



DESIGN SOLUTION REPORT:

MELBOURNE METRO

Version 1.0

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Contact: Due 2nd May 2019

EXECUTIVE SUMMARY

Melbourne Metro has requested a team to design, plan and potentially prototype a new system to improve commuter's current service. The aim was to critically analyse the current system based on the primary research previously conducted focusing on the commuter's current experience.

Based on the primary research analysis the project team found that the greatest opportunity to improve the current service is by making adjustments to the level of comfort commuters experience on the train to and from work.

The proposed project is to install 4, 20-inch-High definition Monitors housed in special units on to every carriage in the Melbourne Metro fleet. The monitors are intended to use close captioned for new and sports as well as displaying important travel and safety information.

Based on other Metro systems around the world, the newly proposed system is intended to implement the best aspects of Japan, Germany and Norway's carriage entertainment and visualisation.

The project is expected to cost approximately \$2,001,000 with a 10% reserve. The duration of the project is expected for approximately 6 months from the starting date.

Project Goals

- Define opportunity for service improvement
- Design and select potential operating system
- Pitching the new operating system
- Prototyping the system
- Implementing and assessing the new system

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1 INTRODUCTION

Melbourne Metro Train Network has taken aim at improving the current customer experience of the 'day-to-day commuter' based on their own personal experiences and thoughts of the current system. Melbourne Metro has requested that the project team from RMIT University composed of; *Cameron Beveridge, Sherwin Warren Jayewardene and Amelia Rhodes* to conduct their own primary research in order to identify, design and prototype a new function/system/process to enhance the customer experience.

The research that was used in the development of this project was primary research conducted by the project team. A different commuter was interviewed by each project team member of varied professionals/background/lifestyle and had an opportunity to discuss their experience using the Metro Train Network. Based on their experiences an Empathy Map and Journey Map was constructed to help gain insight into the individuals' perceptions and thoughts on their experience. Using various forms of primary data can help provide a greater understanding of the issue at hand (Katz, J.S. and Martin, B.R., 1997).

With the aid of the primary research that was conducted, key opportunities and issues were identified based on the subject's transcripts, Empathy map and Journey Map. Based on the collective data from the team there were several areas that the consumers appreciated and enjoyed about their current service and there were also areas that could be improved and were required to be developed further to enhance their experience. Identifiable features of the current train service were the current price of the service, the protective service officers at each station and cleanliness of the train cleanliness.

Opportunities for improvement varied quite drastically ranging from efficiency of certain services such as commuter traffic and ticket purchasing were raised issues. Others included time as key factor where not enough trains were running and that the duration of the trip was identified as taking to long. Lastly, the comfortability of the train was a raised issue where there are opportunities to improve space, layout and entertainment when using the train.

Based on the discussion between the client Melbourne Metro Network and the project team members, the path taken to improve the train network would focus improving the users experience in relation to comfort when using the train. This decision was based on the feasibility, cost and likelihood of improving the experience in comparison to increasing efficiency of trains and or improving the duration of the train ride which would be expected to be more costly and difficult to prototype.

In order to develop, design and implement we must consider the question;

- How might we improve the level of comfort for train commuter to reduce their level of stress and discomfort?

This question serves as the foundation to the development of the project plan in order to improve the current Melbourne Metro Network service for all of their commuters.

2 IDEATION PROCESS

2.1 Ideation Synthesis and Process

Collaboration for the project was managed through various communications between the client (Melbourne Metro) and project team members. The client created a created brief of their specifications for the project detailing requirements for research and ideation development for opportunities of improvement for their customers. The client had no further input into the development of the project.

The process of collaboration between team members for the project involved each team member creating a profile on different a commuter that takes the train. The profile of each commuter was developed based on an interview, and devised Empathy map and Journey Map. Once the profiles have been developed and the primary research analysed, team members collaborated via e-mail detailing their findings about their research.

Upon collaboration, the team identified several areas that could be improved that correlated with our findings. The team discovered that all parties would prefer to have more trains on the train lines at peak times, greater efficiency with the ticketing system and a greater degree of comfortability with the train commute.

The team decided that the best course of action for improvement to the current service would be the focus on the comfortableness of the commute. The reasoning behind this was that the implementation, design and cost was more feasible than improving the time and or efficiency of the current network. There is already a Myki online payment system in place despite adjustment that could be made and increasing the number of trains in the current network would be far too costly.

Based on the comfortability of the ride we have decided to take a holistic approach to improving the network by taking global concepts and intending to implement them with the current Melbourne network. The ideas were narrowed down to an installed television, quiet train carriages and IT friendly carriages.

Based on the options, the team in conjunction with Melbourne Metro decided that installation of monitors on the current trains could have the best impact on commuter's service experience and cost effective for Melbourne Metro.

2.2 Ideation Development

The process involved in designing an effective monitoring system that can be implemented on trains needed to focus on several aspects. The monitors had to be placed practically around the train, the monitors also had to be protected to avoid vandalism and lastly, they are required to be of quality and meet safety standards.

Inspiration for the design concepts for the monitors on the train were drawn from varied models seen around the world that have been implemented in other metro networks. Initial inspiration was drawn from 3 different countries and how they managed to implement the

system. There are a series benefits taking a process that is already implemented and redesigning it for a different context. Edmondson, and Nembhard, 2009)

The initial inspiration for the monitor system appeared practical in Norway. Smaller monitors were used to visualise live tracking journey, clearly showing the next train station and the one following it. Other information that was provided included destination arrivals and delays. In the situation of an emergency a message would be displayed highlighting key information. However, on their train system they only had one monitor at the end of the carriage to display this information.

In Germany the monitors were out dated and used primarily as the function for entertainment and information. In every carriage there was one set of dual monitor system installed in the center of the carriage. The dual monitor system allowed for varied entertainment. The entertainment alternated between current affairs and sports. The issue related to the system is that the monitors were very small and were not producing quality images.

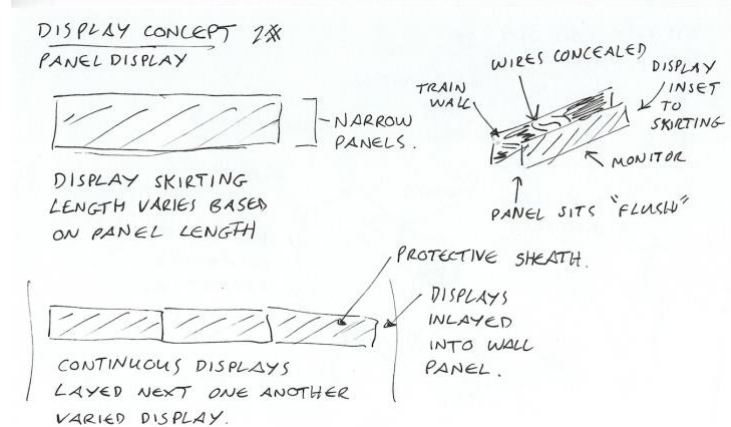
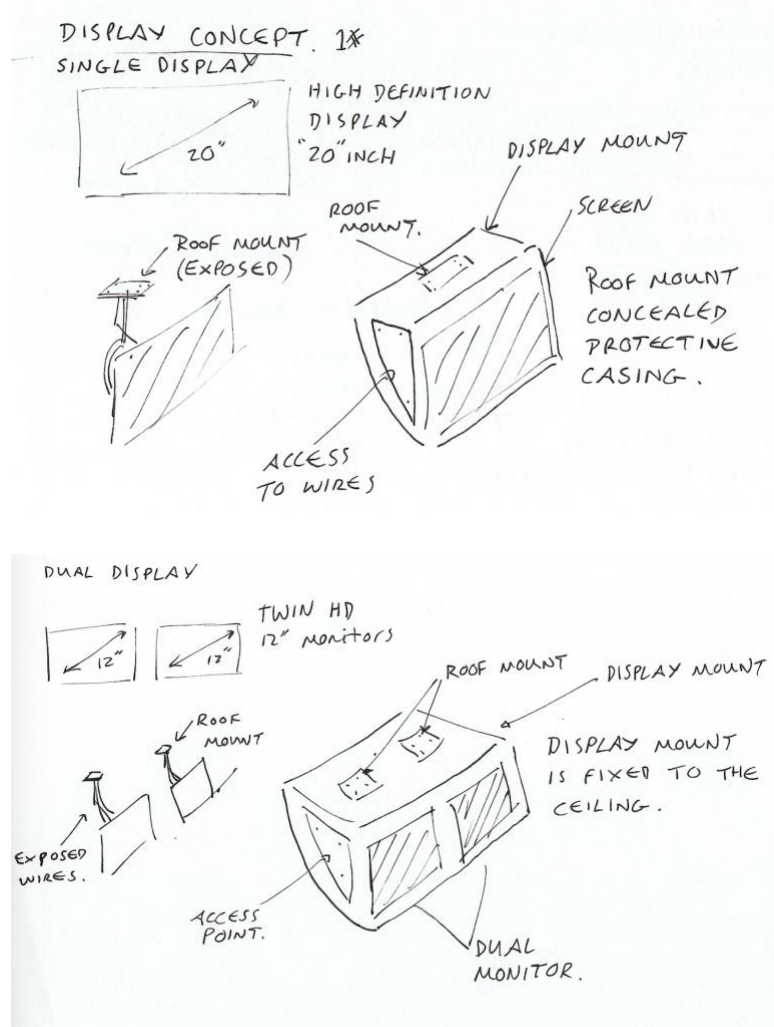
Concept for a modern monitor system that is more discrete as seen on some Japanese rail lines was an idea proposed to create a more modern touch on the monitors. The skirting screens are seen from passengers in Japan due to the seating arrangement face each other from the wall. The concept is a different take on what has been seen elsewhere on other networks.

Initially, different concepts of the monitors were developed. It can be seen in the display drawings shown below that two main ideas were being developed. The first idea was placing a monitor in a protective case and then fixing it to the ceiling of the train. The High definition displays would be subsequently protected from vandalism and theft. The idea was to place the monitors back to back down the train isle where all commuters can see them regardless of being seated or standing. The monitors can be seen essentially from any direction. The dual monitor draws focus on varied functionality. This allows for various information to be displayed simultaneously and aims to appease more than one commuter based on their interest.

The other concept was the skirting monitors that would be inlaid between spacing of windows or set above the windows angled down towards the commuters. The style that was developed is that they would be longer and slightly narrower to accommodate for the limited space. The minors are able to be set next to one another so several screens can be installed across the length of the train. The designs are discrete and suit the trains current style of a modern design. Issues with the design however are more related to the formatting of the project image due to the bizarre shape of the monitor and all the practicality of their position. If they are located on the skirting above the windows, based on the seating arrangement of the trains, the monitors would be difficult to see unless the seating arrangements are managed more effectively.

2.3 Design and Conceptualization

Proposed Monitor Concepts



The typical Japanese train system implemented in Tokyo with face-to-face seating arrangement and skirting advertising.

Source: <https://www.pinterest.jp/pin/442689838364681066/>



The current train system in Berlin Germany with dial monitors fixed to the ceiling.

Source: https://commons.wikimedia.org/wiki/File:U-Bahn_Berlin_H_Type_Quersitze.JPG



This image includes the current Australian Melbourne Metro train carriage.

Source: http://www.wikiwand.com/en/X%27Trapolis_100



The following image depicts a Norwegian long-distance train with monitors installed and the seating arrangement.

Source: <https://www.eurotravlogue.com/2013/08/Flam-Railway-in-Norway.html>



3 CONCEPT PRIORITIZATION AND SELECTION

3.1 Concept Selection

The design selection process was determined on a number of influencing factors. Despite the concepts being drawn from around the world, what was perceived to be the most beneficial aspects of each country was used to develop the system. Adapting the best aspects of each system implemented, the proposed system can be customized to best fit the Melbourne Metro trains.

Based on the German system found in Berlin, the monitors are a dual set up, showing more than one channel or displaying multiply pieces of information. The idea is to use multiple monitors across a single carriage (4) where they will sit back to back based on the seating arrangement of the current Metro train system. This means regardless of where you will be sitting, a passenger will be able to have some form of visual entertainment. In the trains berlin there is only one set of dual screens which isn't observed by everyone. Having back to back single 20-inch monitors should aim to eliminate the problem of some commuters not experiencing the feature.

In relation to the Norwegian system of live tracking of the trip and other emergency details of the commute, the system aims to incorporate both elements of live updates so that passengers can have a more peaceful commute knowing important details of expected delays, safety reminders and destination information. Incorporating both travel details and entertainment aims to provide a less stressful commute to and from work.

Based on the Japanese system installed on their trains, they aren't expected to be as functional when placed on the Melbourne Metro trains. This is expected to be due to the seating arrangement. Having skirting televisions would appear impractical as no seats face the side of the train. Instead of implementing the same format of the Japanese system, the team aimed to take away other aspects of the system. Using high quality monitors housed in sleek housing units, to allow to effortlessly look part of the train.

3.2 Design Approach

In relation to a human centred design approach, the project aims to benefit the population through experience in relation to comfort and entertainment (Liem and Sanders, 2011). Currently there are issues with commuters' level of satisfaction riding the train to and from work. The team aimed to eliminate a level of discomfort and lack of entertainment by installing monitors that will provide them with information in relation to safety during the commute and a degree of information from new sources to keep them informed on their lengthy commute as well as basic entertainment needs such as sports (Lin and Chang, 2002). The aim is to eliminate stress on the way to and from work. This has been determined based on the user's experience from the primary research. The aim is to deliver a system that meets the communities need for comfort.

4.1 Concept Poster

CONCEPT PITCH EXPECTED COST: \$2,000,000 DURATION: 6 MONTHS.

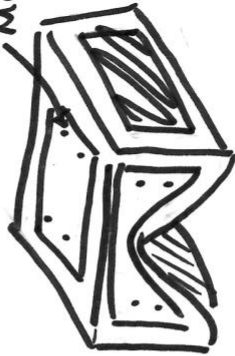
PROPOSED MONITOR
DELL 20 INCH MONITOR HD)



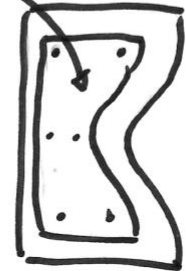
BACK TO BACK PROTECTIVE

HOUSING UNITS (FIXED TO ROOF)

MOUNT



EASY ACCESS



MONITOR



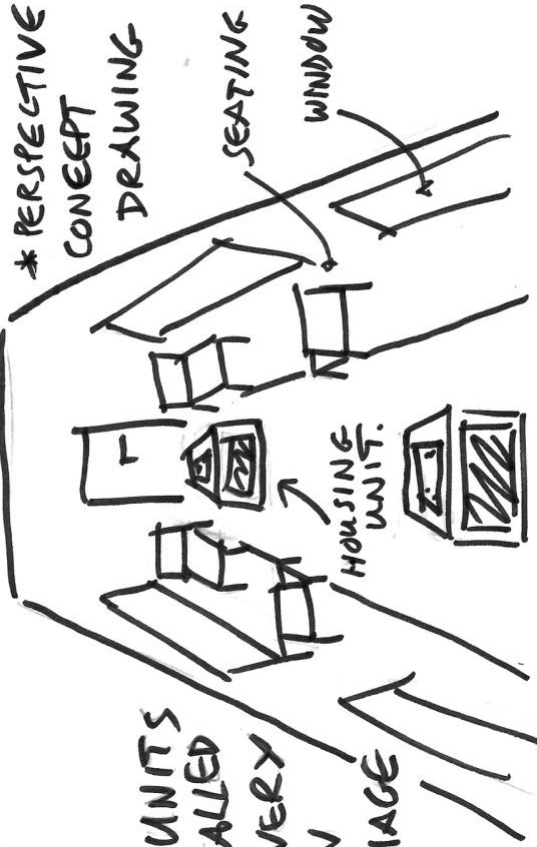
LIVE REPORTING
& TRAVEL UPDATES.



- ANTI THEFT - ANTI VANDALISM
- MODERN LOOK - HIGH QUALITY
- EASILY MAINTAINED - EASILY PROTOTYPED.

- EASY INSTALLATION
- CHEAP
- NO DISRUPTIONS
- CLOSED CAPTIONED (DISABILITY FRIENDLY)
- PROFIT ON SELLING - ADD SPACE

* 2 UNITS
IN STALLED
TO EVERY
TRAIN
CARRIAGE



4.2 Budget and Costing

The following table illustrates the predicted costs of implementing the new monitors into. This estimation is expected to be fitted on the 220, 6-cart trains.

Item	Cost per Item	Number	Total Cost
Monitor	115	5280	640,000
Installation	50 per hour x 50 personal	500 x 50	500,000
Design and Fabrication	N/A	N/A	500,000
Digital Set Up	N/A	N/A	200,000
System Coding	N/A	N/A	650,000
Total Cost			2,001,000

The budgeting cost is only an estimation. It is expected that a 10% reserve is considered for the project in case of any changes to costs. The installation process takes into account of 50 electricians working at a pay rate of 50\$ an hour. The total number of hours is roughly equivalent to 3 months' work

4.3 DVF Analysis

Desirability

Based on the analysis of the primary research Melbourne Metro has an opportunity to further the level of comfort their service offers. The addition of monitors on the train wouldn't only aim to reduce the level of stress in the morning and at night, but also aims to inform commuters who might not regularly read the news or see the news at home (Apóstolo and Kolcaba, 2009). They also provide commuters with a chance to catch up on current affairs if they do not have time at any other stage. The system will also provide a greater detail of transit time and status updates providing a greater service to the commuters. This is beneficial for international users also who are not familiar with events and the Melbourne Network system. The monitors should ease into the commuter's life as they have a choice of whether they choose to observe the monitors or not. This gives commuters the opportunity to look at their own devices or the ones provided on the train. Based on this analysis the implementation of monitors on the trains would be desirable.

Feasibility

The design of the proposed system requires little development. There are similar systems currently in place in European countries around the world and likewise in Asia. There would be some customised changes that would be required to suit the layout of the trains currently in place. In relation to the variation in design, higher quality products are to be used and with a higher degree of safety. The installation of the monitors isn't expected to take longer than 3 months as they are fixed into the ceiling. They can also be installed in during the hours trains are not operational

(night). This way there is no inconvenience to any current commuters and their service and reduce their current attitude towards Melbourne Metro (Bolton and Drew, 1991).

. The project is also relatively low cost. There is no expected deadline for the project. Running over the projected time would not affect the installation in anyway.

Viability

The project aligns with the Melbourne Metro's goal of improving the current service for their commuters. The team has identified that comfort was a key opportunity to improve the current service being offered. The improvements to the system shouldn't infer any additional costs or delays to the commuters, only enhancing their experience for the future. Considering the other options for improvement, the team decided that this option is one of the cheapest where there will be little impact on the current service being offered and will not interfere with any other processes currently in place. The expected return on the investment is expected to be a more positive attitude towards the Melbourne Metro Network (Dziekanski, K., 2004). The higher level of comfort aims to reduce the number of motorists on the road by increasing their comfort level. This in turn should increase sales by enticing new commuters and enhancing current commuter's experience.

4.4 Development and Prototyping

The steps required to begin development and prototyping of the proposed changes to the Melbourne Metro Network requires steps in preparation to installation need to draw focus on further research, development and refinement of the proposed service (Alavi, 1984).

- **Engineering and Design**
This step requires engineers and designers to create a housing unit and to determine how the monitors can be installed to the current trains.
- **System Coding**
System engineers will be required to develop the software that will operate and illustrate safety messages, announcements and updates.
- **Temporary Installation**
Installation should only occur on selected carriages on selected lines to determine the effectiveness of the proposed monitor system which can be removed easily after.
- **Consumer Research**
Further research will be required in to the user experience via interview or survey to determine the relative effectiveness of the proposed project.
- **Approval**
Once the system has proven be effective execution of the project will go ahead to fit out the rest of the train carriages.
- **Procurement**

Monitors and materials will be procured on a large scale where they can be prepared and fabricated for fitting.

- **Approved Installation**
Monitors will be installed professionally by carpenters when trains aren't operating to prevent commuter discomfort.

4.5 Project Review

The project of installing monitors is expected to be a beneficial development for the Melbourne Metro Network. The proposed systems aim to improve customer satisfaction. The system is expected to be relatively low cost in comparison to other potential developments to improve the commuter experience. The project also has the potential to attract new users increasing profits, and also potentially improve current customer satisfactions. The duration of the project is projected to run for approximately 6 months, but of the 6 months, 3 months will be dedicated to the installation of the monitors.

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