

10 May 2024

File Ref: OIAPR-1274023063-26445

[REDACTED]

Tēnā koe [REDACTED]

Request for information 2024-083

I refer to your request for information dated 16 April 2024, which was received by Greater Wellington Regional Council (Greater Wellington) on 16 April 2024. We note there is correspondence between yourself and our customer care advisors regarding the on board announcements. This is followed by your request for the following:

“And, tell me how many

- *blind*
- *Te Reo-only speakers*
- *etc*

people use the service who actually derive any benefit from these announcements. Even better, do a proper study - you personally take that bus every day over 6 months; during which time you will hear

NEXT STOP A WHAEA KINEA etc etc

TENS OF THOUSANDS OF TIMES, every few seconds; and for those 10,000 + times you hear the announcement, tell me exactly how many

- *blind*
- *Te Reo-only speaking*
- *and otherwise differently abled people actually rely on the announcement.*

From that, draw up a cost-benefit analysis and forward it to me.

I will look forward to the results of the study.”

Greater Wellington’s response follows:

Background

The On-Board announcement system is part of Metlink’s commitment through Greater Wellington’s 2020 Metlink Accessibility Charter *‘to increase accessibility for disabled people to our public transport network’* and as part of the Charter to *‘Ensure that services information is accessible and widely available by using appropriate formats and media including both visual and audio channels’*. A full version of the Accessibility Charter is available on our website here: https://www.metlink.org.nz/assets/Accessibility-content/Metlink-Accessibility-Charter/Metlink_Accessibility_charter_1.5_English_web1.pdf

Since March 2023, the on-board announcement system (the system) has gone through live testing to ensure:

- it is meeting the requirements of blind passengers
- the information is reliable and that the content is accurate
- that the volume is set at a level that minimises distractions for drivers and regular passengers, whilst being audible for blind and unfamiliar passengers.

We have attached here our business case for the onboard announcements (**Attachment 1**) and the On Bus Announcements Test Summary Report (**Attachment 2**) for your reference. This test was completed in 2019.

The test summary report outlines our customer engagement, the routes that were tested, and how we observed customer behaviour. The key group to benefit from onboard announcements are those with visual disabilities and impairments. Others who expressed interest were those unfamiliar with the network such as those visiting from wider New Zealand and from overseas.

Page 4 and 13 of the test summary report discusses the test approach, the discussions surrounding the routes, and the selected tested routes and trips.

Below is the timeline of our testing and engagement for the bus announcements:

March 2023: Metlink tested the announcements with the visually impaired and hard-of-hearing community

April 2023: Metlink held stakeholder demonstrations with the disability community – Blind Citizens NZ, CCS Disability Action and Council’s Public Transport Advisory Group

April 2023 – June 2023: Metlink held demonstrations with bus operators and their drivers

May – July 2023: Metlink operated up to 20 buses to test the system with passengers and to gather customer feedback. In response, minor refinements took place.

August 2023 – Onwards: After receiving positive feedback, more areas were serviced with the onboard announcements.

How many people use the service?

Our collection of daily patronage data does not specifically target those who use this service, and as such refuse this part of your request under section. We are therefore refusing this part of your request under section 17(g) of the Act on the ground that the information requested is not held by Greater Wellington and we have no reason for believing that the information is either

- (i) held by another local authority or a department of Minister of the Crown or organisation; or
- (ii) Connected more closely with the functions of another local authority, or a department or Minister of the Crown or organisation.

Create a report / study / Cost Benefit Analysis

The Act enables people to request official information from local government agencies, including Greater Wellington. However, the Act only applies to information that is already held. There is no obligation on Greater Wellington to create information in order to respond to a request.

The information you are seeking in this case is not held by Greater Wellington but would need to be created in order to respond to your request. Greater Wellington does not already hold reports, studies or a cost benefits analysis of the information you are seeking.

We are therefore refusing this part of your request under section 17(g) of the Act on the ground that the information requested is not held by Greater Wellington and we have no reason for believing that the information is either –

- (i) held by another local authority or a department of Minister of the Crown or organisation; or
- (ii) Connected more closely with the functions of another local authority, or a department or Minister of the Crown or organisation.

If you have any concerns with the decision(s) referred to in this letter, you have the right to request an investigation and review by the Ombudsman under section 27(3) of the Act.

Please note that it is our policy to proactively release our responses to official information requests where possible. Our response to your request will be published shortly on Greater Wellington's website with your personal information removed.

Nāku iti noa, nā



Samantha Gain

Kaiwhakahaere Matua Waka-ā-atea | Group Manager Metlink

PROACTIVE RELEASE

GWRC - Light Business Case

Completion of the On-bus Next Stop Announcement System

| | | | |
|---------------------|--|-------------------|--|
| Sponsor: | GM Metlink | Senior Supplier: | ICT (technology supplier/s to be procured) |
| Project Owner: | David Boyd, Customer Lead, Metlink | Steering Group: | Steering group required |
| Project Manager: | TBC | | |
| Project Size: | \$960k | SAP WBS Code: | 569/3110/02 |
| Project start Date: | 1 July 2020 | Project end Date: | 30 September 2021 |
| Alternative timing: | Delay of the implementation has made the project a priority. The proposal recommends a limited implementation, possible within existing funding constraints, to mitigate reputational risk of further delay or non-delivery. | | |

| | |
|---------------------------------|--|
| LTP or Annual Plan description: | Provide digital information that keeps pace with customers' expectations of ease and responsiveness. |
| Capex allocated: | Yes. |
| Opex allocated: | No |
| Third Party Funding required? | Yes – NZTA FAR at 51% (\$489.6k contribution) |
| Mandatory Requirements: | Mandatory Council Considerations Attached with email |

1. PROJECT BUDGET.

| | |
|-------------------------|---|
| Project Budget - Capex: | \$ 920,000.00> |
| Project Budget - Opex: | \$ 40,000 (procurement/ICT contractor related costs) |
| Ongoing Opex: | c. \$100,000 pa ongoing 2021/22 FY |
| Rates Impact: | Yes. NZTA will pay 51% funding assistance rate. The capex GW portion will be loan funded over approx. 10 years within budget. The \$100k operational cost PA will have a \$49k impact on GW rates annually. This is to be managed within BAU Budgets. |

2. BACKGROUND

The on-bus announcement system will provide audio-visual information along each bus route on the next bus stop, key interchanges, the current location of the bus and network related information (such as public health messages and conditions of carriage).

The primary purpose of the system is to provide information to people with visual and cognitive disabilities so they can confidently get off at their stop. As part of the PT Transformation Programme, GWRC committed to the disability community to provide a bus announcement system with this functionality as part of a 'fully accessible' bus fleet.

The system will also improve accessibility for all passengers, especially passengers who are new or unfamiliar with a bus route. As well as meeting accessibility needs, the system will encourage the wider adoption of public transport.

With the advent of Covid 19, the system can also play a key role in promptly broadcasting important public information about safe bus travel or changes in service (for instance changes to physical distancing rules or payment methods).

All new buses introduced since May 2018 (c.80% of the current fleet) have been required to include screens and speakers as a requirement of the PTOM partnering contracts vehicle quality standards (VQS). These are owned by the bus operators and form part of each bus. This specification remains for all new buses entering the fleet (including the proposed 98 new electric buses due from mid-2021). There is currently c. \$1.5 million of unused screen and speaker assets on Metlink buses.

Once procured the remaining hardware and software required for the system will be owned by GWRC (ie similar to the RTPi and Snapper hardware installed in the existing Metlink bus fleet).

Approval for \$2.3 million of funding was given by the PTP Management Board (including the GWRC Chief Executive) in October 2017, with a plan for full region-wide implementation by 2020. This plan was stalled due to:

- Reprioritisation of ICT resource throughout the 2018/19 FY on to RTI remediation development of the 'Omnibus' system during the implementation of the mid-2018 bus network changes
- Loss of 2018/19 funding, as the budget was re-appropriated by the PTP for other on-bus equipment
- Loss of 2019/20 funding as NZTA reassessed its funding priorities for programmed LTP work.

Some early progress has been made on the system with a live prototype of the system being developed in-house and tested with customers by GWRC on two Tranzurban buses for a period of 6 weeks in June and July 2019. This process informed the customer, technology, content management and operator requirements for the system. This will inform the procurement strategy.

Full region-wide implementation of the system, including the procurement, development and region-wide deployment of the media players, software and interface on over 485 buses is ultimately required. New buses, with screens and speakers (i.e the operator provided hardware) by operator is outlined below.

| Operator | New buses: Current | | New buses: Planned mid-2021 - 2022 |
|--------------|--------------------|--|------------------------------------|
| Tranzurban | 237 | c.133 of these buses on Wellington city units | 31 |
| NZ Bus | 103 | All 103 operating on Wellington city units | 67 |
| Mana | 25 | | 1 |
| UzaBus | 21 | | - |
| Total | 386 | | 99 |

Limited funds have now become available within the Public Transport budget as part of Low Cost Low Risk NZTA funding. NZTA have endorsed the use of these funds for this purpose. As a result this business case is for the procurement, design, development of the remaining hardware and software required to implement the system to allow partial deployment on up to 236 buses operated on Wellington city PTOM units by Tranzurban and NZ Bus (highlighted in the above table). Limiting the project to these units will at least:

- Allow the system to operate on in the busiest parts of the Metlink network,
- Go some way to manage stakeholder expectations, and
- Allow GWRC to resolve the design and development of the system, so the overall cost of future deployment is decreased.

We may discover through the procurement process that the partial roll-out is further limited within these Wellington city units if the cost is greater than anticipated. In this case implementation would be targeted to units and routes providing the greatest exposure and benefits to customers.

Implementation of the system on the buses that operate across the remainder of the region will require additional funding through the next LTP. This funding will only need to cover deployment of the system, as the design and development will be delivered within the scope of this project.

3. PROBLEM OR OPPORTUNITY STATEMENT.

- The introduction of an on-bus announcement system will significantly improve accessibility for people with disabilities, as well as improving the over-all quality of the public transport experience for people who are new or unfamiliar with Wellington’s public transport. It will keep passengers well informed, safe, confident and comfortable on their journey, encouraging them to adopt public transport on an ongoing basis.
- The on-bus announcement system was publicly committed to as part of the promise of providing a fully accessible bus fleet through the 2018 bus network changes. Its delayed completion, illustrated by blank screens on all new buses, presents a significant reputational risk to GWRC.

4. LINK TO GWRC STRATEGY OUTCOME(S).

- The system is a specific GWRC commitment to the disability community to provide a ‘fully accessible’ bus fleet as part of the Public Transport Transformation Programme in 2018. This aligns with GWRC’s commitment to recognising the UN Convention on the Rights of Persons with Disability.
- An activity in 2018/19, 2019/20 and 2020/21 PT Group Annual Plans as part of the LTP initiative ‘Provide digital information that keeps pace with customers’ expectations of ease and responsiveness.’
- The 2014 GWRC Regional Transport Plan key policy area of ‘Connection with our customers’. Provision of audio-visual passenger information on-board buses supports this approach and assists delivery of the following outcomes outlined in the RTP, to:
 - “Improve the range of information that is produced in formats that are accessible for people with impaired vision or hearing”; and
 - “Improve the provision of information and maps inside public transport vehicles”
- The ‘access’ strategic priority in the Government Policy Statement on Land Transport 2018, through enabling transport choice and access by:
 - Incorporating technology and innovation into the design and delivery of land transport
 - Improving the customer experience of public transport through better information enabling mode shift.

5. OBJECTIVES.

| BENEFIT # | BENEFIT DESCRIPTION | MEASURE |
|-----------|---|--|
| 1 | Deliver on a commitment to the disability community. | Improved relationships and collaboration with disability community stakeholders. |
| 2 | Improving the access and experience for bus passengers with disabilities. | Increased adoption of, and satisfaction* with, public transport by people with disabilities. |
| 3 | Improving the access and experience for all bus passengers, especially visitors, new and infrequent bus users. | Increased adoption of, and satisfaction* with, public transport. |
| 4 | Improving the delivery of public information on buses about bus use and Covid 19/health and safety related messaging. | Improved passenger behaviour, safety and lower levels of complaints about passenger behaviour. |

| | | |
|---|---|--|
| 5 | Improving the delivery of information about delays and disruptions. | Improved satisfaction* with information about delays and disruption. |
| 6 | Providing a potential channel for sponsorship and advertising. | Increased sponsorship opportunities and revenue from on-bus advertising. |
| 7 | Mitigation of any accessibility issues (impeding visibility of bus stops) associated by placing advertising over bus windows. | Increased revenue from on-bus advertising. |

**measured by the annual passenger satisfaction survey*

6. OPTIONS ANALYSIS.

1. Doing nothing would present a significant reputational risk by: a) Not delivering on a commitment to the disability community that the system will be implemented as part of the network changes. The community have an expectation it is being delivered, and; b) Investing public funds in screen and speaker assets that have not been used. Any LGOIMA enquiry would discover c. \$1.5 million has been invested in these unused assets to date.
2. A minimum option would be to provide public information through the screens and not to include next stop information. This would still require deployment of significant elements of the system, including a media player, wiring and development or procurement of a platform for broadcasting content. It would not mitigate the risk of not delivering on a commitment to the disability community to provide next stop announcements.
3. A partial option would be to procure, design and develop a system, but only partially implement it. This would be done on the busiest bus operator units on the network, operated by NZ Bus and Tranzurban in Wellington city. This would demonstrate reasonable progress to the disability community. This could be funded within the funding available through LCLR projects (c\$960k). Funding to implement the system on the remainder of the network would need to be secured through the 2021/22 LTP.
4. The ideal option would be to procure and implement the system region-wide in a single project as originally planned and agreed by the PTPP Management Board in October 2017. However without available funding for the required full amount (c\$2.3), the process required to receive full funding would further increase the delay of deployment into 2023/24 and the associated risks of that delay, especially the risk of reputational damage.
5. Related to Option 4, the delay of full deployment as part of the planned replacement of the RTI system has been considered. While both the on-bus announcement and RTI systems communicate similar forms of real-time information to customers, they are not required to be interdependent on each other in the open technical architecture we are now adopting for PT customer information systems. This open approach will favour the flexibility of integrating multiple systems, so we can better adapt our technology to meet changing customer needs. The hardware specifically required for the on-bus announcement system (such as the media player and wiring) is independent of the RTI system. So any potential minor benefits in shared system infrastructure in terms of cost are outweighed by the further delay an additional year in implementation.

The preferred option is: Option 3 because of the currently availability to LCLR funding in 2019/20/21 and partial realisation of the benefits listed in [5. OBJECTIVES](#).

7. CONSTRAINTS.

- LCLR funding within the remaining 2018-21 LTP budget. Work must be undertaken within a \$1 million dollar cap.
- Existing screen hardware on buses. This has been provided through a number of suppliers, depending on the bus manufacturer and operator. Some of the screens have been set up with proprietary cabling and fittings, which may require different solution variants to fit with the different screen specifications.

- Development and implementation of the system is dependent on bus fleet availability and operator ability to support the procurement process and work with GWRC and the supplier to install and test the system with no increase to current operator service fees. It is assumed that operators will provide the required support/services (at no additional cost to GWRC) based on previous similar on-bus technology upgrades, but this has not yet been confirmed.

8. DEPENDENCIES.

- A procurement process is required to select a vendor or a consortium of vendors to provide and support the system.
- Development and implementation is dependent on GWRC ICT support.
- Procurement support of a RFP process, which is likely to be comprehensive given the complexity of the required solution.
- Alignment with bus operators to support the procurement process and to install and test the new system in the required timeframes with no increase to current PTOM Partnering Contract services fees

9. SCOPE.

In scope

- Wellington city Tranzurban and NZ Bus units (up to c.236 buses – as budget allows):
 - Procurement, design and development of software and or online delivery
 - Procurement and installation of media players/transmitters
 - Procurement of ongoing support and maintenance of the system
 - Design and development and delivery of audio and visual content and ongoing content management.

Out of scope

- Implementation for remaining bus operator units (planned for completion as part of the 2021/22 LTP).
- Implementation as part of the RTI 2.0 upgrade project.

10. KEY RISKS.

1. Limited resource to support this within ICT could further delay its implementation, beyond the funding envelope. Confirmation of dedicated project resource will be required before proceeding.
2. The procurement process may identify a higher than anticipated cost for the proposed implementation and ongoing maintenance and content management. This may mean the initial implementation is further limited in scale (on fewer buses) than anticipated.
3. Operators may seek to increase the service fee to cover the cost of the additional support required during the procurement process and to implement and test the system.
4. Variations of screen hardware and cabling may add complexity and cost to the solution required for the media player. These can be further identified and managed through the procurement process.
5. The value of the hardware and software that will be procured (and owned) by GWRC will be lost if it is not capable of being removed from the bus (at retirement) or at the end of the relevant PTOM contracts and installed on future buses operating on the Wellington network.

11. KEY MILESTONES:

| INDICATIVE MILESTONES: | PLANNED DELIVERY DATE: |
|---|---------------------------------------|
| 1. <i>Business Case sign off</i> | 29 June 2020 |
| 2. <i>Project Governance established</i> | July 2020 |
| 3. <i>Project Governance first meeting</i> | July 2020 |
| 4. <i>Project management plan established</i> | July 2020 (allow 2 weeks) |
| 5. <i>Business and technical requirements confirmed</i> | Mid-August 2020 (allow 4 weeks) |
| 6. <i>Procurement plan & contract scope developed</i> | Mid-September 2020 (allow 6 weeks) |
| 7. <i>Procurement in market and tenders evaluated</i> | 1 November 2020 (allow 6 weeks) |

| | |
|--|---------------------------------------|
| 8. <i>Contract negotiations complete and contract awarded</i> | Mid January 2021 (allow 5-6 weeks) |
| 9. <i>Project implementation start date “kick off” meeting</i> | January 2021 |
| 10. <i>Mid project review (design, testing, live pilot)</i> | May 2021 |
| 11. <i>Implementation complete</i> | September 2021 |
| 12. <i>Handover to BAU</i> | September 2021 |

PROACTIVE RELEASE

12. SUMMARY OF PROJECT COSTS AND RESOURCES.

| | Year 1 | | Year 2 | | Total Project Cost | | Ongoing |
|----------------------------------|-----------|-----------|-----------|-----------|--------------------|-----------|-----------|
| | 2020/2021 | | 2021/2022 | | | | |
| | OPEX \$ | CAPEX \$ | OPEX \$ | CAPEX \$ | OPEX \$k | CAPEX \$k | OPEX \$k |
| Planning/procurement (Opex only) | \$40,000 | | | | \$40,000 | N/A | |
| Delivery | | \$600,000 | | \$320,000 | | \$920,000 | \$100,000 |
| Project Total | | | | | \$960,000 | | |

Excludes debt funding and depreciation (include details of ongoing)

13. REVIEW AND APPROVAL

| PANEL REVIEW | | APPROVAL | |
|----------------------|---|-----------|--|
| Finance: | Luke Baron endorsed 15 th June 2020 | GM: | Sponsor |
| ICT: | Sue Mclean endorsed 19 th June 2020 | CFO: | Endorsed via Luke Baron 15 th June 2020 |
| Legal & Procurement: | Linda Going endorsed 19 th June 2020 | CE (ELT): | ELT meeting 29 th June 2020 |
| PMO: | Chris Maggs endorsed 22 nd June 2020 | COUNCIL: | Not applicable |
| Strategy: | Not applicable | | |
| | | | |

ELT approval minute extract:

<http://ourspace.gw.govt.nz/ws/prgmgt/plan/On%20bus%20annoucement%20ELT%20Minute%20extract%20approval.msg>

PROACTIVE RELEASE

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Purpose

The purpose of the On Bus Announcements project is to improve the customer experience for bus users by enabling more accessible journeys.

Scope

The scope of this project is restricted to audio and textual information, to enable accessible journeys for people, with a primary focus on people with visual disabilities.

The table below outlines which elements contribute positively to the experience of identified targeted and general customer groups.

| Customer Value Matrix | Audio | Text | Maps | Te Reo Sign Language Other Languages |
|---|---|---------------------|---|---|
| Customers with visual impairment / disability | Yes | Only in large print | No. Detail too small to be effective. | Nice to have |
| Customers with cognitive impairment | Yes | Yes | Nice to have, but can create confusion or anxiety for some | Nice to have, but can create confusion or anxiety for some |
| Cautious / anxious customers | Yes | Yes | Nice to have | Nice to have |
| Unfamiliar customers (ie- Visitors) | Yes | Yes | Nice to have | Nice to have |
| Regular Customers (ie- Commuters) | Yes, but some will have lower tolerance to audio. | Yes | Nice to have, but most customers with data-enabled devices prefer to use their device to interact with a map on an app of their choice. | Nice to have, but announcing every item in multiple languages can reduce the comfort of regular travellers. |

Intentions and priorities

The following intentions, in priority order, are taken into consideration when making decisions on this project:

1. Consistency in experience
 - a. Announcements – audio & visual
 - b. Stop naming
 - c. Visual cues/branding
2. Information presented is consistent as much as practicable (i.e. the preference is for an audio and textual announcement at the same time)
3. Accessibility and ease of Usability (with a focus on the primary audience)
4. Some desired functionality may not be possible due to technical and financial constraints.
5. Customer and Stakeholder feedback informs the decision of the solution
6. Be mindful of all customers' needs including the comfort of the journey for regular customers

Background

On Bus Announcements are intended to provide audio and visual announcements of route, destination, and next stop. Most information currently available within the realm of public transport is printed or visual, and could better meet the needs of customers with visual impairments or disabilities. Audio announcements are a key improvement to providing a more accessible journey, working in support of other Metlink customer information channels including the Metlink website, mobile app, and real time information systems.

Existing LCD screens, cabling, and speakers were installed on all new buses delivered from July 2018, in anticipation of an announcement system. Media players and receivers were not previously sourced or installed, since the media solution was not predetermined.

The intended outcome of Phase 1 was to furnish a test system on an electric double decker bus on Route 1 (Island Bay to Johnsonville) for 4-6 weeks to assess customer experience needs and expectations, and test that data and on board equipment are reliable, consistent, and fit for purpose.

After challenges sourcing an off-the-shelf product that would be suitable for the purposes of this test, an in-house team (an ICT Solutions Architect and a PT Customer Experience Designer) collaboratively developed custom test software for a generic media player, combined with an integrated GPS/router. This afforded control over all elements and behaviours of the system, the ability to use in-house support to make ad hoc adjustments, and gain important insights around data, bus operations, and challenges that could affect future implementation. On-board and remote test monitoring informed more than 236 changes to software code throughout Phase 1. Two dedicated browser-based applications for testers were also developed: one to monitor real-time vehicle movements and status, and another live feed replicating the information displayed and announced on a test vehicle.

On Bus Announcements Test Summary Report

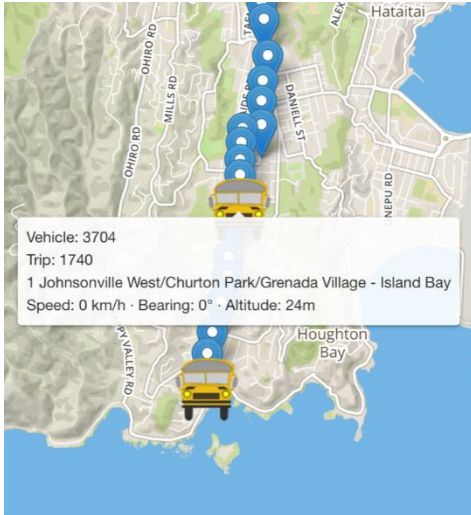


Fig 1: Real-time vehicle monitoring application

Stakeholder engagement

Staff and councillors from Greater Wellington Regional Council (GWRC) and representatives from a wide variety of disability community groups were invited to attend live demonstrations of the test system on chartered bus rides through the city before being launched to the public. All members of the Accessibility Reference Group who regularly engage with Metlink were invited to attend, and the invite was open to extend to other interested parties. Representatives from other groups, including but not limited to, the Blind Foundation, Blind Citizens NZ, CCS Disability Action, My Life My Way, Adaptive Tech, and Age Concern, and Tourism New Zealand were also invited to attend.

The Wellington iSite staff were invited to attend the demonstrations. Previously, the iSite staff had provided insights about visitors using public transport for other Metlink projects, which were useful and relevant to this project.

A dedicated feedback session for members of the Blind Foundation and Blind Citizens took place mid-July to engage by sharing ideas, feedback, and insights for the project.

We will continue to engage with stakeholder groups throughout various stages of the project.

Test approach

Understanding what visual and audio information will improve the experience for all customers was the goal of testing, which took a customer-centred approach, engaging with customers directly and co-designing with other stakeholders to inform the design of features. Metlink staff interviewed customers on board, using open-ended questioning and observing customer behaviour. Test buses were chartered

On Bus Announcements Test Summary Report

for three private demonstration rides for targeted testing with stakeholder and community groups, such as Blind Foundation, Age Concern, and GWRC staff.

Critical basic information of route, destination, and stops were the focus of initial testing. Customer experience and tolerance factors including voice quality, volume and frequency of audio announcements were also considered. Text size, colour and other icons were also included in initial testing.

Some key design features still require further discovery and development beyond initial testing. For example, how people want to receive services updates and information, such as bus etiquette. Later versions may also test the feasibility of other elements, such as additional languages.

Testing was scheduled to run for a minimum of two weeks on one Tranzurban electric double decker bus servicing routes 1 and 32X, and was further extended for several more weeks and to routes 7 and 23e and an additional bus for operational reasons.

Metlink website and app service updates, social media feeds, and on-bus screen prompts instructed customers to provide their feedback through the Metlink Contact Centre.



Fig 1: Social Media post announcing testing and instructions for feedback

On Bus Announcements Test Summary Report

| Date | Event |
|-----------------|--|
| 27 May | Test system installed on bus #3706 |
| 28 May | On Bus live final system test |
| | Service update detailing the trial posted to Metlink website and app |
| 29 May | System demonstration charter bus ride for GWRC Staff and Councillors |
| 29 May | System demonstration charter bus ride for representatives from Blind Foundation and other disability advocacy groups |
| 30 May | System demonstration charter bus ride for representatives from Blind Foundation and other disability advocacy groups (2nd session) |
| 31 May | System launched for audio announcements on public service for routes 1 and 32x |
| | GWRC staff feedback drop-in session |
| 31 May – 3 July | Customer interviews and observations conducted on bus (5 weeks) |
| 12 June | Additional test system installed on bus # 3704 |
| 12 June | Sound equipment hardwired on both test buses to ensure audio enabled on all trips |
| 18 June | System updated to enable audio announcements on routes 7, 23e and 23z |
| 24 June | Front facing screens turned off due to safety concerns over reflection on windscreen |
| 4 July | Customer interviews concluded, system remains active on both test buses |
| 10 July | Feedback and co-design session held at the Blind Foundation |
| 21 July | Test system turned off on bus #3704 |
| 24 July | Service update detailing the trial removed from Metlink website and app |
| 25 July | Test system turned off on bus #3706 |

Fig 2: Test timeline of key events

1. Customer experience insight summary

Benefits for customer segments

The key group to benefit is customers with visual disabilities or impairments. Customers in this group were generally satisfied with the level of information provided, although they did provide feedback on some of the content, and suggesting that bus stops are named for landmarks and key businesses, since this is a key part of how they navigate. Audio announcements of route information and next stops provides the necessary information to confidently and more independently complete their journey, which is an integral part of creating more accessible public transport. Traditional visual-based information is not always usable for customers with visual disabilities or impairments. For example, on-street timetables and network maps are static printed information, which are not always available in large print.

Customers unfamiliar with the network, including visitors and locals unfamiliar with public transport, did express benefit from the route and stop information, especially around landmarks and local attractions. Commuters and familiar customers found benefit when visibility of bus stops was difficult (darkness, winding roads, condensation on windows, rear-facing seats, crowded buses, etc.). On many occasions, customers whose attention was on smartphones or otherwise were prompted by the announcement of their stop. In other instances, customers were observed discussing with travel companions about which stop (of the three listed on the screen) would be the best place to alight.



Fig 1: Condensation on windows in daytime



Fig 2: Condensation on windows when dark

It is worth noting that different customer segments had appetites for different information. For example, commuters indicated interest in estimated times of arrival at key stops and service disruptions, while visitors and infrequent local users were interested in landmarks and reassurance that they had boarded the correct bus. People who are dependent on public transport, especially those with disabilities, had needs and appetite for a wide range of information to complete their journey. The challenge with future implementation will be providing the type and amount of information relevant to customers in a way that contributes to an overall positive customer experience, while providing for accessible journeys.

Key insights from customer segments

General insights around the key requirements and features of the system are summarized below based on customer/traveller types. Groups are categorised below as Visually Impaired/Disabled (V), Unfamiliar travellers including visitors (U), or Frequent travellers (F).

| Feature / Requirement | Customer response | Recommendation |
|---|--|--|
| Next stop identifier – name or number | <p>V: <i>I am more confident and independent knowing that my stop is next.</i></p> <p>U: <i>I wouldn't know where I was meant to get off otherwise.</i></p> <p>F: <i>I know where I'm going. Announcing every single stop isn't necessary for me.</i></p> | <p>Every stop must be announced at least once.</p> <p>Repetition of announcements should be further tested for tolerance during peak times.</p> <p>Stop numbers should not be used, as they are not useful to most customers, and would contribute to visual and audio clutter.</p> |
| Next stop additional information – landmark or attraction | <p>V: <i>I navigate by landmarks, like Te Papa or the Cable Car, more than street names or stop numbers.</i></p> <p>U: <i>This makes it easy to catch the bus to the places I want to see. I won't remember stop numbers, but landmarks are helpful.</i></p> <p>F: <i>I know my city well, but I don't mind hearing about landmarks. I don't use the numbers unless I'm searching in the app for next arrivals (RTI).</i></p> | <p>Recommend a customer-centric review of naming convention of stops to include landmarks or "household name" locations. Interim measure would be using both the official stop name and additional colloquial descriptions.</p> |
| Route identifier – number, destination, direction | <p>V: <i>It confirms for me that I'm on the right bus.</i></p> <p>U: <i>I'm not familiar enough with the city to know for sure if I'm going in the right direction just by the end destination, or if this route will take me where I want to go.</i></p> <p>F: <i>I don't need this information. It's routine for me to catch this bus.</i></p> | <p>Customer test the understanding of wayfinding terms including northbound, city-bound, inbound, etc. as a potential to increase network understanding. Opportunity for enhanced static signage at bus stops to indicate this would be beneficial.</p> |
| Route additional information – via key locations or hubs | <p>V: <i>This helps me understand the network, especially if I need to go somewhere new or assist my peers.</i></p> <p>U: <i>I like knowing that this route is taking me where I want to go. Although, it's not that clear if or where I'm supposed to transfer.</i></p> <p>F: <i>I'm in a routine – I don't need this. But it helps me explain the route to others if they ask me for help.</i></p> | <p>Further customer testing about whether via information is needed/tolerated during peak times. Ensure that via information does not include points that have already been passed in the trip. For example, don't include "via wellington hospital" in announcements after the hospital stops, as it may confuse unfamiliar customers about the direction or route of travel.</p> |
| Audio announcement tolerance – frequency, voice, and volume | <p>V: <i>The volume should be loud enough for anyone to be able to hear it, regardless of</i></p> | <p>Ability to adjust frequency and volume should be managed centrally, and in response to</p> |

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| | <p>ability, and especially for those who are less able to use visual information.</p> <p>U: Repeating the announcements helps me feel confident in my journey.</p> <p>F: When stops are close together, the announcements are too frequent when it repeats at every single stop.</p> | <p>customer feedback. Drivers should not have control over volume, and may switch the system off if they don't like it. Drivers may not be reliable to turn the system on.</p> |
|---|--|---|
| <p>The following features were not included in initial testing, however some feedback was received.</p> | | |
| Feature / Requirement | Customer response | Recommendation |
| <p>Map of route or network map (untested)</p> | <p>V: Maps aren't helpful if they're too small to read or if they're moving/scrolling.</p> <p>U: I'm not that familiar with the city, so a simple map might be helpful – but I would probably need the map before I even get on the bus. I'm more likely to use google maps or ask for directions.</p> <p>F: I know my routes and my stop. If I'm going somewhere new, I'd prefer to interact with a map or app on my own device.</p> | <p>Conventional maps persistent on screen are not recommended for this application. Simplified schematic graphics or pop-ups of hub maps may be useful at connection points.</p> <p>Recommend waiting until development of new Metlink mobile website and app is completed, and open data becomes available for 3rd party apps, as this is the preferred option for customers with access to mobile devices.</p> |
| <p>Transfer / Connection information (untested)</p> | <p>V/U: Transfers are confusing. Do I wait at this stop or do I have to walk to a different one? Which bus am I supposed to wait for? Is it the same on the way back?</p> <p>F: I know where to transfer, but I'd like to know if I'm going to make my connection or if I'll have to wait.</p> <p>Note: There was a large amount of feedback about the experience of waiting, getting on and off multiple buses, and the accessibility of the hubs themselves, but less specifically about the way that transfer information would be provided with the on-bus system. There was an interest in announcements of "Transfer here for buses to XYZ", but nothing more specific.</p> | <p>Further development of static and digital customer information regarding hubs, connections, and transferring should be explored outside of this channel and project. Ensure that level of detail of transfer/connection information does not overwhelm unfamiliar passengers. This channel has limitations regarding communicating this level of detail.</p> |
| <p>Service updates / disruptions (untested)</p> | <p>V: Showing these on the screen, especially if they're scrolling text, isn't helpful for me. I know that announcing or reading them all out could be annoying for others.</p> <p>U: I like being informed, but it's overwhelming when you don't know what it means or what your alternatives are.</p> <p>F: I'd like to know in advance if my journey will be affected so I can adjust my plans. I'd</p> | <p>Develop alternatives to scrolling text for service updates. Pop-ups, split screen, icons, and other innovative ideas to meet existing and future customer expectations should be thoroughly developed and tested.</p> |

| | | |
|--|--|---|
| | <i>like to see an estimated time of arrival – especially if there’s traffic.</i> | |
| Safety and etiquette messages (untested) | V: <i>Keep us safe by informing us of hazards. Passengers should be reminded to be courteous to those with disabilities.</i> U: <i>It’s good to know what is expected of me. I don’t want to inconvenience the other passengers.</i> F: <i>Some people need occasional reminders of etiquette, but keep it short, and don’t announce them so frequently that it’s annoying.</i> | Develop alternatives to scrolling text for safety and etiquette messages. Pop-ups, split screen, icons, and other innovative ideas to meet existing and future customer expectations should be thoroughly developed and tested. |
| Metlink brand messaging (untested) | No specific feedback, but a general expectation that there will be messaging from Metlink on the bus. | Existing and future customer expectations should be thoroughly researched and tested. |
| 3 rd party advertisements (untested) | No specific feedback, but there were queries whether we would be playing ads on the bus. Some asked if that could mean cheaper fares because of ad revenue. | Existing and future customer expectations should be thoroughly researched and tested. Policy and strategy regarding 3 rd party advertising on bus is required. |

Awareness and attention

The majority of customers appeared to ignore audio and visual information across both peak and off-peak times. Older customers and those in priority seating areas (nearest the screens) were most likely to display interest. The novelty of the system for most appeared to last only a few moments, then was quickly ignored. Many customers were not actively watching the screens due to smartphone usage or other reading material. Many wear headphones, and commented that the announcements couldn’t be heard while wearing headphones. Feedback about the volume indicated that it was loud enough to be heard over ambient noise, but subtle enough to be ignored or “tuned out”.

Volume

The initial assumption was that audio announcements would require higher volume during peak time due to a larger number of passengers being on board, and lower volume during off-peak times due to fewer passengers being on board. In testing, it was found that the opposite was required, since peak commuter services are very quiet since passengers rarely interact with each other. Reductions to volume during peak time largely curbed early negative feedback. Off-peak services had more families with young children, groups of visitors, and older customers, all of which were more active and social on board, which required an increase in volume to be heard clearly. Testing found that during peak, volume set at 10% quieter than baseline (off-peak) was the ideal balance.

It was observed that the upper decks of double decker buses have less ambient noise from opening doors, engines, and snapper machines. This makes the same volume seem louder on the top deck than the lower deck. The ability to control multiple audio zones for different volumes is desirable, but feasibility has not been explored in this phase.

The volume and frequency of the audio announcements was described by some customers as “similar to the Snapper machines” on board. Most customers said they now are “so used to the Snapper sounds

Commented [MC1]: Not sure how best to communicate, but peak is 10% quieter than the baseline, which is off-peak mode (rather than louder than it was initially) done.

that [they] don't even notice it anymore." Other noises customers are accustomed to include the bus stopping chime, door closing warning buzzers, and beeping of vehicle indicator/turn signals, although some customer complaints do persist in this area.

Stop names and landmarks

Most customers interviewed described bus stops in terms of landmarks or familiar businesses instead of official stop names or intersecting streets. The exception was when both streets are major streets, for example "Taranaki Street at Courtenay Place". Examples include "Courtenay Place at Reading Cinema", "David Jones", "outside the Supreme Court", "Willis Street at Unity Books", and "the last stop before the Basin". Members of the Blind Foundation were unfamiliar with the name "Adelaide Road at Broomhedge Street", since they refer to this bus stop as "Adelaide Road at the Blind Foundation." The ability to include landmarks in addition to (or instead of) official bus stop name is an opportunity to improve customer experience.

None of the customers interviewed could recall any numerical stop IDs, including their regular boarding or alighting stops. Most said they were not interested in learning or using stop numbers, as they are not memorable or necessary to complete a journey. Those with a native language other than English indicated that landmarks, businesses, and street names were preferred.

Screen glare

The highly reflective surface of the vandal-proof glass housing for the screens were affected by daylight and bus lighting sources, which greatly reduced the visibility of information displayed on screens. Front-facing screen graphics also created significant reflection on the windscreen in the critical viewing window for the driver. The decision was made, in the interest of safety, for front-facing screens to be turned off for the remainder of the test until a permanent solution could be implemented. Other attempted solutions, such as anti-glare privacy screen filters, were unsuccessful.

Driver control

The test system initially required the driver to turn on the stereo to enable audio announcements. This was found to be widely ignored, and announcements would only be enabled when a Metlink tester was on board requesting sound to be turned on. This posed a risk that the test would not have significant coverage, so the sound system was hardwired to no longer require driver activation. Drivers quickly discovered that activating the bus' microphone would "duck" the volume of audio announcements, rendering them silent to passengers. It is recommended that activation and volume of audio announcements are isolated from driver control completely.

2. Feedback channels

Opportunities for customers and stakeholders to provide feedback were welcomed and openly communicated across multiple channels.

- Dedicated feedback sessions were held for GWRC staff and Blind Foundation members, listed above in the Test Summary Timeline.
- Service updates on the Metlink website and app informed members of the testing and included an invitation to provide feedback through the Metlink Contact Centre.
- A scrolling and pausing text bar on the test bus screens read "This is a test of a passenger information system being developed for implementation in 2020. Please direct any feedback to the Metlink Contact Centre 0800 801 700 or metlink.co.nz". Social media response was also monitored by GW staff.
- Social media commentary was monitored and captured by Metlink staff
- On board customer interviews were conducted by a Metlink staff member, totalling approximately 60 contact hours across 5 weeks of testing.

Interview prompt questions

A list of question prompts was developed to facilitate customer interviews, and gather insights around customer behaviours, attitudes, and motivations as applicable to the customer experience of this system. General responses to these questions are summarised in Customer experience insights summary (section 1).

Behaviours

- *"How do you plan your journey now? Specifically, what tools do you use?"*
- *"How do you know where to get off? What about on an unfamiliar route/area? What about when it is dark?"*
- *"Tell me about a time when you have missed your stop."*

Attitudes

- *"Who do you think would benefit (most) from a system like this/information like this?"*
- *"How could [information like] this improve your Metlink experience?"*
- *"Is this what you would expect from a passenger information system? What's missing?"*

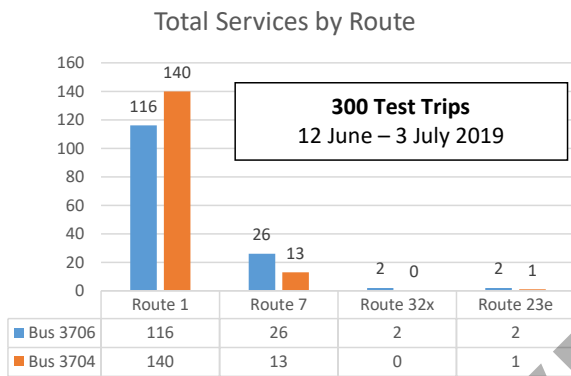
Motivations

- *"What's the most difficult part about catching a bus to an unfamiliar place?"*
- *"Would this system give you confidence to explore more of the network? How so?"*
- *"If your regular bus route changed, how would you figure out how to make your journey?"*

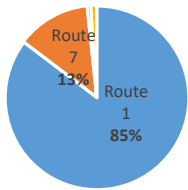
3. Tested routes and trips

Initial discussions with the operator, TranzUrban, required the designated test bus to run on routes 1 and 32x as much as operationally possible. After three weeks of testing, the decision was made to equip a second test bus and include routes 7, 23e and 23z in the testing, since electric double decker vehicles were often used for these routes due to operational factors.

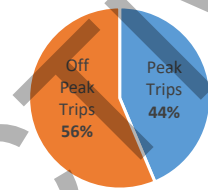
Nearly 17,000 customer journeys were reached during the test period between 12 June and 3 July, which is the period when the system was consistently reliable on both vehicles, and supervised by Metlink staff.



Route Distribution



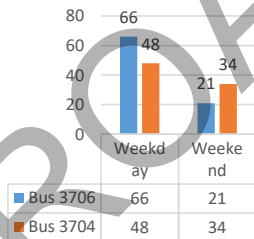
Peak vs. Off Peak



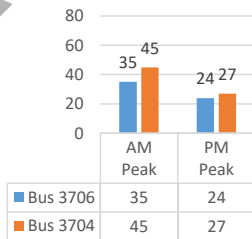
| Fare Type | Patronage |
|--------------|---------------|
| Adult | 11,578 |
| Child | 2,182 |
| Senior | 1,830 |
| Tertiary | 1,135 |
| Under 5 | 66 |
| Accessible | 49 |
| TOTAL | 16,840 |

Figures inclusive of cash fares

Off Peak Services



Peak Services



4. Design Specification

Key design principles

- **High visual contrast:** Best practice for high-visibility accessible signage is high colour contrast and large text, with minimal (if any) scrolling text. To reduce glare during dark hours, a dark background with light text was used.
- **Familiar visual style:** Metlink on street and printed information uses coloured circles for visual recognition of routes, and this style was applied for consistency. Metlink brand colours were used.
- **Maximise critical information:** To maximise usable screen area for critical information, text labels such as “Next Stop” and “Destination” were replaced with familiar icons, such as the map pin icon and “string of beads” common in transport maps.
- **Hierarchy of information:** For customers to complete their journey, the key information is route number, destination, and next stop name. Supplementary (nice to have) information includes route via descriptions, additional next stops, landmarks and attractions. Additional “easy wins” include a clock and outdoor temperature.

Features not included in testing

Many non-critical features and information were not included in the first phase of design due to constraints of time, cost, complexity, and/or non-necessity. Network or area maps, brand imagery or advertisements, bilingual text or announcements, safety announcements, service updates, connecting services, schedule adherence (early/lateness), predicted arrival time to each stop, fare zones, bus stop numbers, route diversions, and “Bus Stopping” system integration were not included in the initial design of the minimum viable product.

Graphic layout

Sans serif fonts are generally accepted as more accessible than serif fonts, and adequate space between lines of text make shape recognition of letters easier for those with visual impairment. Font sizes used were found to be adequate for our testers with visual impairments.

Colours of the destination bar, next stop icons, and scrolling message bar were amended mid-test to reduce screen glare and increase legibility of text (see Fig. 2). White text on the red bar was particularly difficult for customers to read.

Due to the restricted height of some displays, the immediate next stop was placed at the top of a list of the 3 upcoming stops, rather than at the bottom, to maximise visibility of this key information over the heads of other seated passengers (see Fig. 3). This also implies a list of stops in logical order (1st, 2nd, 3rd), rather than implying the path of travel, since buses have screens facing both the front and rear of the bus.



Fig 1: First customer-facing version of graphic layout



Fig 2: Last customer-facing version of graphic layout



Fig 3: Next stop positioned near top of screen for visibility over other patrons' heads. Top Deck of an EVDD.

Animation

Since the test system was designed as a minimum viable product, animation of bus movements on a map were not incorporated at this stage. Customer interviews indicated that most customers would find a map “neat”, but not necessary, and would likely find difficult to see the detail on the screen unless sitting very close to it. Most would also prefer to interact with a map on their own device using an app of their choice.

Simple animation of the text (slide up and grow, then slide up and disappear) was used to attract attention and enhance comprehension. A later addition of a disappearing white border around the next stop icon (indicating progress to the next stop) was incorporated to test customer reaction and understanding. (Links to videos are listed in the Appendix.)

Audio announcements

The minimum requirement was an audio announcement and visual representation of every stop to serve the needs of customers with visual impairment who may not be able to easily identify their alighting stop from other information sources. A key insight required of the customer experience testing was the tolerance to this frequency of audio messaging, especially in areas where stops are close together (e.g. – the Golden Mile). Volume, timing, repetition of announcements, and level of information detail were tested in various arrangements throughout the test. Time, temperature, scrolling text bar message, and generic safety messages were not included in audio announcements for this test. Multiple recordings of frequent phrases like “Next stop” and “This is a route 1 service to...” were randomised, to provide subtle variations to increase tolerance, as it seems less robotic and repetitive.

Although text-to-speech engines were presumed to be less expensive and easier to implement, the cost and simplicity of using real voice recordings was the better option for this test. Voice recordings eliminate the time-consuming process of sculpting text-to-speech files for correct Te Reo and local dialect pronunciation (as native New Zealand accents were not available or cost effective). Real voice recordings also simplified the programming required to include additional information data sets.

Audio announcements on Metlink trains and in the Wellington Railway Station use a recorded female voice, so using real voice on the buses contributes to a consistent brand experience. A male voice was chosen for this test to assess if Metlink customers notice the difference, have a preference, or have different sentiment to audio announcements in relation to the particular voice.

Initially, voice recordings for audio announcements were only created for routes 1 and 32x, although the program was capable of visually displaying all routes and stops on the screens. The system was prescribed to only include audio announcements of routes 1 and 32x, but the routes 7,23e and 23z were added to the audio enabled routes part way through the testing due to bus operations. (See Test Summary Timeline).

Peak mode and Off-peak mode

The initial test provided two variations of audio announcements, nicknamed “Peak” mode and “Off-peak” mode, due to the timeframe when the variation would be live for customers. The assumption was that most peak travellers are commuters who require less information to complete their journey, as it is part of an established routine. Visitors mostly travel during daytime hours and weekends when local attractions are open for business. Off-peak hours offer free travel for Gold Card users, who tend to have a stronger appetite for information to help them complete both familiar and unfamiliar journeys, for a variety of reasons.

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The visual component of both modes is identical. Visual display was enabled for all routes and stops, although the audio announcements were only enabled on the designated test routes 1 and 32x, and later 7, 23e and 23z. During peak times, announcements include only the route number, destination, and next stop. During off-peak, it announces route number, destination, route via information (key stops), next stop, and repeat of next stop upon arrival when the bus had stopped. The final stop of any service announces that it is the final stop, and concludes with a cheerful "Thank you for choosing Metlink."

For the purpose of this test, "Peak" trips included those that operated the majority of the service between 4:00am – 9:30am, or 4:00pm – 6:30pm on weekdays. "Off peak" included all other times, including weekends. Although Metlink policy dictates that off-peak fares conclude at 3pm, we chose to include the 3:00pm to 4:00pm in the off-peak category for this test, since many school children and visitors travel during this period (after school and visitors leaving attractions in late afternoon). The additional information about routes and stops included in off-peak mode would likely be useful to these customer segments.

Bus movement logic

Logic parameters were fine-tuned over the period of testing to accommodate for a variety of operational behaviours, variability of GPS accuracy and bus stop geolocation points, and sections of routes with "hairpin" turns causing errors in location calculation. The GPS unit would compare the vehicle's current position and the location of the stops on that leg of the trip, then measure which stop was nearest, and trigger various logic accordingly. Bus route shape files were not used for this initial test phase, as the integration would have added complexity for only a marginal benefit.

Buses will drive past stops without stopping when no one is boarding or alighting, so logic was created on the basis of a maximum speed at a particular distance before the stop, so that passed bus stops would not be re-announced (off-peak mode). Logic for re-announcements of a stop on arrival were set so that the announcement would be triggered only if the speed of the bus dropped below 5km/h while within 25m of the head of the stop. Buses often stop short from or past the head of the stop, so this logic was created to accommodate that behaviour. Similar logic was employed for stop departure on the basis of a minimum distance past the head of the stop and a minimum speed before the next stop would be queued.

A common driver error is logging onto a trip in the wrong direction, so logic was added to recognize when stops were being passed in reverse order, and would automatically reverse the stop list to provide accurate next stop information. Logic was included to accommodate for buses that divert from the intended route, by pausing announcements and clearing visual information from the screens until the correct route is resumed. This is to prevent inaccurate next stop information.

5. Technology procedures assessment

Operational challenges and adaptations

The highly reflective surface of the vandal-proof glass housing for the screens were affected by daylight and bus lighting sources, which greatly reduced the visibility of information displayed on screens. Front-facing screens also created significant reflection on the windscreen in the critical viewing window for the driver. The decision was made, in the interest of safety, for front-facing screens to be turned off for the remainder of the test when other solutions, such as anti-glare privacy screen filters, were unsuccessful.

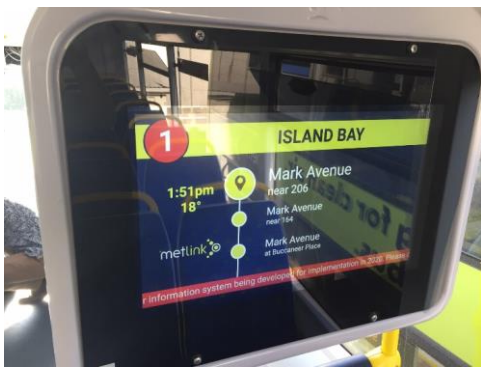


Fig 1: Reflection onto screen case glass covering



Fig 2: View from driver's seat of reflection

The initial test system required the driver to turn on the stereo to enable audio announcements. This was found to be widely ignored, and the announcements would only be enabled when a Metlink tester was on board requesting sound to be turned on. This posed a risk of the test not having significant coverage, so an adaptation of the sound system switches hardwired the sound so that it no longer needed to be activated by the driver. An additional hurdle with the sound system was found when drivers discovered that turning on the bus' microphone would "duck" the volume audio announcements, rendering them essentially silent to passengers. Multiple instances of this behaviour were noted by Metlink testers. The recommendation for any audio announcements to be completely isolated from driver control or intervention is highly advised.

Technology challenges and adaptations

Finding one piece of hardware capable of fulfilling all roles in the system was a challenge. Although options were identified, they either fit into the category of being able to fulfil all roles, but not very well, or being cost prohibitive for the purposes for the trial. The resulting configuration was a composition of 3 smaller devices.

Early in the hardware testing phase, it became apparent that sending video to the displays would not be straightforward due to the fact that they ran a proprietary video protocol. Work was undertaken to reverse engineer and develop a transcoding application to render the application in a compatible format.

Although the buses were built and wired to an approved specification, there were considerable variations between individual configurations. During installation of the first test unit, only 2 of the 3 displays powered up correctly. The operators spent some time attempting to identify the fault, but was eventually resolved by shifting the test kit to another vehicle. On the second vehicle, the coach sound

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amplifier was faulty, but this was simply swapped out with the one from the first. Other variations included cable location and length, connector types and display numbering.

The connections provided for audio were connected to the low-gain (speaker level) input of the coach sound unit. This presented a challenge as the media player's output was line-level. A minor reconfiguration was done on the unit to instead use the line-level input. Additionally, a Molex key/jumper was installed to disable the head unit and permanently activate the coach amplifier.

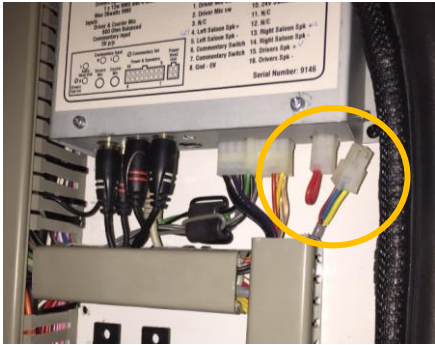


Fig 1: Solution to bypass stereo power control

During provisioning of the second test kit, there was an issue with Vodafone which caused the data connection not to come live. After waiting over a week for a resolution from Vodafone, a decision was made to replace the SIM card in the router to resolve the issue.

The vehicle power supply was stable and clean, but even the connections marked as "Full time 24V" lost power shortly (up to 3 hours) after the bus master switch was turned off. This presented a number of issues relating to boot up/power loss behaviour, and also fatigue on the SD card. In one case (during an update), the power was lost, corrupting some system files. Following this, the Linux image was rebuilt to be a read-only file system to minimise the impact of a sudden loss of power. Updates required the system to specifically be put in read-write mode, and all volumes requiring operational write access were moved to volatile storage (ramdisk). Since making this change, no related issues have occurred.

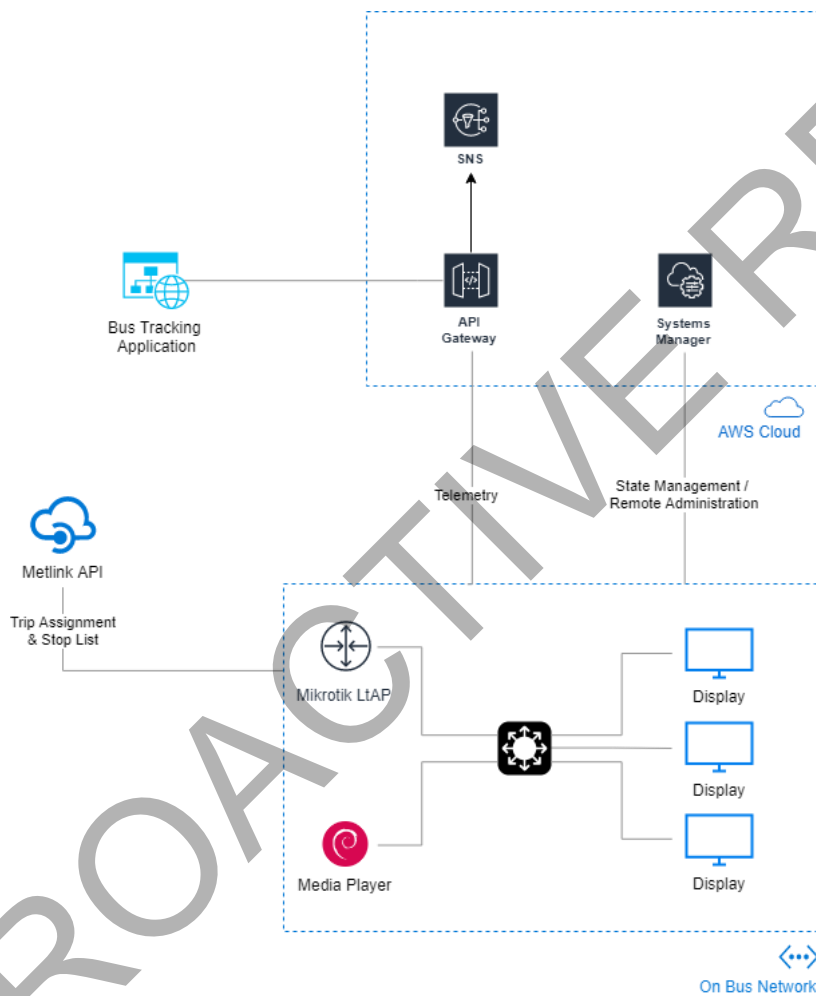
AWS systems manager was chosen as the state management and remote access platform due to its simplicity, negligible cost and full feature set. Although the product itself is relatively mature, the client agent did contain some bugs, which resulted in occasional loss of remote access. This now appears to be resolved with the later versions.

GPS wandering was observed but never specifically an issue. A decision was made with the test kit to use a commodity GPS unit as it was readily available and cost-effective. A consequence of using a unit of this type was the requirement to increase stop and route deviation tolerances. By the end of the testing, these tolerances were at a point where there was negligible negative impact on the behaviour of the system.

6. Technology system design (Minimum viable product)

Hardware for the test included a MikroTik LtAP router, a CTC switch and a Raspberry Pi configured as a headless media player. The test software was an in-house developed HTML5/Angular application rendered using Blink and multicast through the on-bus network. The underlying launcher and telemetry system was a NodeJS application. Data for the system was sourced via the Metlink API using the bus's fleet identifier.

Designing the system in this way facilitated simple monitoring and updates to the application.



PROACTIVE RELEASE

7. Recommendations for Additional Testing (Phase 2 and 3)

7.1. Customer experience requirements to be addressed

| | Summary | Detail | Recommendation |
|----|---|---|---|
| C1 | Metlink brand campaigns and etiquette messaging | Type, timing, and format of information were not tested in this phase | Focus group and ongoing customer feedback to assess appetite and develop best practice |
| C2 | Customer information & disruptions | Type, timing, and format of information were not tested in this phase | Focus group and ongoing customer feedback to assess appetite and develop best practice |
| C3 | Additional Languages | Application and format of additional languages were not tested in this phase | Stakeholder engagement and ongoing customer feedback to assess costs and feasibility |
| C4 | Bus stop naming convention & landmarks | Customers widely refer to bus stop names in terms of landmarks, creating a gap in comprehension and ability to provide accurate stop identification to Metlink for complaints or feedback | Review of bus stop naming convention policy, including risks and benefits of including landmarks or businesses in official bus stop names |
| C5 | School services | Quantity of school routes and school bus stops will contribute a significant cost to initial and ongoing budget | A decision will need to be made by Metlink whether to include school services and stops in the provision of audio announcements. |

7.2. Vehicle specification requirements to be addressed

| | Summary | Detail | Recommendation |
|----|--|---|--|
| V1 | Reflective surface of screen housing glass | Visibility of information presented on screen is obstructed by reflections of objects both inside and outside the vehicle, most notably reflections of other passengers, bus lights, and bright daylight. | Anti-reflective treatment on the outside surface of screen housing glass |
| V2 | Reflective surface of driver windscreen | Reflection of front-facing displays is highly visible and obstructive to the drivers' critical viewing window, creating a significant safety risk for those on board and on street. | This is part of a larger issue with windscreen reflection being investigated by Metlink and operators. Short term solution may include disabling front-facing screens and/or repositioning screens as much as practicable |
| V3 | Driver sound interference prevention | Drivers have been found unwilling to enable an audio announcement system without being specifically requested by Metlink staff. The risk is that drivers will disable the announcements (intentionally or unintentionally) given the opportunity. | Fit buses with sound system that does not need to be activated by the driver and prevents interference or override by the driver |
| V4 | Volume level commissioning and control by vehicle type | Different vehicle types will have different levels of ambient noise, with electric vehicles being markedly quieter, and top decks of double decker buses being significantly quieter than lower decks. | Commissioning of each vehicle to a specified level (to be determined). Retain ability to administer volume settings remotely. Investigate feasibility of independent volume levels for different zones on the same vehicle |
| V5 | Position/activation of speakers near drivers | Speakers installed directly above and near the driver contribute to the distraction and annoyance of audio announcements to the driver. This increases the risk of driver attempting to interfere with audio announcements for personal preference. | Disable speakers above and near drivers, and position passenger-required speakers as far away from the driver as practicable. |

On Bus Announcements Test Summary Report

| | | | |
|----|--|---|--|
| V6 | Position of speakers in Priority seating areas, notably the dedicated wheelchair space | Some vehicles have speakers installed above luggage racks and not directly above wheelchair-specified seating areas. This reduces the effectiveness of audio announcements for a passenger with hearing impairment in this priority seating area. | New buses to specify speaker position to priority seats and wheelchair seats |
|----|--|---|--|

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7.3. Technology requirements to be addressed

| | Summary | Detail | Recommendation |
|----|--|---|---|
| T1 | Storage/CMS of recordings | The quantity of bus routes, stops, and information required for the entire regional public transport network needs a content management system for storage that is easy to implement, maintain, and integrate into other Metlink systems. | Suggestion to adapt Metlink dev website to house voice recordings and other content |
| T2 | Service Design updates (routes, stops) and ongoing maintenance of data | Process for updating of bus stop names does not currently include lead time for audio recordings to be sourced and applied. Voice talent is not yet confirmed for ongoing services. | Include voice recordings in process of stop information updates. Confirm voice talent on ongoing basis for maintenance of information |

8. Appendix

8.1. Test Summary Report Approval

The undersigned acknowledge they have reviewed the **On Bus Announcements Test Summary Report** and agree with the approach it presents. Changes to this **On Bus Announcements Test Summary Report** will be coordinated with and approved by the undersigned or their designated representatives.

Signature: _____ Date: _____

Print Name: Michael Calcinai

Title: Solution Architect

Role: Test Manager

Signature: _____ Date: _____

Print Name: Lauren Strpko

Title: Customer Experience Designer

Role: Test Manager

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8.2. References

| Document Name and Version | Description | Location |
|---|--|---|
| Communications Plan Onbus Announcement Customer Experience Testing May – June 2019 v3 | Communications Plan | http://ourspace.gw.govt.nz/project/onbus/comeng/Communications%20Plan%20Onbus%20Announcement%20Customer%20Experience%20Testing%20May%20-%20June%202019%20v3.docx |
| On Bus Announcements Test Question Matrix | Test Plan and question prompt matrix | http://ourspace.gw.govt.nz/project/onbus/pjmgmt/On%20Bus%20Announcements%20Test%20Question%20Matrix.xlsx |
| Onbus Announcements Customer Testing Info Sheet | Test information sheet for Metlink Contact Centre | http://ourspace.gw.govt.nz/project/onbus/comeng/Onbus%20Announcements%20Customer%20Testing%20Info%20Sheet.docx |
| On Bus Announcement Test Record | Test Record | http://ourspace.gw.govt.nz/project/onbus/pjmgmt/On%20Bus%20Announcements%20Test%20Record.xlsx |
| Peak On Bus System Video | Video: Peak Mode | http://ourspace.gw.govt.nz/project/onbus/pjmgmt/Peak%20On%20Bus%20System%20Video.mp4 |
| Off Peak On Bus System Video | Video: Off-Peak Mode | http://ourspace.gw.govt.nz/project/onbus/pjmgmt/Off%20Peak%20On%20Bus%20System%20Video.mp4 |
| "Where is my bus?" | Bus Tracking Tool | https://gw.binarydesign.co.nz/hub/ |
| On Bus Announcement System feedback Resolve | Metlink Contact Centre feedback report (Resolve cases) | http://ourspace.gw.govt.nz/project/onbus/pjmgmt/On-Bus%20Announcement%20System%20feedback%20Resolve.xlsx |

Commented [MC2]: This will only work as long as the test equipment is on-bus, obviously.

Commented [LS3R2]: Maybe add a disclaimer* ? up to you.

8.3. Staff and customer feedback post-it exercise

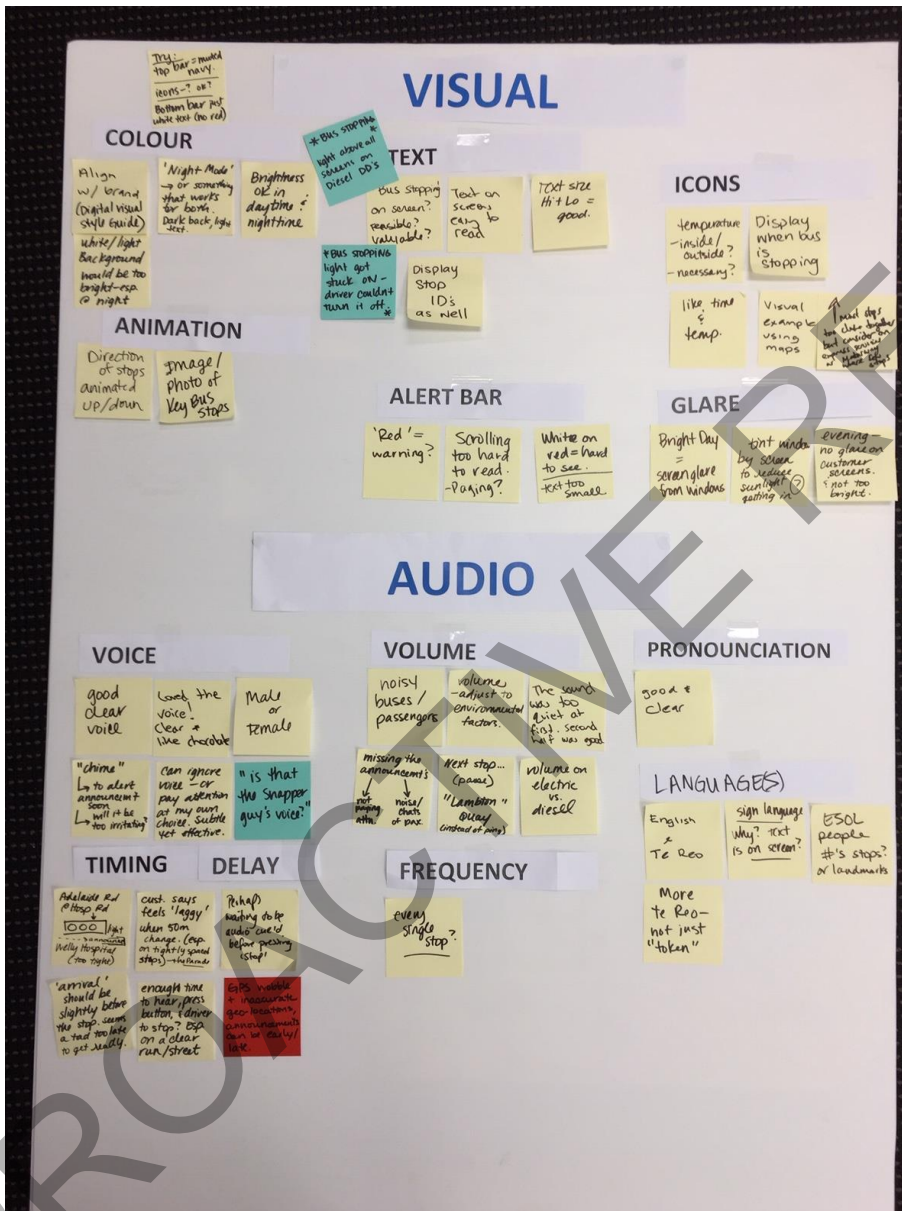


Fig 1: Visual and Audio

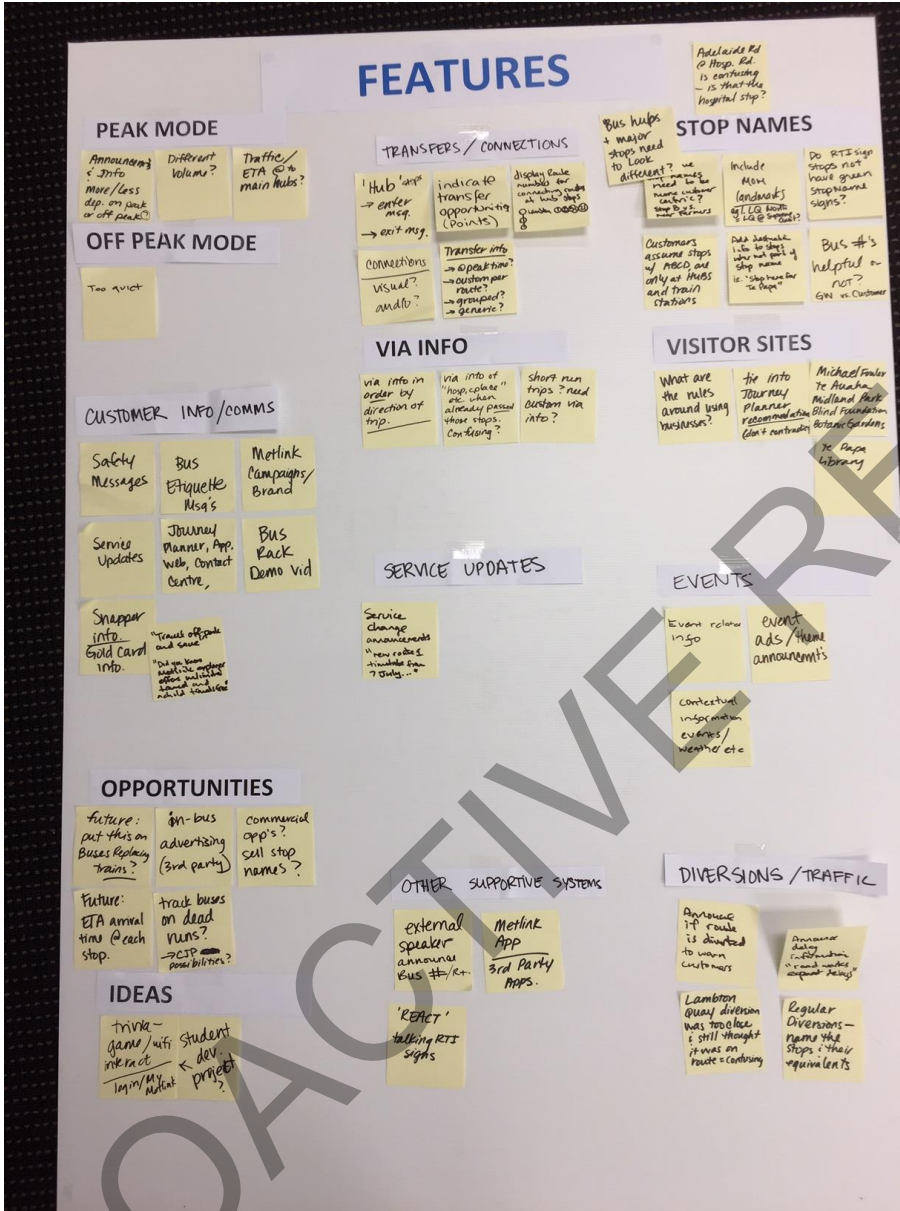


Fig 2: System Features, Information, and Opportunities

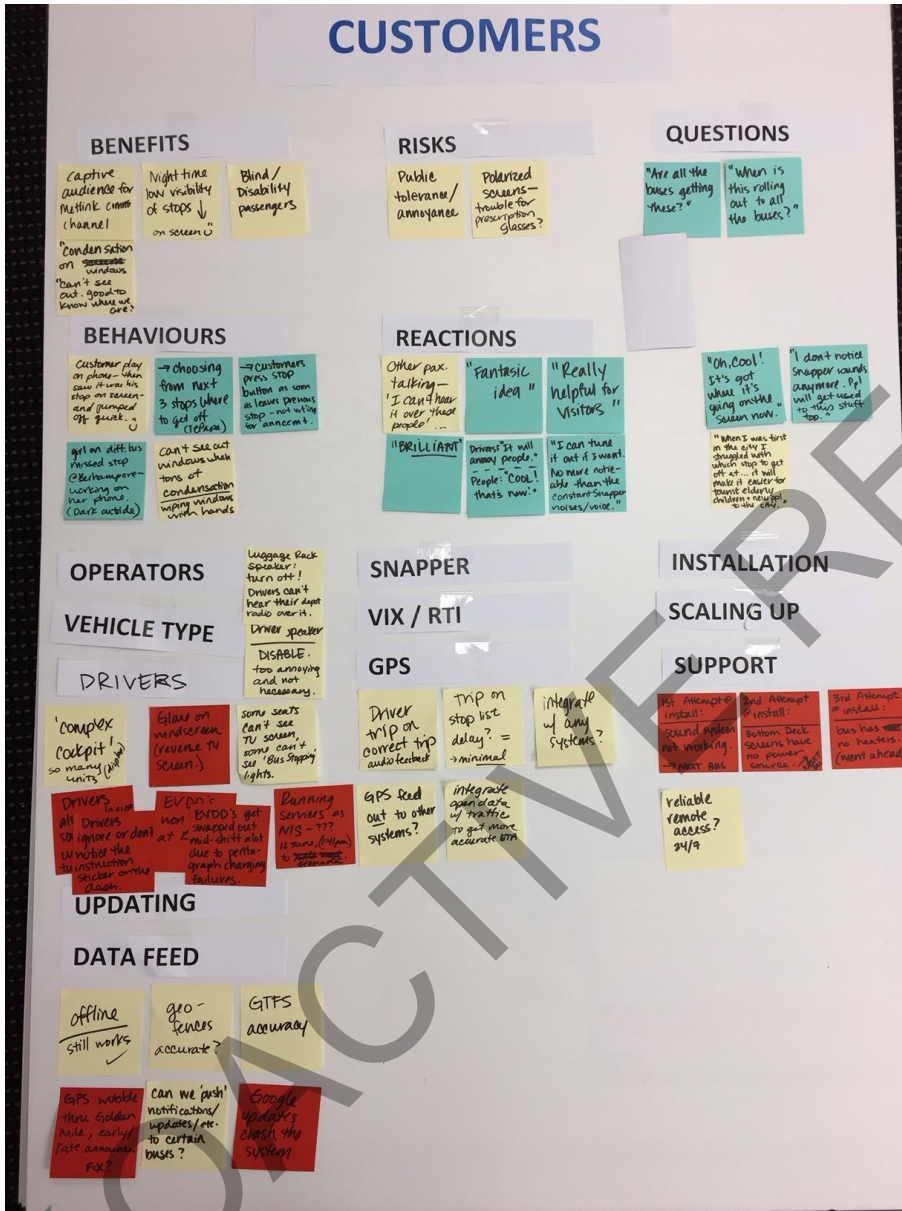


Fig 3: Customer Impact and Reactions; Operational and Technology