Yarrawonga and Mulwala: Demand-Responsive Transportation in Regional Victoria, Australia

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In November 2013, Public Transport Victoria implemented a service called Flexiride in twin regional Victoria towns, consisting of an on-demand public transport service using taxis. This service replaced an existing fixed-route bus service, which was poorly patronized.

This scenario was designed to investigate operational performance change between two different DRT schemes: Flexiride and a completely ad-hoc scheme. More details can be found in (Ronald et al., 2015). This work was a first step in developing a decision-support tool to evaluate different DRT schemes, particularly when integrated with other transport modes.

The scenario was part of a larger project exploring the viability of mobility-on-demand, focusing on ridesharing and DRT services (Ronald, 2014).

The scenario covered twin towns on the border of Victoria and New South Wales, Australia, separated by the Murray River. Yarrawonga (Victoria) has a population of 7 057 and an area of 95.0 square kilometers, while Mulwala (New South Wales) has a population of 1 904 and an area of 18.6 square kilometers.

The Flexiride scheme delivered six services on weekdays and three services on Saturday, leaving Yarrawonga center (Orr St) at fixed times. The local taxi operator was paid a holding fee by Public Transport Victoria to have a taxi available at Orr St at the nominated time. The taxi returned to normal service when there were no bookings or passengers waiting.

Passengers could ride either by starting their trip at Orr St, or by phone booking, at least 10 minutes before a scheduled departure from Orr St. Existing bus stops were used as pickup and drop-off points.

Flexiride drivers recorded pickup and drop-off locations for each service. Using this data, probabilities of trips occurring between two zones were developed, using the process in Deflorio (2011). A continuous departure time distribution was derived from evenly spreading demand for particular services to either side of that service.

The network was extracted from OSM. Some bus stops were removed if they were assigned to the same link in MATSim, e.g., stops on the same road between intersections.

Only passengers for the demand-responsive service were included. However, the use of MATSim for this initial model means that other modes could be added in later versions.

This was an exploratory simulation that demonstrated how DRT could be modeled for exploring viability and comparison of different schemes.

Using MATSim, experimentation with varying demands, two different scheduling algorithms and an altered Flexiride service, with more services, were carried out. Outcomes like drive time, vehicle-kilometers traveled and passenger wait time could be measured.

Results showed that the two schemes performed differently for operators and passengers. Optimization schemes had little effect in low demand situations, while seating requirements showed more variability in the ad-hoc scheme, as demand increased. Future work involves estimating both schemes' costs for further comparison.