Media streaming (63.5% that intends to use it)	1st
Shopping (61.1% that intends to use it)	2nd

Figure 43: Summary of support for modes and non-modal services.

4.3.6 Chapter highlights

This chapter presents the results of a multi-faceted study on mobility barriers faced by end users in RTRH areas of New South Wales, which includes qualitative analysis from end user group discussions along with a traditional 'paper & pencil' survey in the three locations and provides a statistical analysis for the state-wide online survey in the 16 regional cities.

Section 4.3.1 summarizes the results of the end user group discussions and provides insights into the barriers they are facing and preferences of end users towards the integration of different modes of transport. Section 4.3.2 summarizes the results of the 'paper & pencil' survey, providing a snapshot of local trip-making behaviour and mode preference among vulnerable groups. Section 4.3.3 highlights the results and insights obtained from both the group discussions and the 'paper & pencil' survey and provides implications for the design of the state-wide online survey. Finally, Section 4.3.4 summarizes the descriptive results of online survey and Section 4.3.5 summarizes the modelling results from the online survey.

5. Discussion and policy implications

The in-depth interviews (Chapter 3) identified stakeholders' barriers to mobility and the implementation of regional and rural MaaS whilst Chapter 4 discussed the constraints to access activities reported by end users. This chapter discusses associated policy implications and provides suggestions on the role of government in the implementation of MaaS.

5.1 Policy implications of reduced mobility constraints

Transport costs can be a significant burden on low-income families. The overarching policy response should aim to guarantee affordable transport options for all, especially those with limited financial resources (Section 4.3.1). In principle this should cover all trip purposes, since integration in society through accessing activities whether social, medical, education or work are the determining factors in achieving social inclusion (Section 4.3.1).

Improving the accessibility of public transport in rural and regional environments is an important goal for creating an inclusive and equitable society and encouraging social inclusion. Accessibility of public transport is both in-vehicle and access to the vehicle dependent. For access to the in-vehicle part of a trip, it is important that all services provide accessible vehicles with appropriate infrastructure (for example, ramps when low floor vehicles are not available, the installation of handrails and tactile surfaces) (Section 3.3.3). Access to the vehicle is just as important, as poor footpaths and walkways can pose difficulties for older persons and the disabled and travellers with pushchairs or luggage and badly lit access can give rise to fears (e.g perceptions around personal safety) that prevent travel plans (Section 4.3.1). It should also be remembered that not all disabilities are visible and provision be made universally to include audio-visual systems where appropriate (Section 4.3.1).

Whilst rural and regional public transport have lower spatial densities which make them more challenging to meet the varied trip purposes of citizens, respondents in the qualitative interviews highlighted the need for a well-designed public transport network to reduce the likelihood of delays and missed connections (Sections 4.3.1 and 4.3.2). Whilst expanding conventional public transport may not be financially possible, an efficient backbone of conventional services, enhanced by on-demand services could provide convenient access for a greater number of potential travellers (Section 4.3.1). On-demand bus services, such as Woopi Connect in Coffs Harbour or the Moree On Demand service, have been shown to facilitate greater access to essential services, such as healthcare, shopping, and employment: consideration of extending these in suitable areas would enhance social inclusion. Community engagement and ridership pattern data need to be used as design inputs with a hierarchy of trip purposes (work, education, medical, social) as a focus.

The challenges of network design are considerable. Extending the service time of public transport, including weekends and night-time under the 16 Regional Cities Services Improvement Program could help to address the transport needs of individuals who work unconventional hours, have different schedules, or need to travel at night (Section 3.3.13). Alternative approaches of on-demand services maybe more economical that the increases in operating costs of extending service hours of fixed route services.

Providing services is one step towards enabling greater mobility and enhanced accessibility. An important, and often neglected step is improving potential passengers' awareness of the

available services so that available transport services can contribute to unmet mobility needs. This is particularly important as modes that are more flexible are introduced, for example, on-demand services, car sharing services, as these are less visible to the travelling public than conventional public transport (it is still the case that on demand bus services are not commonly included in journey planners). It will be a pre-requisite in the implementation of regional and rural MaaS that sufficient attention is paid to the marketing, advertising, and educating the public of the available modes to reduce the gap between available services and unmet demand (Section 3.3.12).

Rural MaaS, in common with other MaaS schemes, is conceived as using technology for searching, booking and paying for transport services. In an ageing society, and with many regional and rural communities showing an ageing socio demographic profile, setting up a special telephone line for non-digital users to book mobility services could make transport services more accessible and inclusive for all users, including those challenged by the use of technology, or who lack access to appropriate technology or where spatial contexts lack connectivity (the so-called "not spots") (Section 3.3.12). Beyond booking, the integration of fares both within and outside existing geographical boundaries (including those that cross state and territory borders) would make travel cost easier to understand and avoid multiple payments of flagfalls for different modes within a multimodal journey (Section 3.3.7).

Specific issues with access to medical services in rural and regional areas were raised consistently in both qualitative stakeholder interviews and end user discussions (Sections 3.3.2 and 4.3.1). Improving access to this key trip purpose involves addressing a number of barriers, particularly for those with mobility challenges, such as older persons and the disabled (Section 4.3.1). Lack of connectivity of public transport to medical facilities and hospitals could be ameliorated by a re-appraisal of the network of public transport services with a focus on providing connectivity to medical services. This could be achieved by considering door-to-door shuttle services for patients and/or facilitating the co-ordination of transport services of multiple transport providers (Section 3.3.1). Another option would be to improve the reliability, frequency, and accessibility of public transport services to make travel easier (Section 4.3.2) and to reduce the time costs of going to a medical appointment and to subsidise transport costs for lower income individuals and families to reduce the financial burden (Section 4.3.1). Reducing the need to attend medical services in person through investment in technology to improve tele-medical appointments would reduce the individual time and money costs associated with accessing medical care (Section 3.3.7).

Many of the more vulnerable groups, including older persons are eligible to use Community Transport (CT) for accessing transport trips both locally and further afield, including medical trips. CT trips are subsidised at the point of travel, with travellers paying a lower than 'market price' for transport. Widening access to CT could be improved by a review of the eligibility criteria for use including the ability of carers to accompany passengers at similarly subsidised fares. Eligibility criteria, whilst needing to be standardised, should be reviewed regularly through consultation with stakeholders, including CT providers, local authorities, and representative organizations for vulnerable groups, to gather their perspectives on the issue (Section 3.3.4). In many cases, vehicles providing CT trips have spare capacity which CT organisations are obliged to price at full cost which often makes them unaffordable as a means of public transport to the general public (Section 3.3.4). Therefore, a change in this

rule would allow lower fares to be charged and for the spare capacity to be available to provide for unmet need in non-eligible passengers. The qualitative interviews identified that relying on volunteer drivers meant that the workforce was often uncertain. Many CTs, particularly those in urban areas, already employ drivers on a formal basis and this could provide a more stable workforce which in turn could improve the reliability and quality of service.

In many cases, a lack of supply of transport in rural and regional areas was identified as a constraint to travel (Section 4.3.1. Implementation of MaaS would need to explore how to expand supply through increasing access to taxi services for users, especially those with mobility challenges. This could include the introduction of organised shared taxis services. More urban based MaaS schemes include car-sharing (for example, GoGet), ride hailing (for example, Uber), ride or lift sharing and these are less likely to be present in a rural and regional environment. Expanding supply could be achieved by partnering with local transport providers, including local bus companies, and community-based organisations to find ways of utilising spare capacity (Section 3.3.11). Increasing knowledge of existing services would be enhanced by the use of a dedicated App and the improvement of taxi booking and dispatch systems. Government needs to consider if lack of transport supply is a constraint in a particular locality and consider subsides, discounts, and/or tax incentives to promote start up services.

5.2 Policy implications for implementing regional and rural MaaS
Combining insights from the outcome of the qualitative analysis and end user group discussions underpins the policy implications on implementing MaaS discussed in this section.

MaaS is conceived as using technology for searching, booking and paying for end-to-end multimodal transport services. This requires the integration of different modes of transport, including public transport, taxi, and car-sharing services, to provide seamless and convenient mobility options for users (Section 3.3.7). Achieving integration and providing real-time information and pricing through an App could greatly improve the visualization of transport services and make it easier for people to access and compare different mobility options (Section 3.3.7), while also encouraging partnership among different transport service providers through agreements or contracts that outline the data sharing and updating process (Section 3.3.11). As discussed above, this may require government intervention to stimulate supply, where this is a constraint. It also requires transport operators to share data to improve the user experience. Non-mobility services (Section 3.3.7) could be included in the offer (as explored in the stated preference survey in Section 4.3.4), for example, deliveries so that if a user orders groceries online, the delivery time could be co-ordinated with available transport services. The convenience of including non-mobility services maybe sufficient for their use but users of multiple services could be offered loyalty awards.

There are a number of advantages of having an App for information about services (Section 3.3.7). First, this could be linked with other government Apps, such as myGov and Centrelink (Section 3.3.11). This would allow direct payments and subsidies from these accounts which would be dependent on establishing data sharing agreements which comply with privacy and security regulations to allow the necessary data to be securely transferred to a MaaS App. However, it needs to be recognised that not all potential users may have smart phones, that

rural and regional areas are likely to be less internet connected 'on the go' and that, particularly the older members of the population may not be sufficiently skilled to negotiate their use. At least in the short term, an App should therefore be accompanied by a user-friendly website where similar information and booking services could be enacted. Alongside this, voice recognition options could be added to a smartphone App to make it more appealing to the digitally challenged.

MaaS should aim to make travel seamless and user centric. The design and delivery of an App is critical: it needs to be a user-friendly interface which makes the finding of information for end-to-end journeys, booking and payment easy. Both within the App and outside the App, conventional public transport routes need to be simple, and timetables must be understandable: the delivery of high-quality information accompanied by clear maps, highlighting key transfer points and destinations have been shown to encourage use (Section 3.3.12). Alongside this, improving the understanding and communication between transport users and operators is a key step towards providing a better user experience and ensuring that transport services meet the needs of all stakeholders. Government can take the lead in facilitating the co-ordination of the stakeholders and their meetings as well as setting standards for timely feedback between stakeholders, particularly between users and the providers of transport services (Section 3.3.13).

The concept of MaaS has arisen (in part) because technology could enable the user interface. Technology also exists to promote a cashless approach to payment, improving efficiency and security for operators. Such a cashless approach, typically with a smart card or debit card, should be accessible to all residents, regardless of their age, abilities, or income levels (Section 3.3.13). A state-wide system (Section 3.3.13) would allow rural and regional residents to seamlessly access specialised services as they travel longer distances outside their immediate residential areas. This may involve providing support and assistance to individuals who are not familiar with electronic payment systems or who do not have access to the necessary technology (Section 3.3.1). Government led investment in technology enable supply side benefits such as real-time tracking which could reduce wait times, provide better information about services to users, improve reliability and increase use of public transport. For example, the NSW *AnyTrip App* real-time departure information for bus and train across regional areas and the Transport Connected Bus (TCB) Program delivering vehicle tracking and automatic passenger counting technology across contracted buses in rural and regional NSW are good developments in this area (Section 3.3.4).

This research has identified possibilities for a greater role for the shared use of the private car in meeting mobility needs proposes the concept of community membership club (CCC) [18], which matches private car trips between drivers and potential users. This would be based on a no-fee membership model where the safety and security of the members and the safety of vehicles can be ensured. This could be operated under charitable status. CCC matches requests for trips to specific destinations made by car owners and those made by residents in much the same way haulage companies match loads and CT has been aggregating trips in the recent past.

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[18] Successful matching and expediting will be associated with a donation which will be dispersed to the owner of the CMCC and the driver of the private car. The apportion and sum can be decided on a case-by-case basis with some guidance on what might be deemed a fair allocation (for example, a 50:50 split of $20).

Finally, the results of discrete choice modelling (Section 4.3.5) suggest that offering bundle discounts can be an effective way to encourage individuals to choose certain modes of transport. In particular, car club/subscription for non-drivers and taxi/rideshare were found to have the highest elasticities, indicating that offering bundle discounts for these modes of transport may be particularly effective in encouraging uptake. The results highlight the importance of considering the preferences of individual users when designing bundle offers. We found that drivers who are willing to share their car through a car club/subscription have heterogeneous preferences in terms of their valuation of the discount offered. In addition, the results suggest that offering other services can be an effective way to encourage individuals to choose certain services. In particular, media streaming and shopping were found to have the highest elasticities, indicating that offering bundle discounts for these services may be particularly effective in encouraging uptake.

5.3 Suggestions for the role of government

Government involvement is key to facilitating the implementation of regional and rural MaaS, especially when market driven solutions are unlikely.

In a rural and regional context, a MaaS platform might best be operated by a community-based body with the government providing the key role of facilitating the integration of different transport service providers. Government agencies also have an essential role in working closely with organizations and stakeholders to understand the different funding streams and requirements, and to develop a strategic approach to securing the appropriate funding. In addition, by leveraging the benefits of technology, governments can help to better integrate different modes of transport so as to pave the way for the implementation of MaaS.

Facilitating integrated transport services through incentivised contracts can help improve the overall efficiency and effectiveness of the transport system by encouraging collaboration between different modes of transport. Key performance indicators (KPIs) should be structured to match user requirements such as reducing travel times, improving reliability, or increasing ridership. Participation by any operator should be subject to appropriate KPIs, even if the service supplied is operated without subsidy. Governments can also incentivise travellers to try MaaS by offering promotions, discounts, or other as a way to enhance the adoption of these services over time.

It is unlikely that regional and rural MaaS will be sustainable in the short-term, or the long-term. Subsidy is likely to be needed: financial stability underpins a stable transport network which is important for user understanding of the network and for user commitment to its use (rather than relying only on ownership of a private car). The best approach to subsidy is likely to be a mixture of user-based subsidy, lowering the farebox revenues, and subsidies targeted at transport providers. Additional subsidy to citizens who might still find travel unaffordable could be managed through the welfare system or targeted subsidies through eligibility to discount cards.

Government is responsible for building and maintaining transport-related infrastructure to improve connectivity and accessibility. Improvements to the transport network more

generally, including adding new roads and bridges can help improve connectivity and accessibility and improve all journeys, including those by public transport.

Rural and regional transport is different from their urban counterparts: lower population densities mean that they will inevitably be less frequent and need to be carefully structured to ensure they meet the needs of citizens. In the context of MaaS implementation, user awareness about available MaaS services and the benefits they provide will be key to generation of patronage. An important role for Government is to educate users about the various transport options available to them through MaaS, and to highlight the benefits of using these services, such as increased flexibility, convenience, and cost savings.

6. Conclusions and next steps

This report has summarized the main findings from the analysis of collected primary data focussing on the requirements for the blueprint for regional and rural MaaS. Three strands of work have been summarised: 1) results of qualitative analysis of in-depth interviews with supply-side providers / organisers at the three locations (Dubbo, Nowra, Coffs Harbour); 2) results of qualitative analysis of end user group discussions with a "pencil & paper" survey at the three locations; and 3) results of the NSW-wide online survey.

Qualitative analysis provides a deeper understanding of the needs from the perspectives of both services providers and end users, which informs the development of the blueprint's goals, objectives, and strategies. The results of qualitative analysis identify mobility needs and can make suggestions to allocate resources more effectively by identifying barriers and where the greatest impact can be made. This study sheds light on reducing social exclusion and improving well-being come to the forefront as very important objectives that can be enhanced through a MaaS framework in a regional and rural setting. The analysis provides insights on how closer integration between various mobility services could facilitate and influence travel behaviour, enhancing user experience, accessibility to surroundings, modal shift, and trust in public transport, including:

- the underlying conditions in regional and rural areas (e.g., current mobility services available, current usage of technology, current payment methods, current means to know available services) and barriers to implementing future MaaS initiatives (e.g., barriers of different transport service providers, barriers to meeting mobility needs, barriers of transport in the Aboriginal community).

- the barriers and business opportunities of different stakeholders (Transport/Non-Transport Provers) and factors influencing the ability to meet users' requirements, and assess the aspects of MaaS sponsorship, and explore the business prospects of MaaS.

- the significant roles of the government in promoting MaaS from the perspectives of policy regulation, funding and investment, technology assistance, collaboration and co-ordination, data management and analysis, public education and awareness, and monitoring and evaluations.

- the mobility barriers faced by end users, including how they access their surroundings, the constraints of getting out, barriers to meeting mobility needs, impact of transport disadvantage on vulnerable groups, and to understand users' expected gold standard on transport.

- indications of how travel behaviour could be facilitated / influenced by closer integration between various mobility systems from the perspectives of enhanced user experience, easier access to surroundings (e.g., medical services, schools, and social activities, etc.), increased modal shift, better information, and increased trust on public transport.

- the role of technology such as digital Apps, AV, social platforms, and electric vehicles, in enhancing mobility and delivering societal benefits, such as improving well-being

and social activities. By continuing to innovate and improve these technologies, everyone can be ensured to have easier access to the resources and opportunities they need to live healthy, fulfilling lives.

- offering bundle discounts can be an effective way to encourage individuals to choose combinations of mobility and non-mobility services which can be used to facilitate local sustainability objectives.

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