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Institutional arrangements for greater inter-modality between bicycles and buses: A Melbourne case study

Christopher Lowe^{a, *}, Robert Wright^b^a Bus Association Victoria Inc, 450 Graham Street, Port Melbourne, VIC 3207, Australia^b MorelandBus, 65 Colebrook St, Brunswick, VIC 3056, Australia

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1. Introduction

As a growing city with an expanding population and metropolitan area, Melbourne's integration between transport modes and land uses is becoming increasingly important. Further, the forecasted growth in transport confronts the entire transport system with major challenges. Accordingly, the themes of innovation in inter-modality/co-modality of transport systems (two or more different transportation modes linked end-to-end in order to move passengers from the point of origin to the point of destination ((Sahin et al., 2014)) the use of more than one transport mode is a priority to all three levels of government and industry transport policy agenda's. However, up until now, the extent of inter-modality, or carrying of bicycles on buses in Australia, is poor,

limiting the extent of active and public transport options available to residents of Melbourne. (see Figs. 1 and 2)

This paper study presents a case study exemplar of how voluntary professional association's (VPA's) can contribute towards the achievement of societal goals by developing and implementing multi-stakeholder, industry-wide initiatives that aim to improve the extent of inter-modality for users of bicycles and buses in Victoria, over the long term, not just as an agent of bus operators, but of Government as well.

Buses are starting to achieve a higher profile in Victoria's public transport scene and more people are interested in understanding what buses have to offer in terms of being "road ready" and a cost effective solutions to dealing with chronic congestion. At the local level, the public are becoming more engaged with the concept of modal coordination, land use/transport integration, achieving greater development density along transport corridors and ensuring that public transport is more accessible to more people.

After introducing the topic, Section two of this paper will provide some context by detailing the historical and current state of the carrying of bicycles on buses (the initiative) in some local and international jurisdictions. Section three will present the methodology adhered to for the development and delivery of the initiative. Section four will summarise the success of the initiative to date and present some key indicators which could help aid in the decision making associated with the greater proliferation of bicycle racks on buses, and provide some insights as to what a state-wide and/or fleet-wide rollout might entail. Section five will conclude this paper. It is hoped this paper will make two contributions to knowledge: a contribution that extends Lowe (2016) and Lowe and Evans's (2016) hypothesis of agency theory with two agents, and; a contribution that assist others in utilising theory for policy change. It is also hoped that this case study exemplar is of assistance to other VPA's (or industry representative bodies) looking at developing industry-wide responses to societal issues.

2. Context

This section provides some context to the bicycle, public transport, stakeholder and regulatory environment, particularly in Melbourne.

* Corresponding author.

E-mail addresses: clowe@busvic.asn.au (C. Lowe), rwright@morelandbus.com.au (R. Wright).

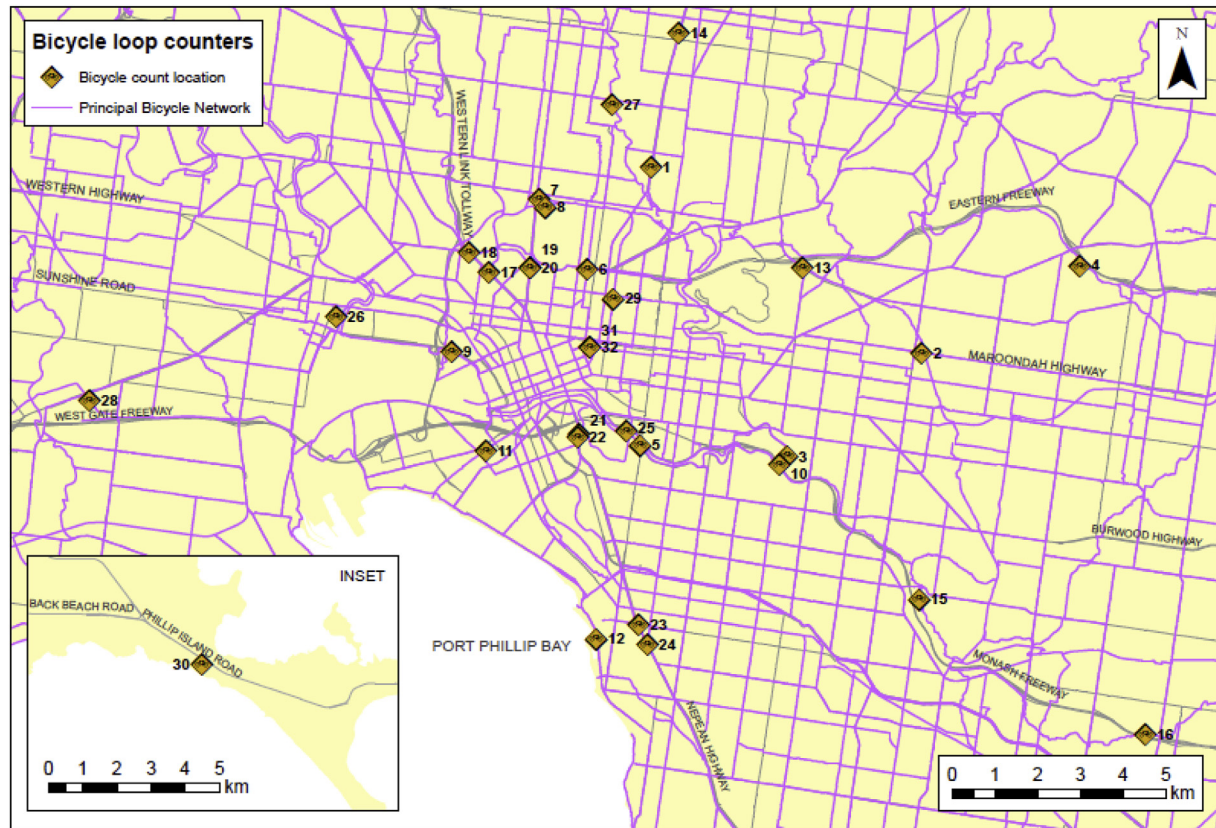


Fig. 1. Location of bicycle loop counters (Source: VicRoads, 2014).

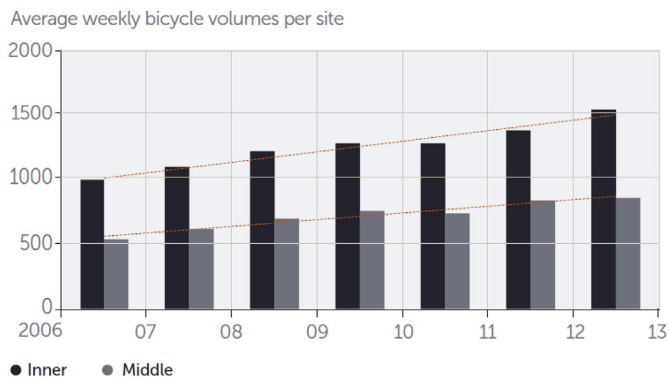


Fig. 2. Melbourne - Average weekly bicycle volumes (source: VicRoads 12/13 Traffic Monitor Bulletin, 2014).

2.1. Melbourne as a bicycle city

In Melbourne commuting and recreational cyclists have always had the ability to take a bicycle on board a train as a way of adding an extra element of mobility to a trip, and while it has never been a question for trams, the inability to do the same on buses is an issue that emerges every couple of years.

VicRoads now has the ability to record bicycle volumes on key routes with a total of 32 loop counters located around Melbourne. According to the 2012/13 VicRoads Traffic Monitor Bulletin, bicycle volumes exceeding 1500 cyclists recorded per site across all sites means approximately 48,000 recorded trips per week. This figure is likely to be higher as the counter locations are not able to record all trips.

VicRoads data also shows that there is a steady increase in the number of people cycling to work on a daily basis. The table below shows the increase between 2006/07 and 2012/13 of 48% for the inner Zone and 55% for the middle zone. The development of a Principal Bicycle Network (PBN) supported by strategic cycling corridors and bicycle priority routes has further facilitated the increase in modal share within inner Melbourne and across Victoria as a whole.

2.2. Melbourne's public transport patronage

Further evidence of the growing demand for alternative forms of transport is the steady growth of public transport patronage, particularly buses. Victoria's official patronage report published for the June 2015 quarter by PTV highlights 124.0 million metropolitan bus boardings during the 12 months from June 2014 representing a neutral growth rate compared with the previous period. During the June 2015 quarter PTV recorded a 5.1% growth rate for bus patronage. The figure below illustrates this growth in the context of the other modes and highlight a slower rate of patronage growth for metropolitan trains and trams compared to forecast (see Fig. 3).

Bus patronage is also increasing in regional Victoria and while the data is not available to assess the performance of individual centres, overall the growth trend is upward. During the 12 months between June 2014–June 2015 regional route buses recorded 15.4 million boardings representing a growth rate of 1.6%. In the June 2015 quarter regional buses recorded 3.6 million boardings representing a reduction over 19.4% over the previous period. Fig. 4 illustrates the performance of regional bus in the context of other public transport modes showing that regional bus journeys are still exceeding the overall forecast growth rates.

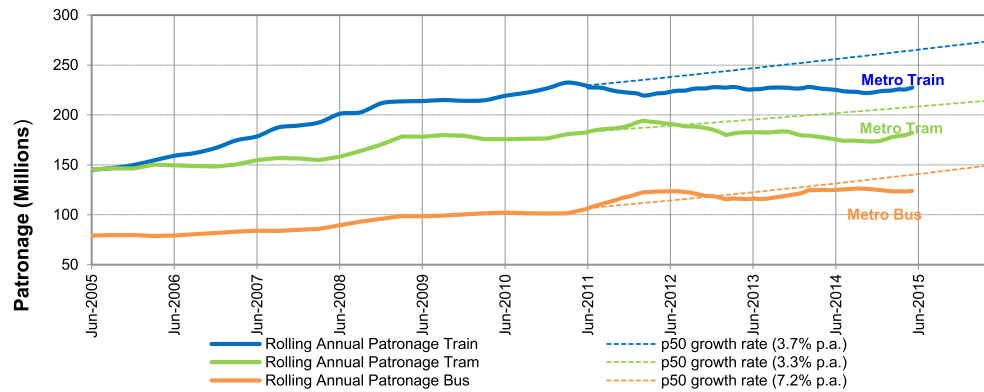


Fig. 3. Rolling annual estimates compared to long-term forecasts (Source: PTV, 2016).

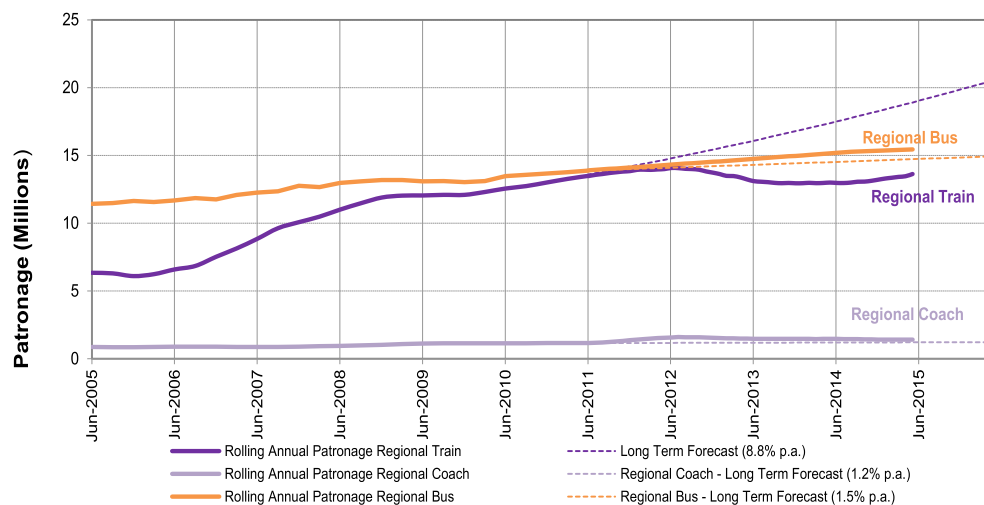


Fig. 4. Regional public transport performance results (source: PTV, June 2016).

The continuing strong performance of both bus and cycling as a share of daily trips is a good sign that if given the opportunity commuters would take advantage of the ability to take a bicycle on the bus as a way of either completing the trip with great convenience or augmenting one's journey.

2.3. What other cities do

Currently, Canberra is the only city in Australia with front mounted bike racks with approximately 83% of the ACTION fleet fitted with racks. A study tour of the Australian Capital Territory (ACT) bus network was conducted as part of this initiative. The purpose of the trip was to gain firsthand experience with the racks and to discuss operational issues with ACTION managers.

The ACT first adopted the use of racks in 2005 as part of an implementation of a broader sustainable transport policy for Canberra (known as *Transport for Canberra 2012–2031*). The decision to allow buses to be fitted with racks was a 'top down' approach with the program announced by the ACT Minister for Transport. This led to directions from the Minister and instructions to the ACT Government owned bus operator ACTION to take the steps necessary to achieve the outcome. ACTION noted that if not for the top down policy position starting with the Minister, the program would likely not have commenced at all, a notable difference from other parts of Australia where trials have not succeeded. The ACT program forms part of an integrated transport policy which includes a broader

strategy aimed at encouraging the use of bicycles via a program of infrastructure development at certain stops.

Queensland Main Roads have found that integrating the bicycle network with public transport provides broad benefits to the community¹ including:

- significantly increasing the potential destinations available to bicycle riders;
- adding flexibility to public transport commuting;
- increasing the catchment area around public transport by 10–14 times that for pedestrians;
- improved cyclist safety;
- expanding recreational and touring cycling opportunities;
- improving access for bike riders and other users such as pedestrians with mobility aids, wheelchairs and parents with prams.

There has been previous Australian trials in other states (Brisbane and Hobart), in Victoria there has been a lack of industry support for allowing racks to be mounted. Implementation and operational issues identified by operators and manufacturers include:

¹ C6 Cycling and Public Transport <http://www.tmr.qld.gov.au/Travel-and-transport/Cycling/Bike-user-guide/Technical-information.aspx>.

- passenger safety;
- third party property damage and liability;
- 'through-routing' and;
- buses exceeding the maximum vehicle length.
- compliance with Australian Design Rules (ADRs)

Front mounted bicycle racks are a common feature on buses in US and Canadian cities and evidence from one US study estimates that there are in excess of 50,000 buses in North America equipped to carry bicycles (Wheeler & Beatley, 2014) with over 12 million trips taken annually in 2014. The North American active-public transit interface is a mature one with bicycles having gained recognition as a credible form of transportation for commuting as well as recreation. Non-motorised transportation modes are now an element of the federally mandated regional transportation planning process. Merging bicycle transport with transit services further enhances the potential of both modes of travel and many American transit agencies have gained experience with successful approaches to bicycles-transit integration (TRB, 1994).

2.4. The voluntary professional association

In Australia, there is a VPA's (or industry representative body) for bus operators and suppliers in each State. It's remit is to represent their members' best interests to respective state and territory governments on matters including service contract negotiation, state-based industrial relations, legislative and regulatory compliance, education (mainly through conferences, exhibitions and seminars), public safety and transport infrastructure (Lowe, 2016). The Victorian VPA is acknowledged as being unique in the bus and coach representation environment. It has an employee headcount and turnover that is markedly larger than the other bus VPA's and it undertakes a significant amount of research in quadruple bottom-line (social, economic, environmental and governance) issues in an endeavour to show government and other industry representative bodies how increased resources for public transport can aid the alleviation of externalities such as urban congestion, public health, emissions and social inclusion, and improve the efficiency and effectiveness of the bus services in the communities in which its members operate. The Victorian VPA also owns several commercial entities that sell its member operators products and services that enable them to fulfil their contractual and regulatory obligations, such as bus inspections (to attain annual mandatory roadworthy certificates), spare parts and accessories, finance, comprehensive insurance, education and events opportunities. Member operators show a high degree of loyalty to these commercial endeavours. Importantly, the state government has also contracted the Victorian VPA over the years to deliver on some of its objectives such as fare evasion reduction and ticketing system implementation, as its agent, making the VPA an appropriate organisation to lead a group of stakeholders through a trial to increase the degree of inter-modality between active and public transport.

3. Methodology

The Victorian VPA is seeking to advance the debate among industry operators and stakeholders as a result of renewed interest from local government and the public regarding the carrying of bicycles on buses. Starting with a trial of bicycle racks on two metropolitan and two country route services in Victoria, the VPA conceived and initiated a trial by garnering the support and inclusion of stakeholders in a working group to ensure all necessary approvals and operating exemptions have been obtained before the trial commences and that all relevant issues relating to the design

of the trial have been considered.

3.1. Establish a stakeholder working group

Adhering to the stakeholder perspective, the VPA invited the following organisations to join the working group to design and implement the trial: operators (3), representatives from the Victorian bus VPA to represent the views of the operators and suppliers (1); representatives from the state-based road regulator (VicRoads) to represent the views of the road regulator (1); a representative from the public transport contract regulator (PTV) to sanction the trial and harness the travelling public's views (1); a representative from the Transport Workers Union to represent the interests of the bus drivers (1); a representative from each of the local government authorities that the trial services operate in (6 LGA's in total) to represent the views of the LGA's, a representative from the transport safety regulator (TSV) to ensure mass, dimension, safety and operational requirements were met (1) and a representative from Bicycle Network Victoria, the bicycle industry representative, to represent the views of cyclists.

The VPA took a stakeholder approach as stakeholder theory is notable not only in the field of business ethics, but as one of the main frameworks for all corporate social responsibility methods. Further, taking a stakeholder approach to such a project has proven successful for other initiatives championed by the VPA (Lowe, 2015; Lowe, 2016; Lowe & Evans, 2016). In fields such as law, management and human resources, stakeholder theory succeeds in challenging the usual analysis frameworks by suggesting firms put stakeholders' needs at the centre of any action or organisation. Stakeholder theory argues that other parties are involved, including governmental bodies, political groups, trade associations, trade unions, communities, financiers, suppliers, employees and customers. A premise of stakeholder theory is that focusing attention on stakeholders will lead to increased trust and cooperation and reduced opportunism.

3.2. Trial

The working group decided a trial of bike racks on buses would be a practical way of realising substantial progress towards achieving the initiative's objectives. Four bus routes were chosen for the trial which cover a cross section of bus services across metropolitan and regional Victoria; Route 510 and Route 512 in Melbourne's inner north that links a number of significant activity centres, rail stations and the Principal Bicycle Network (PBN), Route 70 from Bendigo rail station to Strathfieldsaye linking rail services with education and new residential areas, and the Cowes to Wonthaggi route that links two regional centres with a significant tourist bicycle trail through South Gippsland.

The trial aims to:

- demonstrate the potential for buses to be better integrated with other modes of transport and that any perceived issues and risks can be effectively mitigated;
- show that the provision of the bike racks will help to raise the profile and visibility of buses on our roads among the general public;
- identify the demand for bike racks on buses under a controlled environment and inform future strategic decisions on a broader implementation strategy.

An early decision for the working group was to determine a critical path, or implementation schedule (Appendix 1.) Then, as one of the objectives of the initiative was to foster local employment, a local manufacturer of bike racks was sought. A local

manufacturer was sourced but was not in a position to advance a local design and manufacture such a small quantity for a trial in such a short period of time. So the decision was made to import the bike racks from the United States of America: the VeloPorter 2 (V2) construction is based on a stainless steel frame and composite material racks. The V2 has a wheel tray design that accepts a broad array of bicycle wheel sizes ranging from 16"–29" in diameter and up to 3" wide. Fig. 5 shows the V2 (see Fig. 6).

3.3. Regulatory approvals

Then the working group needed to obtain approval to operate buses on the state-based road network (VicRoads), the relevant local government authority and the National Heavy Vehicle Regulator (NHVR).

Prior to commencing the operation of the trial, it was necessary to obtain the appropriate vehicle and access approvals from regulators and local government to operate the buses on the road network. With the addition of the bike racks to the front of the bus, the bus may no longer comply with the Australian Design Rules and will require a permit to operate on Victorian roads. The necessary permits came in the form of Over Dimensional Vehicle Permit and Access Permit and a Certificate of Approval Operations from VicRoads which is to be kept in the bus.

The over dimensional permit application included assessing the performance of the bus on the road network with the addition of the bike rack, taking into account the frontal swing and the width of its swept path. Obtaining this permit required the support of VicRoads and the approval of the over dimensional bus by the NHVR. The Access Permit was also issued by the NHVR, with final access to the network obtained from VicRoads and the relevant local governments in which the bus will operate. This required the route to be assessed to ensure the vehicle can safely manoeuvre along the proposed corridor in accordance with its permit conditions. The bus operator also required approval from PTV to operate the modified bus in accordance with current contractual obligations and to review and subsequently assess the impact of the trial on route performance.

Then the working group agreed upon and implemented a marketing campaign through the public transport authority (PTV), local government and other appropriate stakeholders. The marketing campaign initially gauged the level of interest the public had in undertaking a trial of bike racks on buses, then subsequently involved promoting the trial. The VPA then developed and implemented a training program for bus drivers and bus users. The working group then established appropriate measures, including recording and reporting protocols, to assess the performance of the trial and the collection of data during the trial. It was agreed the VPA would prepare a final report on the outcomes of the trial and submit the report to stakeholders for consideration prior to determining the long term direction of the initiative.



Fig. 5. Sportworks VeloPorter 2 bicycle transit rack.

3.4. Funding

The working group then determined who would fund what. The following was determined as an equitable way forward (see Table 1).

3.5. Risk analysis

The bus operators needed to identify how the operation of the trial will impact their business. This included identifying all compliance, operational, commercial and safety obligations. It was the responsibility of the bus operator to update the Risk Register within their Operator Accreditation to reflect the specific impacts on the business. The following figure identifies an example of potential risks associated with the initiative that needed to be mitigated, with some high level mitigation actions. Most of these mitigation actions are the responsibility of the bus operator, while some required collaboration with PTV and local government.

3.6. Report

The report developed at the conclusion of the trial had three tenets: uptake (patronage); user feedback; recommendations.

Usage of the bike racks through the trial delivered varying results across the 3 trial regions. Initially the trial attracted a variety of customers including those who were interested in the concept, regular cyclists, as well as new customers who were able to link bike riding with public transport to access employment, recreational and education facilities. Over the course of the trial, metropolitan patronage remained relatively steady on the 510 and 512 routes. This corridor is well connected to other transport options (public and personal) and is supported by multiple bike paths. Patronage on the two regional services was lower initially, however this grew steadily over the trial period. The Cowes to Wonthaggi service, saw strong patronage growth after the first 4 months as the service became established and in line with a new marketing campaign. Patronage on the Strathfieldsaye corridor in Bendigo remained steady over the trial period with regular users the corner stone of the service.

Second, some of the observations and feedback from customers and operators include:

- Usage was higher in the warmer/drier months;
- Usage increased as the exposure of the trial increased, in particular in regional areas;
- Customers in regional areas were using a combination of bicycle travel and bus travel to get to work;
- There was some use of bike racks on buses to access recreational cycling facilities in regional Victoria;
- There were several regular customers who used the service more than once a week, in particular in regional areas.

Lastly, the working group recommended that the trial met its objectives, that is safety, operational impact and customer (accessibility) performance measures were met and that the program should be rolled out across all route buses in metropolitan and regional Victoria in a structured program.

At the present time, it has been agreed a broader rollout of the program will be managed between the two regulators, PTV and VicRoads and:

- Considering the need to implement a set of template vehicle and access approval processes as a result of this trial, it was recommended that the rollout aim for 100–200 buses per annum for the first two years, expanding to approximately 300 buses

Item	Risk	Potential Mitigation Options
<i>Bike Rack</i>	Bike falling off	Customer training / Marketing Rack maintenance Driver training
	Passenger injured positioning / retrieving bike	Customer training / Marketing Driver training Rack maintenance
	Bike becomes lodged in rack	Customer training / Marketing Driver training Rack maintenance
	Children using rack	Customer training / Marketing Driver training
<i>Bus Operation</i>	Accident in depot	Driver training Insurance
	Accident on road – car, pedestrian, street furniture	Marketing Driver training Appropriate vehicle and access approvals and permits Insurance
	Bus leaves before passenger can retrieve their bike	Driver training Customer training / Marketing
	Passenger seeks to place extra bike on rack	Driver training Customer training / Marketing
	Impact on bus schedule	Driver training Customer training / Marketing Establishing: Operating procedures KPIs
	Effectiveness of the trial	Performance measures Questionnaires for users Marketing Recording usage of bike racks
	Overall initiative risk assessment	Risk assessment
<i>Overall Safety</i>		

Fig. 6. Risk analysis.

Table 1
Schedule of funding.

Item	Cost
Bike Rack Options – DL2/DL3; V2/V3	\$1200 each (borne by the Victorian bus VPA)
Vehicle Assessment	\$5000 (borne by the Victorian bus VPA)
Bus operating permit	\$70 (however significant additional costs were incurred by the operator in preparing the application) borne by the Victorian bus VPA and participating bus operators
Bike Rack installation	To be borne by bus operator
Insurance	No impact on existing insurance premiums
Marketing	To be borne by PTV and local government as appropriate
Trial operation	To be borne by bus operator

per annum for the subsequent 5–7 years to aim for a 100% fleet coverage;

- The broader rollout will target depots/regions to ensure full coverage along routes and customers. Rollout program to be negotiated with operators;
- VicRoads will Gazette a road access for the Controlled Access Bus Network in Victoria which will incorporate a map of approved routes for VicRoads and local government managed roads. The map will be updated as required to reflect new approved bus routes;
- VicRoads will work with the NHVR to establish a blanket vehicle permit approval for accredited bus operators for route buses. The permit will apply for the contract life of the vehicle;

- The parties will work towards having an agreed network access approvals process with local government for buses that receive NHVR approval under;
- The parties will support the local manufacture of bike racks in Victoria. The Victorian bus VPA is working with a local manufacturer on a bike rack system that will be quality and cost comparative to the imported product as well as creating jobs within the Victorian automotive sector.
- The next phase of the marketing campaign will be aligned by PTV to focus on how customers actually use the bike rack and available over the internet. This will be linked with a maintenance regime by the operators to ensure that the handle is fully lubricated and easy to engage for all users.

4. Discussion

The Victorian bikes on buses initiatives is an case study exemplar on how VPA's (or industry representative bodies) can contribute towards the achievement of societal goals like improving public health, reducing the rate of growth of congestion, reducing transport emissions by developing and implementing multi-stakeholder, industry-wide initiatives that aim to improve the extent of inter-modality for users of bicycles and buses in Victoria, over the long term, not just as an agent of bus operators, but of Government as well.

All of the initiatives presented herein confirm that industry/government partnerships in a public transport context are an effective method of realising substantial progress towards achieving shared goals and societal concerns. The initiatives presented confirm that the practice of governments partnering with non-profits allows the government to provide the services with less internal staff and at the same time allows the community to build social capital. These partnerships have emphasised greater trust between industry and state, lower transaction costs and benefit spillover into the public realm. The initiatives presented saw communities (both territorial and relational) engaged in development processes and have served as a bridge between the private and public sectors. They have all been executed via a decentralised governance model, been participatory in their development and seen shared decision making (Bryce, 2012; Eversole & Martin, 2005). In other words, the methodology adopted to realise the strategic outcomes for each initiative contained herein have been negotiated rather than imposed, and it is this negotiation between a diverse set of stakeholders that is fundamental to any public transport partnership. The aforementioned assertion is reinforced by some scholarly attempts to explain partnerships in a public transport setting (Stanley, Betts, & Lucas, 2007; van de Velde, 1999; Longva & Osland, 2010; Walters, 2010.) The pursuit of partnerships and the resulting outcomes are underpinned by stakeholder theory – multiple stakeholders working together to undertake some level of industry performance to achieve social legitimacy for the public good. Stakeholder theory argues that firms are responsible to parties other than shareholders – that are parties are involved, including government bodies, political groups, trade associations, trade unions, communities, financiers, suppliers, employees, and customers in bringing about a return to a firm's shareholders. Freeman's (1984) landmark publication identified the groups that are stakeholders of a corporation, describing and recommending methods by which management can give due regard to the interests of those groups.

The initiatives presented in this paper are also consistent with agency theory. Agency theory, in its traditional form, explains the dynamic between the member bus operator firms and their VPA. The bus operator firm, as the “principal”, delegates authority—in terms of control and decision-making about certain tasks—to another party, in this context, the association, as the “agent”. Additionally and importantly, the VPA is not only representing the best interests of its members, it is also acting to a lesser extent as an agent of the State Government (SG). The SG looks to the association to achieve public policy outcomes, so both the operator and the SG, as principals, seek the services of the association as their agent. Lowe (2016) and Lowe and Evans (2016) first advance this nuance of agency theory; how an agent representing and negotiating with two principals (member operators and government) and this paper extends this unique type of agency. The unique structural relationships among operators, a voluntary professional association,

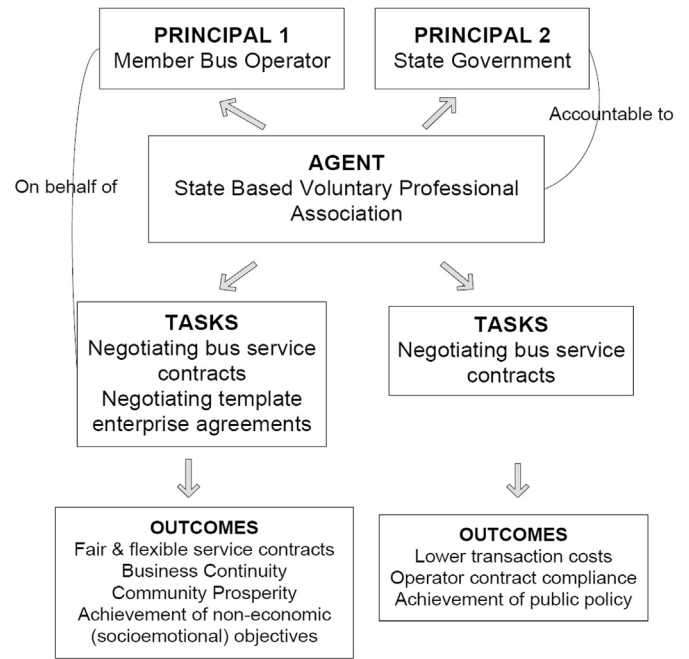


Fig. 7. Agency theory in the context of the Australian bus and coach industry (Lowe, 2016).

and the SG, as it stands at present is illustrated in Fig. 7.

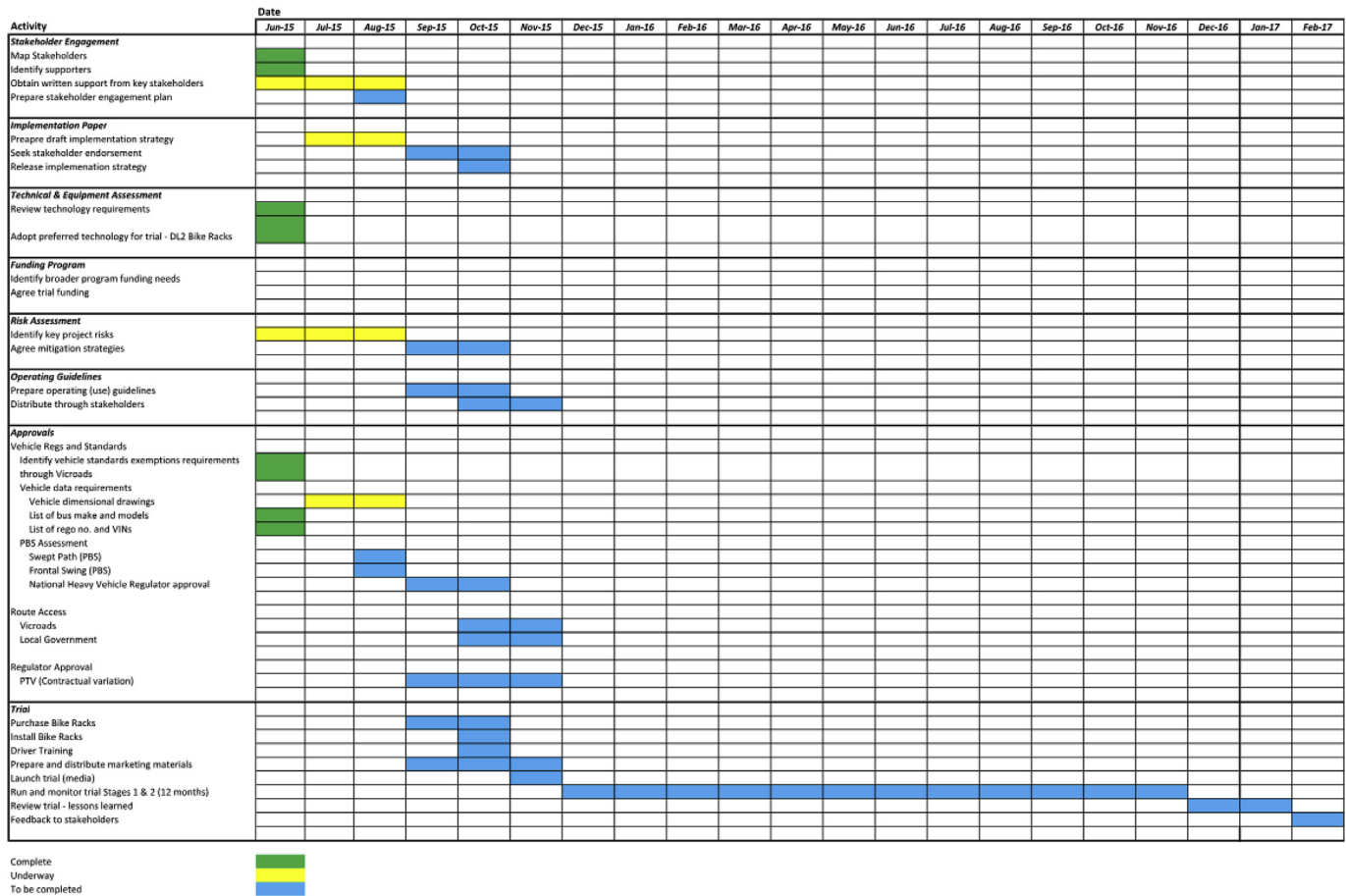
5. Conclusion

This paper presents a case study exemplar of how: (VPA's) can contribute towards the achievement of societal goals like improving the degree of inter-modality between bicycles and buses in Victoria; how taking a stakeholder approach can ensure maximum input and result in all stakeholders having shared goals; and how VPA's can act not just as an agent of bus operators, but of Government as well (which is a contribution that assist others in utilising theory for policy change). The methodology that a working group of stakeholders adhered to in introducing bicycle rack on buses in Victorian has been described in the hope that it might help other VPA (or industry representative bodies looking to work with Government in partnership.) The initiative itself has been deemed a success and a state and network-wide rollout is now underway.

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Appendix 1. Implementation schedule



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