

# Framework Characterisation of Mobility as a Service (MaaS) of Autonomous/ Semi Automated Shuttles

Project Number: #28  
Group: Transport

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## Introduction

With recent advancements in vehicle, communication and sensory technologies, the integration of autonomous vehicles in our transportation networks is fast becoming a reality. Shared autonomous vehicles (SAVs) could particularly be an effective part of future transport system solutions. However, the effective and safe utilisation of such vehicles requires critical thinking on how to best implement them to ensure potential benefits are realised.

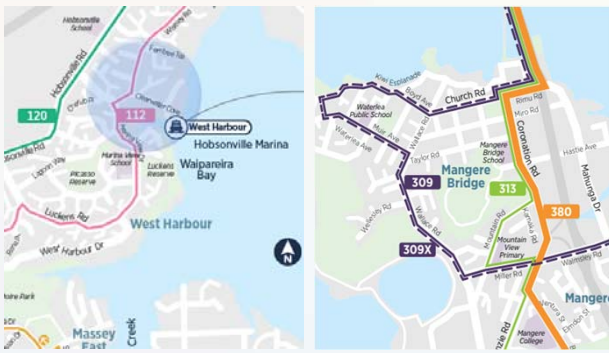
An evaluation framework was developed that analyses geospatial locations that could gain the greatest benefit for improving first and last km outcomes for transport journeys using SAVs in areas with limited public transport access. Services will act as Mobility as a Service (MaaS) for users, especially the transport disadvantaged, to comfortably and conveniently access the initial and final legs of their transport journeys.

## Objectives

Create an evaluation framework to numerically score locations where SAVs could be trialled, and analyse Auckland Transport (AT) data to test this evaluation.

## Methodology

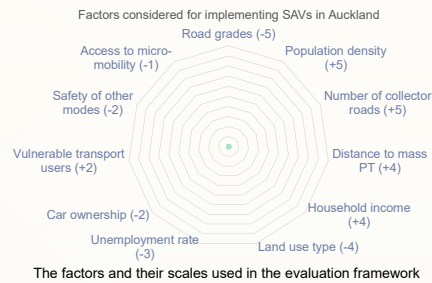
A newly developed area with poor public transport (PT) connectivity and high population density was initially chosen. Current bus routes traversing around the area were identified to determine the frequency of PT, and whether this was sufficient. Based upon the criteria, West Harbour and Mangere Bridge were selected. It was discovered that only the 112 route passed through the area chosen for West Harbour and three routes, 309, 313, and 380 were relevant for the area chosen for Mangere Bridge. These are shown below with their respective areas.



Route 112 for West Harbour is shown on the right, while Routes 309, 313 and 380 for Mangere Bridge are shown on the left (source: AT)

## Evaluation Framework

Following the area selection, an evaluation framework was developed that ranked issues regarding implementing SAVs from a scale of 1 to 5, from least to most critical. These factors were deemed to be either positive or negative based on the viability of introducing SAVs into the area. They were then evaluated against specific criteria using Stats NZ or Auckland Council GeoMaps, where scores from 1 to 3 were established, dependent on statistics for the Auckland region as a whole. These scores were multiplied by the scale of the factor and subsequently added together to generate an overall score for the area, with higher scores being better. A web graph of the factors used and their scales are shown below.

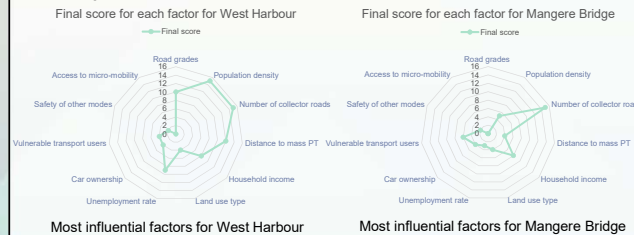


The factors and their scales used in the evaluation framework

This framework was applied to our chosen areas as well as the nearest transport hub to the areas for quantitative comparison.

## Results from Framework

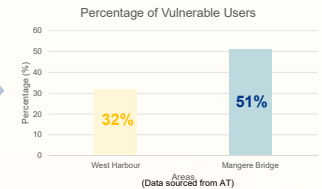
The final scores for each factor for West Harbour and Mangere Bridge were calculated and are shown in the web graphs below. These indicate that the main contributing factors were high population density for West Harbour, and a sufficient number of collector roads for both areas. Both West Harbour and Mangere Bridge had a total score of 25 each.



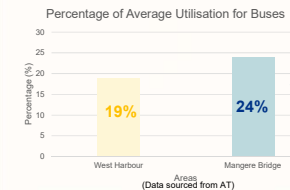
The nearest transport hub to the areas were identified and evaluated. Westgate and Mangere Centre are the closest transport hubs to West Harbour and Mangere Bridge respectively. Both produced low scores, with 12 for Westgate and 9 for Mangere Centre. This indicates that the framework successfully identified West Harbour and Mangere Bridge as feasible locations to implement autonomous shuttles for first and last km outcomes.

## Results from AT Data

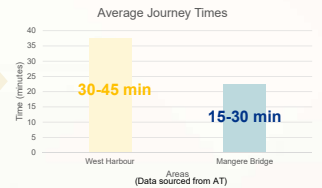
This high percentage of vulnerable users for West Harbour and Mangere Bridge indicate that there is a significant proportion of users that may benefit from an SAV service running for both areas.



The low utilisation of the bus services found in the AT data showed that there was sufficient capacity for further demand on these services. This indicates that the current transport is not suitable for these areas. A solution could be to implement the SAV shuttles to replace the 309 route around Mangere Bridge and the 112 route around West Harbour.



If a 15 minute SAV shuttle service was added, this would make the total travel time to around an hour for West Harbour and just under an hour for Mangere Bridge.



## Conclusion and Recommendations

The established framework successfully identified both West Harbour and Mangere Bridge as feasible locations for implementing SAV shuttles. The AT data showed the bus routes for both areas were underutilised with abundant spare capacity on all routes. SAV shuttles could be used in both of these locations to encourage vulnerable transport users to use PT.

- Some recommendations for further studies are:
- Refine evaluation framework with recent census data when it becomes available
  - Incorporate the AT data analytics into the framework

## Acknowledgments

Julia Lockhart and Arisha Zaman would like to thank Dr. Douglas J. Wilson and Sujith Padiyara for their support and guidance for this research project. They would also like to thank AT for their assistance in providing the data required.