A framework and pragmatic strategies for transit priority implementation

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Abstract

Transit priority measures preferentially allocate road space or intersection time to buses, streetcars and trams. There is strong justification for transit prioritisation in urban environments because on-road transit vehicles can carry more passengers than private cars and can therefore make more efficient use of available road capacity. Unfortunately, transit priority measures may make conditions worse for other traffic, require on-street parking to be removed, or have other politically unpopular impacts. In democracies road systems are ultimately controlled by politicians and, indirectly, the voting public. Therefore, political and public support is often necessary for the implementation and retention of transit priority measures, and this may be a significant obstacle in cities where most voters drive.

Transit priority research to date has generally focused on the development and technical evaluation of priority measures. This is consistent with the broader transport policy research field, which tends to focus on technical and quantitative models, but needs to "pay greater attention to context, politics, power, resources and legitimacy" (Marsden & Reardon 2017, p. 249). Research about transit priority has yet to fully engage with public policy analysis, legitimacy theory and other related areas that might help to explain why some implementation efforts have been successful, but others have led to compromise or failure.

The research described in this thesis has two aims: firstly, to understand why transit priority implementation succeeds in some cities, but not others. Zürich and Curitiba provide two examples of cities that have had long and successful programs of transit priority implementation. Unfortunately transit priority implementation efforts and programs have been less successful in some other, more car-centric, cities. The second aim of the research is therefore to understand how to improve implementation in *car-centric cities* where transit priority might have lower levels of political support and legitimacy.

Case study research methods are used to develop a new framework for understanding how legitimacy influences transit priority implementation. The framework suggests that implementing transit priority is inherently more difficult in *car-centric cities* because prioritising on-road transit often makes conditions worse for other traffic. However, this does not mean that successful priority implementation is impossible in *car-centric cities*. The research identifies nine 'pragmatic strategies' for implementing transit priority in *car-centric cities*. These involve: **building legitimacy before implementation** using (1) technical enquiries, (2) transport planning or (3) public processes and hearings; **avoiding impacts** on private vehicles through (4) grade separation, (5) building new capacity or (6) implementing subservient priority measures; and **building legitimacy through implementation** using (7) bottom-up and incremental approaches, (8) pop-ups or (9) trials.

This study responds in part to the call by Marsden and Reardon (2017). It examines transit priority implementation through the lenses of legitimacy theory and public policy analysis, which suggest a new approach for understanding public decision-making about road space and intersection time allocation, and transport policy more generally. For practitioners the research suggests pragmatic strategies that might be adopted to improve the likelihood of successful outcomes despite limited political, institutional or public support for transit priority implementation.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Julian James Reynolds

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Publications during enrolment

The following publications have arisen from the research reported in this thesis:

Reynolds, J, Currie, G, Rose, G & Cumming, A 2017, 'Moving beyond techno-rationalism: new models of transit priority implementation', paper presented at the Australasian Transport Research Forum 2017, Auckland, New Zealand, November 27 to 29, 2017.

Reynolds, J, Currie, G, Rose, G & Cumming, A 2018, 'Top-down versus bottom-up perspectives on streetcar priority', paper presented at the Transportation Research Board (TRB) 97th Annual Meeting, Washington DC, United States of America.

Reynolds, J & Currie, G (in press), 'New approaches and insights to managing on-road public transport priority', in G Currie (ed.), Handbook of Public Transport Research, Edward Elgar Publishing.

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I wish to acknowledge the people of the Kulin Nations, on whose land much of this research was undertaken, and I pay my respects to their Elders, past, present and emerging. Much of this thesis was written further to the north, and I wish to acknowledge the Wemba-Wemba peoples whose land encompasses the Lake Boga area from where I am writing this now. I pay my respects to their Elders, past, present and emerging (Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) & Horton 1996; Swan Hill Rural City Council 2017; Monash University 2020). Significant steps have recently been made towards a more *reasonable* acknowledgement of the first peoples of this land. Much of this has overlapped the period during which this research was undertaken, particularly through the establishment of the Aboriginal Treaty Working Group in 2016, an Aboriginal Community Assembly in 2017, and the election of the First People's Assembly of Victoria in 2019 (Aboriginal Victoria 2019; First Peoples' Assembly of Victoria 2020). While unrelated to the transit priority topic of this thesis, these efforts appear to represent a major shift towards legal recognition and *normative legitimacy* through treaty, and a path forward (Victorian Treaty Advancement Commission 2020).

Part of this research was undertaken on the traditional territories of the indigenous peoples of Canada. In particular, the City of Toronto now stands on the lands "of many nations including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat people" (City of Toronto 2019c). The Williams Treaties and Treaty 13 cover parts of the area considered in the Toronto case study that is included in this research. I acknowledge the first peoples of Toronto and Scarborough and the many Métis, Inuit and First Nations people for whom this land is now home. While this thesis deals with issues of legitimacy in transportation, this is only part of the larger questions of governance and the legitimacy of the state. Despite the many similarities between Australia and Canada (as members of the Commonwealth of Nations and with historical links to the British) there appears much still yet to do, and much we can learn from each other, with respect to land, sovereignty and treaty.

Many people have made contributions that have assisted this research and in the preparation of this thesis. Unfortunately, it is likely that I will inadvertently miss some from this listing, but I would like to acknowledge the following for their assistance. Starting in Toronto: many at BA Consulting Group provided friendship, encouragement and support along the road to commencing a PhD and during my yearly visits. Emily Ecker and Alun Lloyd in particular provided insights into recent LRT construction in the GTHA, while I also had opportunities to draw on Robert McBride and Ed Levy's extensive knowledge of transport in Canada. Ed's book is cited often in the *Transit City* chapter of this book and the discussions over lunch every time I was in Toronto with him, Robert and David Crowley were very helpful in developing that and other chapters. Likewise, encouragement from and discussion with William Denning and Alina Kelly, on transport economics and transport policy respectively, helped during the research journey. Dr Brendon Hemily, Michael Roschlau and Jim Gough were also all generous with their time, knowledge and in helping to provide contacts, insights and materials to assist in this research. Professor Amer Shalaby made similar contributions, while Léa Ravensbergen-Hodgins and Pat Doherty where of much assistance in facilitating the presentation and discussion of this research at the University of Toronto in 2019. David Kuperman of the City of Toronto provided insights into priority implementation, particularly during the King Street Transit Pilot. Tim Lawson of the TTC, likewise, was very helpful in aiding my understanding of the operational impacts of the King Street Transit Pilot and transit in Toronto more generally (including in assisting family members become more familiar with using the TTC!). Together with Pranav Dave, also of the TTC, Tim has also helped through discussion of transit priority, the research outcomes, and in sharing the perspectives of practitioners. Jay Monty of the City of Everett and Kirk Hovenkotter of Transit Center were also generous in sharing their experiences of *pop-up* bus lanes in Boston, both at the Washington DC Transport Camp in January 2018 and through later correspondence.

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This study is one of the 18 projects in the Sustainable and Effective Public Transport Graduate Research Industry Partnership (SEPT-GRIP) at the Public Transport Research Group (PTRG), which is part of the Institute of Transport Studies (ITS) in the Department of Civil Engineering at Monash University. The SEPT-GRIP includes PhD candidates from many other departments and faculties, and is funded by industry partners and Monash University. Many people are involved in this program, not just the 18 people with whom I have been lucky enough to share parts of the PhD journey. There are also supervisors, industry representatives and numerous others. I would like to acknowledge the assistance and support of members of the SEPT-GRIP, as well as the larger academic and research community surrounding them.

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Part A: Research context and approach

Chapter 1: Introduction

1.1 Introduction

Cities around the world are seeking to address challenges related to the overreliance on private cars for transportation. Environmental impacts, traffic congestion and other problems might be reduced by increasing transit ridership (Cervero 1998; Kenworthy 2006; Georgakis & Nwagboso 2012; Rodrigue et al. 2016; Currie 2018, pp. 25-7; Mattioli et al. 2020). However, subways, metros and other high-quality transit systems can be difficult to justify given the low density and car-dependent land use patterns that are common in many countries (Major 1997; Mees 2000, 2010; Wright 2010). In many cities most, if not all, public transport services will continue to be delivered by buses, streetcars and trams operating on roads for the foreseeable future (Vuchic et al. 1994; Motavalli & Schildgen 2002; Currie 2016a; Rodrigue et al. 2016, 2019).

Bus lanes, *Transit Signal Priority (TSP)* and other on-road public transport priority measures are used in many cities to improve the speed and reliability of on-road public transport (or transit) services. The main technical justification for prioritising transit is that buses, streetcars and trams can carry more passengers than private vehicles, and so can make more efficient use of what limited road space and intersection time is available in congested urban conditions (Vuchic et al. 1994; Wright 2001; Vuchic 2007; Currie 2016a). Increasing the speed and reliability of on-road transit services through prioritisation can help to improve ridership, operational efficiency and the overall economic and environmental performance of a city's transportation system by reducing car usage (Waterson et al. 2003; Currie 2016a; Litman 2016; Ryus et al. 2016, p. 40). However, priority implementation may increase delays and congestion for other traffic, require the removal of on-street parking or reallocation of traffic lanes, or have other negative impacts on other road users. The relative importance of these impacts will depend on the observers' perspectives (Litman 2003; Currie et al. 2007; Litman 2016; Ryus et al. 2016), but even if transit prioritisation is, overall, technically appropriate it may still face political, institutional or public opposition (Smith et al. 2005, pp. 19-20; Currie 2016a; Ryus et al. 2016, p. 29).

High levels of priority for on-road transit services have been successful implemented in some cities, notably Zürich and Curitiba (Joos 1989, 1990, 1994; Cervero 1998; Nash 2001, 2003; Ardila-Gomez 2004; Pulichino & Coughlin 2005; Mees 2010; Nash et al. 2020). However, implementation efforts in other cities have sometimes failed to move beyond the trial stage, delivered only limited improvements, or been rejected, cancelled or removed entirely. These challenges do not appear to have been due to technical or engineering problems with the measures themselves, but instead relate to public, political or institutional opposition to the impacts on private motorists (Pulichino & Coughlin 2005; Currie & Shalaby 2007; Currie, Goh, et al. 2013; Currie 2016a; Litman 2016).

Transport policy research tends to focus on technical models and quantitative analysis, but there is a need to "pay greater attention to context, politics, power, resources and legitimacy" (Marsden & Reardon 2017, p. 249). This thesis responds in part to this challenge by using *public policy analysis* and *legitimacy theory* perspectives to examine transit priority implementation in four case study cities: Melbourne, Toronto, Zürich and Curitiba. It contrasts and compares various prioritisation efforts that have been driven by strategic-level plans in each city. Through this the research seeks to understand and identify pragmatic strategies for transit priority implementation in *car-centric cities*[1], where opposition may be more likely and have a greater potential to result in challenges, mixed outcomes or the failure of otherwise technically-appropriate schemes.

This chapter provides an introduction to the thesis and is structured as follows: the next section (Section 1.2) describes the background and motivation for the research. Section 1.3 describes the scope of the study. The chapter concludes in Section 1.4 with an outline of the thesis structure.

1.2 Background and motivation

Difficulties with implementing transit priority measures are not widely reported in the research literature. This is perhaps due to a desire to emphasise successes rather "than to share learnings resulting from system failures" (Currie 2016a). Transport researchers tend to focus more on technological development and refining evaluation methods (Mees 2010, p. 101). However, transit priority implementers are engaged in a "battle for street space" in which "the technical solutions are well known, but implementing them…(is) fiercely opposed" (Nash et al. 2020). In this respect, the call from Marsden and Reardon (2017) for transport policy researchers to pay more attention to non-technical factors may be especially relevant for transit priority implementation. When seeking to prioritise buses, streetcars and trams the often-conflicting needs of different road users and the different views of stakeholders on how public road reserves should be allocated and managed are likely to be of immediate importance to the decision-making process.

Road management and traffic congestion are often politically sensitive and contested topics. Prioritisation of on-road transit has faced challenges, often due to concerns over impacts on other road users (Vuchic et al. 1994; Currie 2006; Currie & Shalaby 2007; Currie & Lai 2008; Vincent 2010, p. 302; Huang et al. 2012; Lindau et al. 2014; Currie 2016a; Litman 2016; Hrelja et al. 2019; Pettersson & Sørensen 2019). Prioritising transit over private motorists is unlikely to be popular with voters who drive. This might suggest that high levels of transit prioritisation are politically impossible in many *car-centric cities*, and that implementers in such places should simply resign themselves to the path dependency of automobile-reliant land use and transportation systems. A more optimistic

[1] The terms '*car-centric cities'* and '*transit-centric cities'* are used throughout this thesis to describe two generic categories of cities. The reality is, of course, that cities are all unique and exist upon a continuous spectrum, rather than neatly fitting into distinct categories. Even within a single city there may be a wide variety of conditions, and some corridors or areas may be more or less car-dependent or transit-focused (Currie 2016a).

This study is focused towards understanding how and why transit priority implementation might be improved in cities that tend towards the *car-centric* end of the spectrum. Hence, the two categories of *car-* and *transit-centric cities* are used in general terms to divide the studied cities into similar groups / contexts. However, it is acknowledged that there is not a sharp change from one type of city to another, and there may be a 'messy middle' into which parts of many cities might fall[2].

In general, this thesis takes its lead from the Currie (2016a) conceptual model for the 'state of the art' in transit priority policy (see Section 2.3):

- when the term *car-centric* is used it relates to cities (or places) where transit provides mostly for people who cannot otherwise drive themselves, or to provide mobility and help to reduce traffic congestion during peak-period commuting times; and
- the term *transit-centric* is generally used to describe cities (or places) where transit provides a realistic and competitive alternative / replacement for travel by private car for trips that are beyond easy walking or cycling distance.

See Sections 2.3, 9.5.2, and 10.2 for further discussions that relate to the *car-* versus *transit-centric*-ness of individual cities.

[2] The same issue applies to other modes and aspects of cities. For example, there are cities (and places within cities) that are more or less focused, friendly and/or accommodating to pedestrians, cyclists or other road users. Categorisation of such as pedestrian- or cyclist-friendly cities, walkable neighbourhoods or similar can be helpful in making generalisations, but in reality these are likely to all be segments on various continuous spectrums of *pedestrian-centric-ness*, *cyclist-centric-ness* etc. without there necessarily being sharp boundaries between categories.

attitude, however, might be to see what can be learnt about how non-technical challenges were overcome in cities where transit priority implementation programs have been successful.

Pulichino and Coughlin (2005, p. 80) highlight that **"implementation of preferential treatment cannot be viewed from a purely technical perspective"** (bold emphasis in original) and that "it is essential to study policy-making processes" to improve transit priority implementation. This foreshadowed (by some 12 years) the findings of Marsden and Reardon (2017) that transport policy research needs to "pay greater attention to context, politics, power, resources and legitimacy". This thesis takes up that challenge and **aims to *identify strategies to improve transit priority implementation in car-centric cities*.**

1.3 Scope

Vuchic (1981, pp. 62-3; 2005, pp. 5-6) defines three types of public transport Right-of-Way (ROW):

- ROW A denotes *fully separated* transit such as a metro, subway or *grade-separated busway*.
- ROW B is *longitudinal separation* where transit is divided from other traffic with substantial barriers such as fences or non-mountable kerbs, but still has at-grade crossings or intersections[3].
- ROW C is where transit operates within *mixed traffic* conditions, sharing the road with general traffic. *Bus lanes* and similar facilities where transit is given exclusive use of part of the road, but where there are no physical separation barriers, is included in ROW C.

The focus of this research is on transit services operating in ROW C, under *mixed traffic* conditions. ROW B is also relevant, but generally speaking if a transit service is *longitudinally separated* it already has high levels of transit priority. Transit operating in ROW A is beyond the scope of this research except for instances where conversion to ROW A is used as a transit priority measure, as in the implementation of a *grade-separated busway* or *grade-separated LRT*.

[3] The term *longitudinal separation* is widely used in the transit priority research literature for this type of operating environment. However, it might have the potential for confusion given that the word 'longitudinal' is sometimes used in the context of time, such in describing a 'longitudinal study'. There may also be some challenges in determining which direction is meant, or which aspect is referred to, when the 'longitudinal' designation is used. The sense in Vuchic (1981, pp. 62-3; 2005, pp. 5-6) and others who have used *longitudinal separation* appears to be that the separation measures (fence, kerb etc.) continue longitudinally along the road in the same direction as travel, and so separate different traffic streams from each other.

Confusingly 'lateral' is sometimes used instead of 'longitudinal' to describe the same conditions, with transit stated to be having 'lateral separation' or 'lateral segregation' from other traffic (as in Barr et al. (2010) for example). The sense here appears to be that the separation measures physically prevent general traffic moving across the road (laterally) into the space reserved for transit. This is largely consistent with the road safety and design terminology that the author is familiar with, which for example often considers the lateral separation or lateral distance to roadside hazards, between carriageways, from cyclists or pedestrians to passing traffic, etc.

Throughout this thesis *longitudinal separation* (or *longitudinally-separated*) is used exclusively. This is so as to adopt and maintain consistency with the original Vuchic (1981, pp. 62-3; 2005, pp. 5-6) terminology and other research that has built upon it.

1.4 Thesis structure

The thesis consists of four parts: Part A: *research context and approach*; Part B: *challenges in car-centric cities*; Part C: *lessons from transit-centric cities*; and Part D: *a framework and pragmatic strategies*. Figure 1.1 shows the structure of the thesis.

Figure 1.1 Thesis structure

Part A discusses the research context and approach. It consists of four chapters, including this introductory chapter. The next two chapters review the two fields of knowledge that together provide the foundation for, and which are brought together, in this thesis. These are:

- research understanding about transit priority measures, their impacts and their evaluation, which is examined and critiqued in Chapter 2: *literature review: public transport priority*; and
- research related to the areas of:
    - decision-making in transportation policy;
    - *public policy analysis;*
    - public involvement in decision-making; and
    - *legitimacy theory*,

  which are discussed in Chapter 3: *literature review: public policy and legitimacy*.

Chapter 3 closes with an identification of gaps in the existing research literature that are relevant to transit priority implementation, and which provide the motivation and basis for this study. The research objectives, questions and the methodology selected to address these gaps are then described in Chapter 4: *research methodology*.

Parts B focuses on challenges in ***car-centric cities*** when implementing transit priority in accordance with strategic-level transport plans and programs. Chapter 5: *Think Tram and Keeping Melbourne Moving* explores two implementations in Melbourne, Australia. These are: the *Clarendon Street Tram Priority Pilot*, which was part of the *Think Tram* program, but was partially removed after opposition from local traders (Currie & Shalaby 2007); and the *Stud Road bus lanes*, which were implemented as part of the *Keeping Melbourne Moving* strategy, but later partially removed after opposition from motorists and a change of government. Chapter 6: *the Transit City LRT Plan in Toronto* turns to Canada and the plan for seven new LRT lines across the City of Toronto. This plan was cancelled by Mayor Rob Ford, who declared that "the war on the car is over" (Kalinowski & Rider 2010) after being elected on a wave of support from suburban voters (Taylor 2013).

Part C explores lessons from ***transit-centric cities***. Chapter 7: *an initiative and public ballot in Zürich* discusses the *Citizens' Transit Priority Initiative*. The passing of this initiative provided a foundation for a gradual shift to a policy of "'Waiting Time Zero' for public transport" (Joos 1994) in Zürich, despite initial reluctance because of the impacts that transit prioritisation would have on other traffic (Nash 2001, 2003; Nash et al. 2020). Curitiba's legacy as "the cradle of Bus Rapid Transit" (Lindau et al. 2010b) is examined in Chapter 8: *Curitiba's Plano Diretor*. This chapter explores how the directions set by the *Plano Diretor de Curitiba*, Curitiba's master plan, were supported by a military dictatorship, the sudden implementation of a new pedestrian mall despite protests from motorists, and approaches to transit prioritisation that avoided impacts on other vehicles.

Part D develops findings from the case studies, which include a framework and pragmatic strategies for transit priority implementation. Chapter 9: *building a framework* builds a new framework for transit priority and legitimacy. This framework allows cross-comparison between the *car-centric* and *transit-centric cities* examined earlier chapters. In Chapter 10: *pragmatic strategies for car-centric cities* the framework and the insights from both *car-* and *transit-centric cities* are used to develop pragmatic strategies for transit priority implementation in *car-centric cities*. Key conclusions and implications arising from the study, and suggested directions for future research are discussed in Chapter 11: *conclusions*.

This concludes Chapter 1 and the introduction to this thesis. The next chapter turns to an exploration and critique of the existing research literature about transit priority measures, their impacts, and the perspectives used in their evaluation.

Chapter 2: Literature review: public transport priority

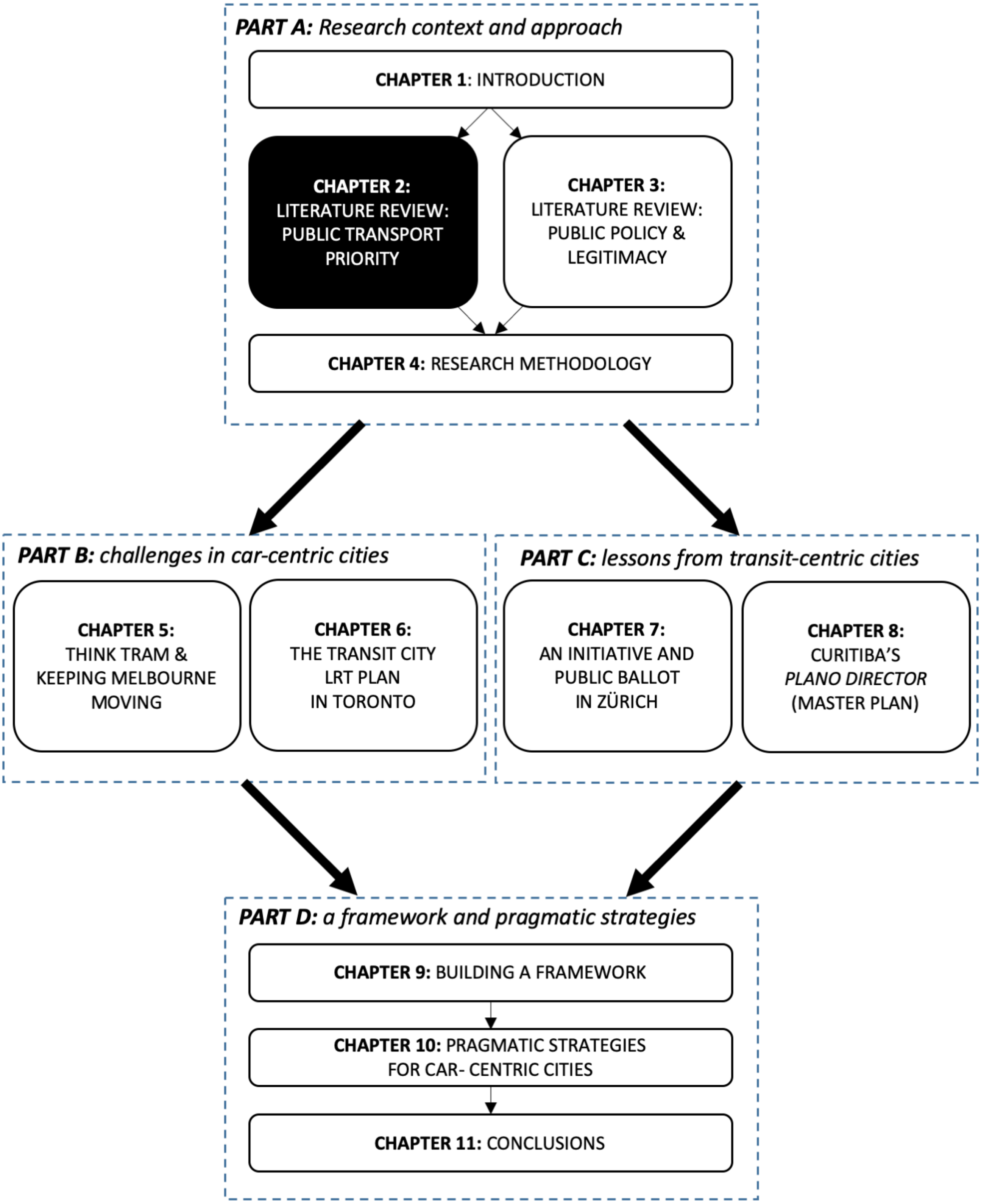


Figure 2.1 Position of Chapter 2 in thesis structure

2.1 Introduction

This thesis aims to *identify strategies to improve transit priority implementation in car-centric cities*, so identifying what transit priority actually is a logical first step. A broad definition of transit priority is that it “is a road environment feature that preferences on-road transit services over other road uses” (Currie 2016a, p. 478). However, transit priority transit priority measures come in many forms (including road rules; physical treatments; and measures that prioritise transit at intersections, often through *Transit Signal Priority* (*TSP*) systems), and these are discussed and classified later in this chapter.

The larger issue at this early stage in the thesis, however, is to understand what is already known about priority implementation and the extent to which the existing transit priority research literature addresses public decision-making, politics and other related factors. Transport policy research tends to focus on technical evaluation and modelling, rather than policy- and decision-making in real world contexts (Mees 2010, p. 101; Marsden & Reardon 2017). In general, priority implementation appears to have a similar emphasis on technical perspectives (Pulichino & Coughlin 2005, p. 80), but the extent that politics, public support and other non-rational influences on decision-making are addressed in transit priority research is as yet unclear.

This chapter, therefore, examines and critiques the existing research knowledge on transit priority evaluation and implementation. It explores the various perspectives used for impact assessment, including the traffic and mobility perspectives associated with *bus lane* warrants, the economic and other models that may provide inputs to environmental effects statements, and other appraisal methods such as those based around strategic objectives and large-scale transportation plans. The chapter then assesses the extent to which *public policy analysis* and related perspectives have been incorporated into existing transit priority research.

This chapter is structured as follows: firstly, the various types of transit prioritisation and the categorisation systems that have been developed by researchers and practitioners to classify priority measures and different transit Right-Of-Way (ROW) conditions are discussed in Section 2.2. Section 2.3 then discusses the existing research literature about transit priority impacts, objectives, and the perspectives that are currently used to evaluate and justify priority implementation. The transit priority literature is then critiqued in Section 2.4, followed by a brief conclusion in Section 2.5.

2.2 Transit priority measures

There are many different types of transit priority measures, but the research field is yet to agree on a single way to classify them. Table 2.1 summarises the different categorisation systems that have been adopted in the research literature.

Table 2.1 Categories of transit priority and facilitation measures

Category	Korve et al. (1996)	Pulichino (2003)	Danaher (2010)	Diakaki et al. (2015)	Ryus et al. (2016)	Currie (2016a)
Time						
Intersection design and control	✓					
Special signal phasing			✓			
Traffic control for highway grade crossings	✓					
Traffic signal priority			✓			✓
Traffic signal control strategies				✓	✓	
Road space						
Alignment considerations	✓					
Exclusive transit lanes			✓			
Infrastructure and bus lanes					✓	
Kerb[4] extensions			✓			
Median transitways			✓			
Queue jump and bypass lanes			✓			
Road / facility design				✓		✓
Stop modifications			✓			
Other						
Bus Rapid Transit		✓				
Enforcement and public education	✓					
Light Rail Transit		✓				
Operational improvements		✓			✓	
Public transport facilitation						✓

Notes   Source: Author's synthesis

1. Table rows grouped to show <u>time</u>, <u>road space</u> and <u>other</u> categories of measures together.

Korve et al. (1996) discuss on-road transit priority and facilitation across four topics: *traffic control*; *alignment considerations*; *intersection design*; and *enforcement and public education techniques*. Similarly broad categories are used by Diakaki et al. (2015), Ryus et al. (2016) and Currie (2016a), but Danaher (2010, p. 5) adopts a more detailed approach, discussing four types of intersection treatments and three types of roadway treatments. Pulichino (2003), in contrast to all the other researchers, divides transit priority <u>by mode</u> into *Bus Rapid Transit* (BRT) and *Light Rail Transit* (LRT), and also includes a category for *operational improvements*.

In general, however, the various approaches used in the research literature suggest three overall categorises of transit priority. These are: (1) **time** priority measures; (2) **road space** priority measures; and (3) **other** types of measures. These are discussed in detail in the following sections.

2.2.1 Time priority measures

Time based transit priority measures work by allowing transit to proceed before other road users. Table 2.2 shows the different types of time priority measures that are described in the research literature.

[4] Kerb in Australian English is equivalent to curb in American English.

Table 2.2 Synthesis of time priority measures described in selected research literature

Transit priority measure	Korve et al. (1996)	Pulichino (2003)	Hounsell (2004)	Hounsell et al. (2004)	Vuchic (2007)	Danaher (2010)	Hounsell and Shrestha (2012)	Ryus et al. (2016)	Currie (2016a)	Aakre (2016)	Currie et al. (2017)
Transit signal priority (TSP)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Passive signal priority	✓	✓	✓	✓	✓	✓		✓	✓	✓	
Adjustment to favour transit / Green priority weighting	✓		✓		✓	✓		✓	✓		
Signal linking and green waves	✓					✓		✓	✓		
Pre-signals / signal islands			✓		✓			✓			
Short cycle times								✓	✓		
Signals installed to facilitate transit	✓							✓		✓	
Time of day phasing variation									✓		
Traffic metering or gating			✓	✓				✓	✓	✓	
Transit only phase and signals	✓				✓	✓		✓	✓	✓	
Turning phase design	✓								✓		
Active signal priority	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Activated signs (e.g. restriction or warning triggered by transit)	✓										
Bus priority using Automatic Vehicle Location (AVL)			✓	✓	✓	✓	✓		✓		
Bus sluice						✓		✓	✓		
Flexible window stretching									✓		
Full override (i.e. full pre-emption or railway level crossing activation)	✓				✓	✓		✓	✓		
Green early start (red truncation)	✓			✓	✓	✓	✓	✓	✓		
Green extension				✓	✓	✓	✓	✓	✓		
Pedestrian crossing activation				✓					✓		
Phase suppression, reordering or rotation	✓					✓		✓	✓		
Phase re-service								✓			
Priority phase sequences									✓		
Recovery after priority service								✓	✓		
Separate on-call transit phases, phase insertion	✓				✓	✓		✓	✓	✓	
Traffic signal shadowing								✓			
Turning traffic clearance phases					✓				✓		
Real-time adaptive signal priority			✓	✓		✓	✓	✓	✓		
Conditional priority			✓	✓		✓		✓	✓		
Depending on traffic conditions			✓			✓			✓		
Schedule or headway adherence			✓	✓		✓		✓	✓		
Other (i.e. minimise passenger delay or based on passenger load)						✓					
Differential priority							✓				
General priority at unsignalised intersections			✓		✓					✓	✓
Bus priority at roundabouts / tram roundabouts										✓	✓
Yield-to-bus-laws					✓			✓			

Notes

Source: Author's synthesis

1. Table rows grouped and shaded to show categories and subcategories of measures together
2. *Passive signal priority* measures can all typically be used as part of *active signal priority* systems. Likewise, *active* and *passive priority* measures can also all typically be applied as part of *real-time adaptive* systems.
3. *Tram roundabouts* are discussed in Currie et al. (2017) and Marti et al. (2015).

Transit Signal Priority (TSP) is the focus of much of the research literature on time priority measures, as most delays in urban traffic conditions occur at traffic signals. *TSP* has three main types: *passive*, *active*, and *real-time TSP.* Table 2.3 shows the differences between the three types, which relate to whether transit vehicles are actively sensed and how the signals[5] are adjusted in response.

Table 2.3 Transit Signal Priority (TSP) types

Type	Transit vehicle sensing	Variable levels of priority
Passive Transit Signal Priority	×	×
Active Transit Signal Priority	✓	×
Real-time adaptive Transit Signal Priority	✓	✓

Source: Author's summary

[5] For an introduction to traffic signal timing, phasing and control systems refer to Johnson et al. (2017).

In *passive TSP* systems there is no sensing of transit vehicles. This might be the case at a simple traffic signal system where the same signal phases are repeated for the same time periods and in the same order every cycle, but where the timings have been set intentionally to favour the directions that have transit services as part of the traffic stream. In contrast, *active TSP* changes the traffic signal phasing in response to a transit vehicle being sensed. This might be achieved by inserting a *special transit-only phase* or *adjusting phase lengths* to provide additional time to transit movements.

Danaher (2010) defines *real-time adaptive* systems separately from *active TSP* because it involves **both** actively sensing transit and adapting signal phases in real-time. However, other literature includes *real-time adaptive* within the *active* category. *Real-time adaptive* systems provide different levels of priority depending on various conditions. These might include only providing priority: if the transit vehicle is running behind schedule; depending on the traffic conditions; or according to other rules or settings.

As shown above in Table 2.2 there are many different types of *passive TSP* measures discussed in the research literature. These include:

- *green priority weighting*, where a road with a transit route on it is allocated more green time than might otherwise be the case, so as to reduce the likelihood a transit vehicle has to wait;
- *green waves*, where successive traffic signals are linked and timed so that a transit vehicle tends to receive all green lights as it progresses along a route;
- setting *short signal cycle times*, or including *transit-only phases* using *special transit signals* to limit delays to transit vehicles at red lights;
- *traffic signals installed* (specifically) *to facilitate transit* to prevent a transit route suffering long or variable delays when turning from an unsignalised side street;
- *pre-signals* installed in advance of a signalised intersection to allow transit vehicles to go before and in front of other traffic when the lights turn green; and
- *signal phasing* plans that are designed to prevent delays to transit due to turning vehicles (*turning phase design*), or that incorporate *traffic metering* or *traffic gating* to reduce the likelihood of general traffic congestion interfering with transit movements.

Many of these measures can also be implemented as part of *active TSP* systems. However, *passive TSP* systems do not change the operation of the traffic signals in response to the presence of a transit vehicle. Rather, the signals are set up so that the signal phasing and timing reduces transit delays and facilitates transit movements **on average**. This may come at the expense of greater delays for other road users, for example when a *transit-only phase* runs even when no transit vehicle is present.

Active TSP senses and responds to the presence of a transit vehicle. These vary in complexity from simple illuminated flashing signs triggered by a transit vehicle passing a sensor (Korve et al. 1996, p. 151), through to city-wide systems that use *Automatic Vehicle Location* (AVL) and *Global Positioning Satellite* (GPS) technology (Hounsell, Shrestha, Head, et al. 2008). As shown above in Table 2.2 the various *active TSP* measures described in the research literature include:

- *green early start* (*red truncation*) and *green extensions*, which provide extra green time so that a transit vehicle can pass through an intersection earlier than it might otherwise;
- *flexible window stretching* and *recovery after priority service* (*phase compensation*), which aim to balance other traffic phases and offset the impacts of *green extensions* and other priority phase adjustments;
- *bus sluices*, which are special phases allowing buses to cross traffic lanes laterally (e.g. from the kerbside to the centre lane) without interference from other traffic;
- the *activation of pedestrian crossing signals* or '*shadowing*' of downstream signalised intersections to facilitate turns by transit vehicles;
- *phase suppression*, *insertion*, *reordering*, *rotation*, *re-service* or *special sequences* to prioritise transit movements or clear turning traffic from in front of a transit vehicle; and
- *full override* of a traffic control system so transit passes through without any delay and with priority similar to that provided to trains at railway level crossings.

Real-time adaptive TSP comes in two types: *conditional*, and *differential*. *Conditional* suggests a binary approach (i.e. no priority or priority) where priority is only provided under certain circumstances, such as if a transit vehicle is running behind schedule. The research literature describes other conditional factors such as traffic conditions, minimising passenger delay or only prioritising buses carrying above a certain number of passengers. *Differential priority* is similar, but provides multiple increments of priority (e.g. none, low, medium, high, total) based on how late a service is running, its headway to other buses on the same route, or to meet goals such as minimising passenger waiting time (Hounsell & Shrestha 2012). *Automatic Vehicle Location* (*AVL*) technology now allows transit vehicles to be tracked in real time, often using GPS. This technology has allowed new transit priority algorithms and techniques to be developed, such as those used in the London iBus system[6]. Technology advances are providing further options to improve technical performance, including a novel approach that combines GPS, visual detection, beacon detection, and door closing sensors to adjust for variability in passenger boarding and dwell times when providing *TSP* downstream of bus stops (Hounsell et al. 2007, p. 134).

[6] See Hounsell et al. (2007); Hounsell, Shrestha, Head, et al. (2008); Hounsell, Shrestha, Palmer, et al. (2008); Hounsell and Shrestha (2012); Hounsell et al. (2012).

However, **not all *time* priority measures need to be technologically advanced** or to involve signal systems. A simple measure is *general priority at unsignalised intersections*, which can be implemented by adjusting Give Way or Stop signage so that a transit route has priority over cross-road traffic (Hounsell 2004; Vuchic 2007). This approach uses existing, basic and low-technology intersection control systems, but simply sets them up to advantage transit. It can also be used at roundabouts, with buses or trams passing directly through the central island (Marti et al. 2015; Currie et al. 2017). In general, this does not require widespread changes to the status quo, new road rules or signalling systems and can be done on a site-by-site basis.

In contrast, *yield-to-bus laws* can be much more complex to implement. While many jurisdictions have laws requiring general traffic to give way to a bus that is pulling out from a bus stop, for historical reasons *yield-to-bus laws* are not part of the traffic rules everywhere. King (2003) and Hyde and Smith (2015) provide examples of the institutional barriers that complicate introduction of *yield-to-bus laws*. In particular, their research highlights the extensive stakeholder consultation and buy-in required to support change. Public education and awareness campaigns are also needed during implementation, despite *yield-to-bus* laws being (at least from a technical perspective) a relatively simple form of transit priority.

2.2.2 Road space priority measures

Transit can also be prioritised by preferentially allocating road space. This is typically achieved through regulatory or physical measures that restrict other traffic from using parts of the road. Some road space priority measures (e.g. *far side bus stops*) are specific to a single location and have minimal effect on conditions along a road. However, other road space priority measures extend along a length of road and alter ROW characteristics. For example, a *bus-only roadway* is both a transit priority measure and a special type of ROW. The allocation of road space is often closely related to ROW classification, as discussed in the following.

2.2.2.1 ROW characteristics and classification

Table 2.4 shows a synthesis of ROW classifications systems adopted by selected researchers and by some practitioners to describe transit operating environments. A widely used system is that developed by Vuchic (1981, pp. 62-3; 2005, pp. 5-6), which defines transit ROW using three categories: ROW A, where transit is *fully-separated* from other traffic (e.g. a subway); ROW B, where transit is *longitudinally-separated* from other traffic, but has at-grade intersections; and ROW C, where transit operates in a *mixed traffic* environment. This system has been used by other researchers, including Korve et al. (1996) who extended it to categorise five different types of ROW B and three types of ROW C. However, Korve et al. (1996) adopt a narrower definition of ROW A by only including grade-separated facilities. This contrasts to how Vuchic (1981, 2005) includes transit with full priority at *railway-style at-grade crossings* in ROW A.

Table 2.4 Synthesis of selected ROW classification systems

<table>
<tr><th>ROW Description</th><th>Vuchic (1981, 2005)</th><th>Korve et al. (1996)</th><th>Levinson, Zimmerman, Clinger, Gast, et al. (2003)</th><th>Gray et al. (2006)</th><th>Vuchic (2007, pp. 300-4)</th><th>Yarra Trams (2017) Melbourne Tram Network</th><th>VicRoads (2007b) Melbourne Tram Network</th><th>VicRoads (2007a) Melbourne Bus Network</th></tr>
<tr><th>Primary Use:</th><th>Research</th><th>Research</th><th>Research</th><th>Research</th><th>Research</th><th>Practice</th><th>Practice</th><th>Practice</th></tr>
<tr><td>Fully exclusive without at-grade crossings</td><td rowspan="2">A, exclusive, rapid transit</td><td>A</td><td>I</td><td rowspan="9">Full BRT</td><td rowspan="2">Light Rail Rapid Transit</td><td rowspan="2">N/A</td><td rowspan="2">N/A</td><td rowspan="9">N/A</td></tr>
<tr><td>Exclusive, but with at-grade crossings where transit has full priority (i.e. railway crossing style at-grade crossings)</td><td rowspan="2">B.1</td><td rowspan="2">II</td></tr>
<tr><td>Longitudinally separated with at-grade crossings</td><td rowspan="7">B, semi-exclusive, semi-rapid transit</td><td rowspan="7">LRT</td><td>Right of Way</td><td>Median ballast or concrete, or raised track</td></tr>
<tr><td>Transit alignment separated by kerbs & fences</td><td>B.2</td><td rowspan="6">III</td><td rowspan="2">Boulevard</td><td>Tram routes</td></tr>
<tr><td>Transit alignment separated by kerbs</td><td>B.3</td><td rowspan="2">Separation kerbing</td></tr>
<tr><td>Transit alignment separated by mountable kerbs</td><td>B.4</td><td>Mountable separation kerb</td></tr>
<tr><td>LRT/pedestrian mall next to a parallel roadway</td><td>B.5</td><td rowspan="3">Shared space</td><td rowspan="4">Tram routes</td></tr>
<tr><td>LRT/pedestrian mall (no parallel roadway)</td><td>C.3</td></tr>
<tr><td>Transit mall (limited other vehicle access, no pedestrians within the transit ROW)</td><td>C.2</td></tr>
<tr><td>Transit in an exclusive linemarked lane</td><td rowspan="6">C, non-exclusive</td><td rowspan="6">C.1</td><td rowspan="3">IV</td><td rowspan="2">Intermediate stage or Full BRT</td><td>LRT, tram or streetcar</td><td>Full time tram lane</td><td>Bus lane</td></tr>
<tr><td>Transit in the shoulder / emergency lane</td><td rowspan="2">N/A</td><td rowspan="2">N/A</td><td rowspan="2">N/A</td><td>Emergency lane</td></tr>
<tr><td>Transit in mixed traffic within a shared lane (e.g. HOV lane, shared with bikes, taxis etc.)</td><td>Intermediate BRT</td><td>Transit lane</td></tr>
<tr><td>Transit in mixed traffic within an exclusive transit during peak periods only</td><td rowspan="3">IV / V</td><td rowspan="3">Initial BRT</td><td rowspan="3">Tram or streetcar</td><td rowspan="3">Part time tram lane</td><td rowspan="3">Tram routes</td><td>AM & PM peak bus lane</td></tr>
<tr><td>Transit in mixed traffic within a shared transit lane in operation during peak periods only</td><td>AM & PM peak transit lane</td></tr>
<tr><td>Transit operating in mixed traffic</td><td>Unclassified</td></tr>
</table>

Notes

Source: Author's synthesis

1. Vuchic (1981, 2005) focuses on separation from traffic, rather than from traffic and pedestrians. Therefore, *transit and pedestrian malls* have been assumed to be part of ROW B in this classification system. Vuchic (1981, 2005) also does not distinguish between types of kerb, and so *transit separated by mountable kerbing* is assumed here to be part of ROW B.

While the Vuchic (1981, 2005) classification approach has been used in research relating to LRT, it does not appear to have been widely adopted in BRT research. Levinson, Zimmerman, Clinger, Gast, et al. (2003) instead define five BRT operating environments based on access control and using a numbering system, which is unrelated to the alphabetic system of Vuchic (1981, 2005). These BRT classes range from fully controlled access (Class I)(i.e. a ROW A *grade-separated busway)*, through to *mixed traffic* operation (Class V).

BRT itself appears difficult to clearly define, particularly with respect to the boundary between a regular bus service and a BRT. Vuchic (2005, pp. 556-8) suggests that BRT is often a misnomer as by his definition *rapid transit* requires ROW A, but BRT rarely has full grade-separation along an entire route length. Many researchers are willing to call a system a BRT even if it is well short of a ROW A standard. For example, Currie and Delbosc (2010) include both *Adelaide's O-Bahn guided busway* (ROW A) and Melbourne's *SmartBus* network (ROW C) in a review of Australasian BRT systems. Likewise, Gray et al. (2006, pp. 7-9) define *Full BRT* as including dedicated running ways or *exclusive bus lanes*, despite these suggesting ROW B and C respectively. These varying definitions may be reflective of BRT's origins as an upgrade of regular *mixed traffic* bus operations. Unlike heavy rail, which has failsafe control systems that essentially require ROW A conditions from the very beginning, there are pathways for the incremental development from a *mixed traffic* bus to 'full' BRT. Gray et al. (2006, pp. 7-9) show how in *mixed traffic* operation might be developed through an intermediate stage of *exclusive bus lanes* or shared *High Occupancy Vehicle* (*HOV*) *lanes* to a final *Full BRT* as greater capital is invested. The European concept of *Bus with a High Level of Service (BHLS)* is one such intermediate type of service. However, Heddebaut et al. (2010, pp. 309-12) distinguish *BHLS* from the USA approaches of *BRT Lite*, *BRT-Heavy* and *Full BRT* due to a lower emphasis on serving just commuters, greater use of *exclusive lanes* and insertion into city centres, and different regulatory and institutional frameworks that make *freeway bus lanes* more difficult to implement in Europe.

These various terms (*BHLS*, *BRT*, *BRT-lite* etc.) are often used as broad network or system-wide descriptions, rather than to describe the conditions at specific locations or segments of a route. System-wide classifications are also used in the research literature to differentiate *streetcar*, *tram*, *LRT*, or *light rail rapid transit* depending on the typical ROW operating conditions (Vuchic 2007, pp. 300-4). Such broad terms are sometimes evident in transportation plans, official planning documents and other government strategies[7]. However, these often appear to reflect *normative* goals for how the transport system should be managed or developed into the future, rather than descriptions of desired ROW conditions. In contrast, there are more descriptive classification

[7] For, example the surface priority network plan included in the City of Toronto (2020a) Official Plan defines some roads as "Transit Priority Segments". However, this broad term could describe a wide range of transit ROW conditions, and the plan does not differentiate between segments that are currently served by streetcars or buses.
Similarly, in Melbourne the "Principal Public Transport Network (PPTN)" (VicDEDJTR 2017) defines some roads as strategically important bus and tram routes. This is further divided in the SmartRoads Network Operating Plan (NOP) framework (VicRoads 2016) into three levels of importance based on transit frequency (Wall 2017c), but the desired ROW conditions are not specified.

systems used in practice to differentiate ROWs based on the current real-world operating conditions. Just three of the classification systems from Melbourne are shown in Table 2.4 above[8], but it appears likely that there are a huge number of bespoke classification systems used by transit operators, road authorities and governmental jurisdictions around the world.

Table 2.4, as a whole, shows the wide variety of ROW classification systems, and that those used in the academic literature do not necessarily match those used in practice. Developing the 'perfect' classification system that describes all possible transit ROW operating conditions in a manner that is useful for both academic researchers and transportation practitioners is likely an impossible task. However, the synthesis in Table 2.4 provides an opportunity to develop a new, refined and combined ROW classification system that incorporates the best parts of some of the systems reviewed in this section. Table 2.5 shows this new ROW classification system, which has been adopted for this study. Figure 2.2 shows examples of ROW conditions in selected categories.

Table 2.5 ROW classification system adopted for this study

Class	Type	ROW Description
A.1	Fully-exclusive	Fully-exclusive without any *at-grade crossings*
A.2		Exclusive, but with *at-grade crossings* where transit has full priority through *railway-style crossings* or *signal pre-emption*.
B.1	Longitudinally-separated	*Longitudinally-separated* alignment with *at-grade crossings* at which transit does not have full priority
B.2		Transit alignment separated by (non-mountable) kerbs and fences
B.3		Transit alignment separated by (non-mountable) kerbs
B.4		*Transit mall* (limited other vehicle access, no pedestrians within the transit ROW)
C.1	Mixed traffic	*Transit and pedestrian mall*, no parallel roadway
C.2		*Transit and pedestrian mall* with an adjacent parallel roadway
C.3		*Transit lane* separated by mountable kerb
C.4		Transit in an *exclusive linemarked lane*
C.5		Transit operating in the shoulder or emergency lane
C.6		Transit in *mixed traffic* within a *shared lane* (e.g. *HOV lane*, shared with bikes, taxis etc.)
C.7		Transit in *mixed traffic* within an *exclusive transit lane* in operation during peak-periods only
C.8		Transit in *mixed traffic* within a *shared transit lane* in operation during peak-periods only
C.9		Transit operating in *mixed traffic*, but with general traffic through movements (along the corridor) restricted so as to advantage transit[9]
C.10		Transit operating in *mixed traffic*, but with general traffic *turn restrictions* to facilitate transit (e.g. *hook turns*[10], *turn bans* etc.)
C.11		Transit operating in *mixed traffic* conditions, directly sharing lanes with general traffic.

Source: Author's concept based on synthesis shown in Table 2.4

[8] The classification system currently used by Yarra Trams (2017) to describe the Melbourne tram network is shown in the eighth column of Table 2.4. The Melbourne tram network has also previously been classified by VicRoads (2007b), the Victorian road authority (Table 2.4, ninth column).
Comparison of these two classification systems perhaps demonstrate how institutional boundaries and the passage of time can lead to large differences in how ROW conditions are described and classified. Despite describing the same tram network, Yarra Trams (2017) classifies mountable and non-mountable kerb separated environments separately, whereas VicRoads (2007b) group them together within the "separation curbing" category. VicRoads (2007b) also uses the generic term "Tram routes" to classify a range of operating environments, whereas Yarra Trams (2017) separates "Boulevard", "Shared Space", "Full time tram lane" and "Part time tram lane".

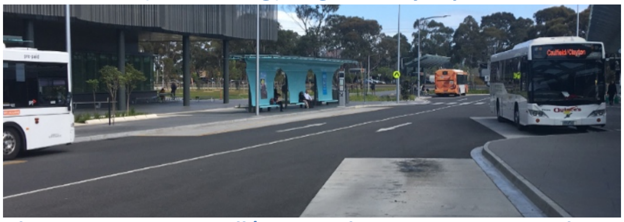
[9] ROW C.9 describes conditions where through movements along the alignment by general traffic are restricted so as to advantage transit services. An example of this ROW condition is the King Street Transit Pilot in Toronto (discussed in detail in Chapter 6), which banned through traffic movements at intersections along the King Street corridor. The Clarendon Street Tram Priority Pilot in Melbourne (Chapter 5), to a certain extent, also discouraged through movements by general traffic by installing kerb extension *far side stops*, and might also be interpreted as ROW C.9.

[10] *Hook turns* are a traffic management treatment used in Melbourne to prevent turning vehicles from delaying trams. Traffic drives on the left in Australia. Drivers wishing to turn right at a *hook turn* intersection must enter the intersection using the left-hand lane, queue within the intersection and then complete their turn as the traffic signals change to show green to side-road traffic. *Hook turns* have been in use in Melbourne for over 50 years and provide safety benefits, improve intersection operations and reduce tram delays (Currie & Reynolds 2011).

a. ROW A.2 *exclusive tram ROW* with *at-grade crossings*

b. ROW B.1 (*side-running*) *longitudinally-separated* tram

c. ROW B.3 tram tracks *longitudinally-separated* by non-mountable barrier kerb (note: jaywalking pedestrians)



d. ROW B.4 *transit mall* (note: pedestrians are restricted to footpaths and have to cross at signals or zebra crossings

e. ROW C.2 *shared transit and pedestrian mall* with no adjacent roadway (note: *platform stop* in foreground)

f. ROW C.3 *tram lane* separated by mountable kerb

Figure 2.2 ROW operating conditions on the Melbourne tram network, classified as per Table 2.5

Source: Author

The new system (Table 2.5) adapts the alphabetic categories of Vuchic (1981, 2005) and the numeric subcategorization approach of Korve et al. (1996). It contains two types of ROW A, four types of ROW B, and eleven types of ROW C[11]. No doubt further ROW classification systems will be developed by researchers and practitioners to suit their circumstances and the transit networks they are examining. However, the new system shown in Table 2.5 is adopted for the remainder of this

[11] ROW A.1 adopts the narrow definition of Korve et al. (1996) where only fully-exclusive ROWs without any *at-grade crossings* are included. ROWs that are fully exclusive, but have *railway-style at-grade crossings* where transit is given full priority are ROW A.2 (Figure 2.2a.). *Longitudinally-separated* transit ROW is divided into ROW B.1 to B.4. These include the basic definition of ROW B (*longitudinally-separated* transit with *at-grade crossings*) as B.1 (Figure 2.2b.), and the definitions adopted by Korve et al. (1996) for ROW B.2 and B.3 (Figure 2.2c.). However, a distinction is made so that only non-mountable kerbing counts as *longitudinal separation*, similar to the way that Yarra Trams (2017) defines “Right of Way” and “Boulevard” categories separately from ***mountable*** *separation kerb*. ROW B.4, is used for *transit malls* with limited access to other vehicles and physical separation from pedestrians.

Mixed traffic transit operating conditions is divided into ROW C.1 to C.11. This recognises the wide range of *mixed traffic* environments that are described in the BRT-related literature of Levinson, Zimmerman, Clinger, Gast, et al. (2003) and Gray et al. (2006), and the separate definition of peak-period only transit lanes used by VicRoads (2007a) and Yarra Trams (2017). The research literature has tended to group most types of ‘streetcar’ operations together (e.g. Korve et al. (1996); Vuchic (2007, pp. 300-4)) rather than distinguish between *part-time* and *full-time transit lanes*, *HOV lanes* or other types of *mixed traffic* transit facilities. It has also not always been clear about where environments shared with pedestrians fit into transit ROW hierarchies. The new system shown in Table 2.5 above therefore includes *shared pedestrian malls* as C.1 or C.2 (Figure 2.2e.) on the basis that the ROW is shared with pedestrians. This is subtly different from a *transit mall* (ROW B.4) environment in which pedestrians are restricted to footpaths (Figure 2.2d.).

Additional categories have been added for *mountable kerb* (C.3, Figure 2.2f.), road shoulders (C.5), *shared transit lanes* (C.6 & C.8), and part-time lanes (C.7 & C.8). These reflect the broad range of *mixed traffic* operational environments that are included separately by some systems, but aggregated by others.

Two additional types of ROW are added, which are not discussed by the literature summarised in Table 2.4. These are ROW C.9 where restrictions are placed to limit general traffic from travelling along the alignment used by transit, and ROW C.10 where treatments such as *turn bans* and *hook turns* that prevent turning vehicles from delaying transit in *mixed traffic*. Both of these added on the basis of examples from the cases studied in this thesis, as discussed in Chapters 5 and 6.

thesis. The next section, therefore, turns away from ROW characteristics to consider individual space priority measures that may exist along a road segment or at discrete locations.

2.2.2.2 Individual road space priority measures

Table 2.6 shows a synthesis of individual road space transit priority measures discussed in selected research literature. These fall into five main groups:

1. *grade-separated* facilities (a ROW class, but also a 'road space priority measure');
2. measures that *longitudinally-separate* transit from other traffic, providing ROW B conditions (likewise, both a ROW class and a 'road space priority measure');
3. measures that prioritise transit in *mixed traffic* (ROW C) environments, such as *transit lanes*, *queue jump lanes* and *elimination of parking*;
4. *turn and movement restrictions* at intersections; and
5. priority measures related to *stop treatments* and *stop relocation*.

Measures discussed in the research literature that provide *full-* or *longitudinal-separation* (ROW A or B) include *transitways*, *grade-separated* or *exclusive BRT* or *LRT*, *transit malls*, *public transport gates* and *bus-only links*, *transit in the median* or *side running transit*, and separation measures such as kerbs, landscaping and fencing. Some of these were discussed in the preceding section in the context of ROW classifications, but the research literature often identifies these as specific road space priority measures as well as types of operating environments. However, caution is required as *transitway*, *busway* and other terms are sometimes used fairly broadly in the research literature and can encompass a wide range of ROW types[12].

The research literature discusses a wide range of road space measures that are used in *mixed traffic* environments (ROW C). All of the reviewed research literature discusses *transit lanes*, *tram lanes* or *bus lanes*, including *shared*, *exclusive*, *kerbside*, *interior*, *contraflow* and *reversible lanes*. *Bus use of shoulders* is discussed by Ryus et al. (2016), studied in detail in a Transit Cooperative Research Program (TCRP) synthesis report (Martin 2006) and examined in research about bus driver workload and the safety of having buses moving at speed in close proximity to slow moving traffic (Ward et al. 2006). Bus driver workload is also relevant to the provision of *wider traffic lanes*, which is identified by Currie (2016a) as allowing increased speeds and reducing delays from interactions with other traffic, but this is clearly a very subtle form of transit priority.

[12] For example, Eccles and Levinson (2007) discuss "at-grade crossings of exclusive busways" across categories of *separated right-of-way busways, bus-only ramps, median busways* and *side-aligned busways*. These might involve buses operating in ROW A.2, B.1, B.2 or B.3 conditions depending on whether there is signal pre-emption at intersections and the type of separation between buses and other traffic.

Table 2.6 Synthesis of road space transit priority measures described in selected research literature

Transit priority measure	Korve et al. (1996)	Pulichino (2003)	Hounsell (2004)	Vuchic (2007)	Danaher (2010)	Ryus et al. (2016)	Currie (2016a)	Litman (2016)	Aakre (2016)
ROW A (fully-separated) or ROW B (longitudinally-separated)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Grade-separated LRT	✓			✓	✓	✓			
Grade-separated or exclusive busway		✓		✓	✓	✓	✓	✓	✓
Transitway		✓		✓	✓	✓			
Pedestrian crossing treatments such as bedstead barriers, swing gates and Z-fencing	✓								
Public transport gates / Bus-only links			✓	✓		✓	✓		
Separation measures (kerbs, landscaping, fencing etc.)	✓			✓	✓		✓		
Side running transit	✓								
Transit in the median	✓			✓	✓	✓		✓	
Transit malls	✓		✓	✓	✓	✓		✓	
ROW C (mixed traffic)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bypass lanes					✓	✓	✓		
Parking removal or restrictions			✓		✓		✓	✓	
Pedestrian malls (shared with transit)	✓			✓					
Preferential freeway entry (exclusive lanes or ramp, or queue jump)				✓		✓	✓	✓	
Queue jump lanes (intersections)		✓			✓	✓	✓	✓	
Road closures (side streets and driveways)	✓								
Speed hump modification						✓	✓		
Transit / Tram / Bus lanes	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bi-directional transit lanes (shared thru a narrow point)					✓				
Bus use of road shoulders						✓			
Centre running or median lanes	✓			✓		✓		✓	✓
Coloured pavement treatment	✓				✓	✓	✓		
Contraflow lanes	✓		✓	✓	✓	✓	✓	✓	
High Occupant and Toll (HOT) lanes					✓			✓	
High Occupant Vehicle (HOV) lanes				✓			✓	✓	
Interior bus lanes					✓	✓			
Intermittent lanes / Dynamic fairway / Flexible lanes[2]					✓		✓		
Lanes separated from traffic using mountable kerbs	✓			✓	✓				
Linemarked lanes	✓			✓	✓	✓	✓	✓	
Kerb side transit lanes	✓			✓	✓	✓		✓	
Part time transit lanes					✓		✓		
Part time shared transit lanes							✓		
Reversible lanes			✓		✓				
Shared transit lanes				✓	✓	✓	✓	✓	
Transit lanes shared between buses and trams				✓					
Transit lanes shared with trucks				✓			✓	✓	
Transit lanes shared with bicycles				✓		✓	✓		
Transit lanes shared with taxis				✓	✓	✓			
Wider lanes							✓		
Turn and movement restrictions	✓			✓	✓	✓	✓		
Transit vehicle exemption from turn restrictions				✓	✓	✓	✓		
Elimination of cross traffic				✓					
Elimination of left turns (in left hand drive jurisdictions)	✓				✓	✓			
Elimination of right turns (in left hand drive jurisdictions)	✓			✓	✓				
Elimination of through traffic				✓					
Stop treatments and relocation	✓	✓		✓	✓	✓	✓	✓	✓
Boarding islands	✓	✓		✓	✓	✓			
Bus bays				✓			✓	✓	
Kerb extensions	✓	✓			✓	✓	✓		
Far-side stops				✓	✓	✓			
Platform stops	✓			✓	✓				
Run-ins and run-outs							✓		
Skip-stop operation[3]					✓				
Stop consolidation				✓	✓	✓			✓
Stop lengthening				✓		✓			
Stop priority[4]	✓								
Stop relocation					✓	✓	✓		

Notes

Source: Author's synthesis

1. Table rows grouped and shaded to show categories and subcategories of measures together
2. Hounsell and Shrestha (2012) show intermittent and flexible lanes as separate types.
3. Skip-stop operation is perhaps more of an operational approach rather than a 'priority' measure, but providing passing lanes at stops is highlighted by Danaher (2010) an option to increase operational speeds while still servicing all stops.
4. Stop priority involves laws requiring regular traffic to halt behind LRT vehicles while passengers cross lanes to board and alight.

Turn and movement restrictions were briefly discussed in the previous section in the context of ROW types and are widely discussed in the research literature. These measures prevent general traffic vehicles from using road space in ways that might delay transit, or alternatively allow transit services to use a more direct route through an *exemption from a turning or movement restriction*. This can provide a similar advantage as *bus-only links*, but without the need for much infrastructure as turning restrictions can be implemented using regulatory signage only.

Priority related to transit stops is also widely discussed in the literature, particularly with respect to the placement of transit stops in relation to traffic signals. *Far side stops* are widely described as being preferable and as improving the effectiveness of *TSP* by moving boarding, alighting and dwell time variability to time periods after a transit has passed through a traffic signal. However, relocating stops to the far side on intersections may require the removal of on-street parking, which is unlikely to be politically popular. While *parking removal* has also been identified as a stand-alone priority measure in and of itself that can help to remove "traffic flow 'friction' between parking traffic and road-based public transport" (Currie 2016a, p. 478), as yet it does not appear that the research literature has clearly identified how to compare the positives for transit of *parking removal* or providing *far side stops* versus the potential impacts on other road users and adjacent land uses.

2.2.3 Other priority and transit supportive measures

The research literature also discusses facilitation or "transit-supportive roadway strategies" (Ryus et al. 2016), which do not fit into the categories of time- or space-based measures. These are shown in Table 2.7, and can be divided into four groups: (1) *education*, *enforcement* and *encouragement* programs; (2) *traffic engineering* and *land use planning* measures; (3) *transit planning and operations* strategies; and (4) *private vehicle design*. The first group shown in shown in Table 2.7 encompasses the three non-engineering 'E's' from the '4 E's' framework. This framework is often used in cycling related research and practice as a way of extending beyond just 'hard' *Engineering* measures to also incorporate the 'soft' strategies of *Education, Enforcement* and *Encouragement*[13]. Researchers and practitioners appear to have similarly appreciated the importance of these non-engineering strategies for transit priority[14]. However, experience with *peak-period streetcar lanes* in Toronto (Currie & Shalaby 2007, pp. 34, 7), BRT and transit priority in the USA (Levinson, Zimmerman, Clinger, Gast, et al. 2003, pp. 12-4 Chapter 4; Danaher 2010) and *fairways* in Melbourne (Howie & Daley 1984; Currie & Lai 2008; Currie 2009) suggests that the focus of implementers is often on the engineering, rather than on non-technical factors related to how road users respond to transit priority measures.

[13] See for example Williams et al. (1993); Taylor et al. (2017, p. 12).

[14] For example, the "Obey the Yellow" campaign in Melbourne was run in support of an concurrent *engineering* program of tram priority implementation, and used advertising to *encourage* drivers to stay out of tram lanes and *educate* them about the complex road rules relating to trams (Currie 2009). Ryus et al. (2016) identifies *enforcement* as "essential for the successful operation of certain transit-supportive road-way strategies", while Litman (2016) identifies it as a cost that needs to be considered when evaluating *bus lanes*. More recently, Cesme et al. (2018) have undertaken a review of best practices for *enforcement* and *education* of *bus lane* restrictions, and found that automated bus-mounted enforcement might provide the highest benefit-cost ratio (of 7.87 over 10 years), but can require additional enabling legislation in many jurisdictions.

Table 2.7 Synthesis of other priority and transit supportive measures described in selected research literature

Measure	Korve et al. (1996)	Pulichino (2003)	Hounsell (2004)	Danaher (2010)	Ryus et al. (2016)	Currie (2016a)	Litman (2016)	Aakre (2016)
Education, enforcement and encouragement	✓		✓	✓	✓	✓	✓	
Traffic control enforcement	✓		✓	✓	✓	✓	✓	
Public education campaigns	✓			✓		✓		
Traffic engineering and land use planning			✓			✓	✓	
Junction incursion bans						✓		
Land use cell connectivity and subdivision permeability						✓		
Pedestrian accessibility						✓		
Pedestrian crossing locations						✓		
Road and intersection alignment						✓		
Road profiles						✓		
Road pricing			✓				✓	
Traffic calming			✓					
Transit planning and operations		✓	✓		✓	✓	✓	✓
Automatic Vehicle Location (AVL)			✓		✓	✓		
Fare payment changes		✓	✓		✓		✓	✓
All-door boarding		✓	✓		✓			✓
Electronic ticketing, mobile phone ticketing			✓		✓			✓
Off-board ticketing		✓	✓		✓			✓
Proof of payment ticketing		✓			✓			
Transit passes					✓			
Route design					✓	✓		
Transit vehicle changes		✓	✓		✓	✓	✓	
Private vehicle design						✓		
Automated vehicle control systems (future)						✓		

Notes
Source: Author's synthesis

1. Table rows grouped and shaded to show categories and subcategories of measures together

A range of *traffic engineering and land use planning* measures that can facilitate transit are identified by Currie (2016a) including *junction incursion bans*, providing good *pedestrian accessibility* to transit stops, *traffic calming*, and providing *road and intersection alignments* that can be readily traversed by large transit vehicles. Transit priority implementation does not just involve the retrofitting of measures into an existing road environment but can also occur when planning new road networks and street configurations. Road networks that can be served by transit without the need to turn at intersections or double back to exit a neighbourhood, wider traffic lanes that allow buses to overtake cyclists, and other subtle considerations at the land-use planning stage might make significant differences to the directness, speed and reliability of public transport services (Currie 2016a, p. 491). However, public transportation is just one of the many factors that are considered when determining road hierarchies, functions and classifications or when designing road networks (see Delbosc et al. (2017) and Davis (2017)). In practice the "artistic and creative" work of urban planners, and the "boring and mathematical" work of transportation engineers may tend to be done in different silos (Mees 2010, p. 5), despite efforts in the research literature to integrate land use and transport planning in both policy development and teaching (e.g. Marshall and Banister (2007) and Krizek and Levinson (2005)). Unfortunately, neither the urban planning or transportation engineering professions appear to have yet fully come to grips with "the politics of public transport" (Mees 2010, pp. 195-201). The research literature sometimes discusses institutional and political issues as simply additional barriers and constraints on policy instruments that might limit the enactment of solutions (e.g. May and Matthews (2007, pp. 348-50)), rather than seeing the central influence of politics and institutional structures on transportation and land use planning. The importance of politics is highlighted by the limited number of *road pricing* schemes implemented to date, despite the apparently strong technical and theoretical case for using price signals to manage traffic demand[15]. Hounsell (2004) and Litman (2016) both mention *road pricing* in the context of transit priority and facilitation. A well-known example is the London Congestion Charge that, together with widespread improvements to the London bus network, increased bus reliability and speeds (Santos & Fraser 2006, p. 273). Unfortunately, the case for *road pricing* in many other places, such as Australia, "has fallen largely on politically non-supportive ears" (Hensher & Bliemer 2014) and there remain considerable challenges to turning the economic theories into real-world policy changes[16]. Given the political opposition and small number of implementations it is perhaps not surprising that the transit priority literature rarely mentions *road pricing* other than in passing, in post-hoc evaluations of impacts on transit of schemes that have been implemented (e.g. Small (2004)), or to suggest that *road pricing* is a distraction from implementing measures that actually separate transit from other traffic (Fitzroy & Smith 1993). In general, it appears unlikely that *road pricing* will ever be introduced in a city specifically and solely to prioritise transit, but when a *road pricing* scheme is introduced to manage traffic congestion there appear to be flow-on benefits for buses and trams.

The research literature also discusses the influence of *<u>transit planning and operations</u>* with respect to *AVL* technology, *fare payment* and *transit vehicle changes*, and *route design*. *AVL* can help in transit operations management, allow the provision of real-time information to passengers, and provide extensive data for performance evaluation. While it is not necessarily a 'priority measure' in itself, *AVL* can also be used as in input to improve the performance of *TSP*. This may require close collaboration between transit and road authorities, but the research literature appears to have mostly focused on technical matters relating to the integration of *AVL* and *TSP* systems, rather than the impacts of institutional boundaries[17]. Likewise, *fare payment changes* and *transit vehicle designs*

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[15] *Road pricing* involves charging for road use by time of day and location so as to reduce traffic congestion, and has been identified as a measure that also helps to prioritise transit. It is based on the concept of internalising externalities, and works by pricing some trips off the road network at peak times so as to reduce demand and congestion. The economic theories supporting *road pricing* are not new; Smeed et al. (1964) considered the concept in detail over 50 years ago. However, progress on bringing theory into practice has been slow. The first road pricing scheme was not introduced until 1975 and involved charging a fee to enter or exit a central zone in Singapore. This fee applied to all vehicles other than public transport and emergency services, and was manually enforced using pre-purchased licences until the introduction of an electronic system in 1998 (Santos & Fraser 2006, p. 268). Such modern technologies have supported electronic tolling and road pricing schemes enacted by other cities, including systems based on charges for driving within the central area of a city, or schemes that charge for road network use more generally.

[16] For example, *road pricing* remains counter to state government policy in Melbourne (Keen 2016). However, it is receiving increased research funding and interest in Australasia in response to traffic congestion problems (O'Connor et al. 2011, p. 1056) and the "big shift" from building new roads to increase capacity towards managing existing infrastructure to improve productivity (Wall 2014).

[17] There is a large amount of research literature that discusses *AVL* or *Automatic Vehicle Monitoring (AVM)* systems, including Burton and Hounsell (1993); Bowen et al. (1994); Hounsell (2000); Hounsell et al. (2000); Levinson, Zimmerman, Clinger, Gast, et al. (2003); Baker et al. (2004); Hounsell (2004); Hounsell et al. (2004); Smith et al. (2005); Currie (2006); Currie and Shalaby (2008); Hidalgo and Graftieaux (2008); Hounsell, Shrestha, Head, et al. (2008); Hounsell, Shrestha, Palmer, et al. (2008); Hounsell and Shrestha (2009); Danaher (2010); Hounsell and Shrestha (2012); Hounsell et al. (2012); Currie, Goh, et al. (2013); Ambrosino et al. (2015); Ahmed et al. (2016); Currie (2016a); Platt (2016). However, most of this research is focused on reporting the technical details of successful implementations. Some researchers have highlighted cases where integrating *AVL* into *TSP* has been challenging or not occurred, and the need for cooperation across institutional boundaries (Morton 2007; Currie & Shalaby 2008; Hidalgo & Graftieaux 2008; Ambrosino et al. 2015). However, the research literature does not yet appear to have widely

might not strictly be 'priority measures', but are widely discussed in the transit literature, particular with respect to BRT[18]. *All-door boarding,* and the greater use of *transit passes* and *off-board, electronic and proof-of-payment ticketing* can help to reduce stop dwell times (Currie et al. 2012; Currie & Reynolds 2016), but the research literature does not appear to fully explore institutional reluctance or other challenges associated with changing *fare payment* systems. Low-floor vehicles are now widely provided to meet disabled access requirements and, together with level-boarding platforms, can provide safety, dwell time reduction and other benefits (Currie & Reynolds 2010; Currie, Delbosc, et al. 2013), but again the research literature does not appear to have explored the institutional, policy-making and other non-technical challenges associated with shifting current practices. *Route design* has broad implications for system operation and outputs, and the 'Squaresville' thought experiment (Mees 2000, 2010) shows the difference between high-frequency networks that provide widespread accessibility through transfers, and point-to-point networks where fewer passengers have to change vehicles, but frequencies may be lower. The implication of a high frequency transfer-based network for transit priority systems is that there may be more competing priority calls where routes cross, and this 'multiple request' problem has received attention in *TSP* research (e.g. Diakaki et al. (2015)). In contrast, a point-to-point network that has many services converging into a single corridor may allow transit priority measures to be deployed at key locations that benefit many routes. However, while *route design* practices can be a strategy for improving transit speed and reliability (Ryus et al. 2016, p. 56) and does have implications for transit priority implementation, it may not itself be a 'transit priority measure' under a strict definition of the term. Regardless, there is a need to better understand how to undertake transit network redesign processes in the context of the political, institutional, cultural, historical and other non-technical factors that influence decision-making in the real world (Currie & Tivendale 2010).

The final measure listed above in Table 2.7 relates to <u>private vehicle design</u>, in particular <u>*automated vehicle control systems*</u>. This hints at a possible future when rules coded into automated vehicles' control systems might make private cars seamlessly give way to transit (Currie 2016a, pp. 494-5). Alternatively, such ideas may be just more of the much-hyped future utopia of automated transport (Currie 2018). A system that takes full control over private cars to benefit a bus appears unlikely to be politically acceptable in many cities, regardless of its feasibility or technical merit[19].

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explored the non-technical and policy-making aspects of implementing *AVL* systems (on transit vehicles) into traffic signal systems (controlled by road authorities).

[18] For example Multisystems Inc. et al. (2002); Levinson, Zimmerman, Clinger, Gast, et al. (2003); Levinson, Zimmerman, et al. (2003a); Hidalgo and Carrigan (2010); Lindau et al. (2010b, 2010a); Vincent (2010); Larwin and Koprowski (2012); Ryus et al. (2016); Ingvardson and Nielsen (2018).

[19] Although I, for one, would welcome our new autonomous bus overlords. With apologies to Kent Brockman of Springfield (see Kim (2012)).

2.2.4 Summary of transit priority measures

The traffic system involves interaction of *technology*, vehicles, road users, and infrastructure, which is influenced by the community, elected representatives, institutions and the "skills and attitudes of traffic engineers" (Wall 2017d). These components, together with the categories discussed above, provide a structure through which to summarise and interpret the many transit priority measures identified in the research literature that have been discussed above. As shown in Figure 2.3, many priority measures appear to be generally reliant on one or more components of the traffic system.

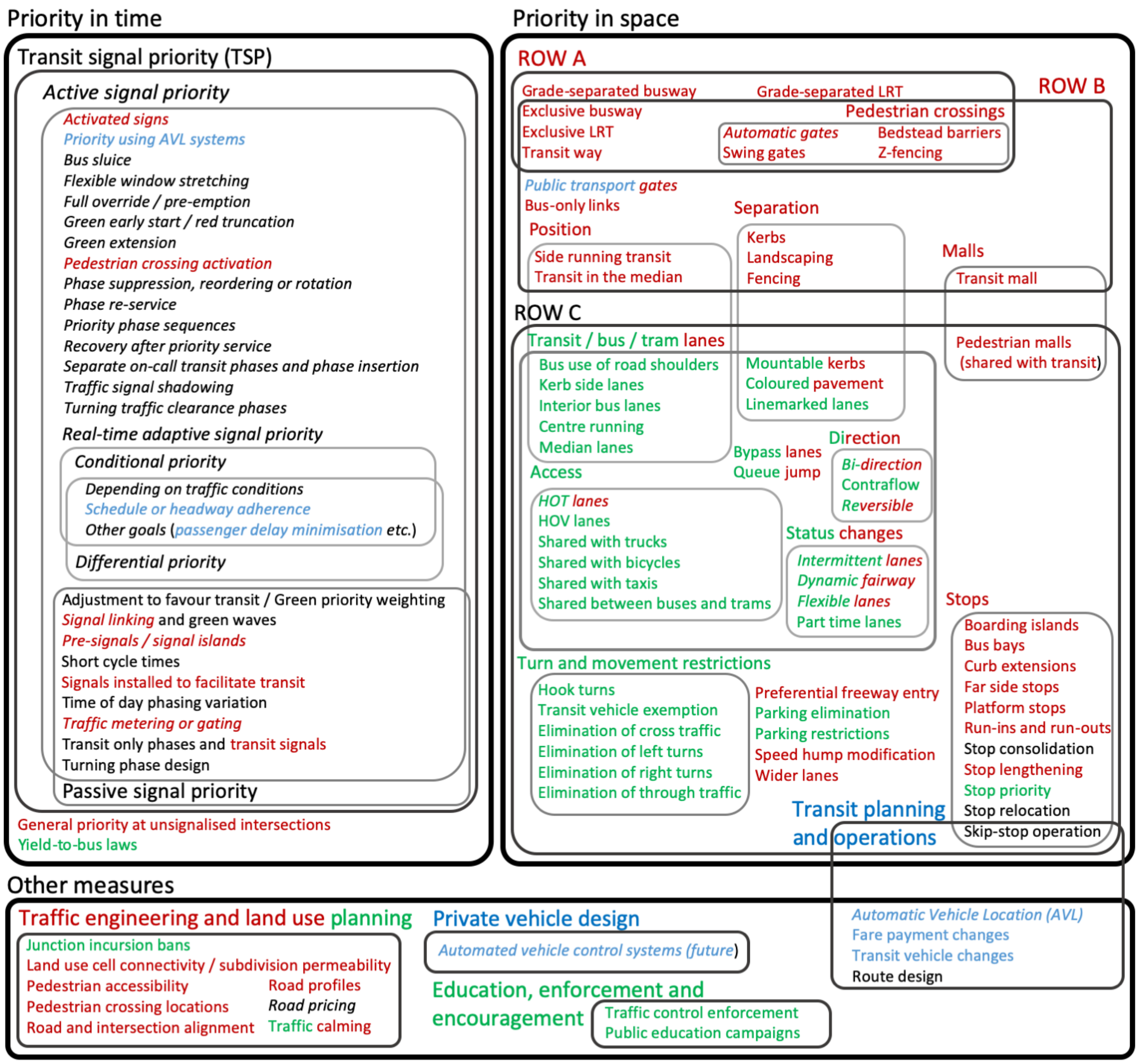

Figure 2.3 Summary of transit priority measures

Notes: Source: Author's synthesis and assessment

1. Red denotes measures generally reliant on infrastructure changes.
2. Blue denotes measures generally reliant on changes to or addition of equipment carried on transit vehicles.
3. Green denotes measures generally reliant on road user behaviour, especially compliance with restrictions.
4. Where more than one of the above is applicable to a measure it is shown in multiple colours.
5. *Italics* denotes measures generally requiring more complex technologies.
6. As an example of the above notes: *HOT lanes* are shown in green, red and italics as they appear to be generally reliant on compliance by road users with an occupancy requirement for free entry into the lane, and tolling infrastructure and *technology* to provide paid access to vehicles that do not. *HOT lanes* are sometime reliant on vehicles carrying toll transponders, but this is not always the case due to license plate recognition systems (and so there is no use of blue text for *HOT lanes* in the above figure).

Figure 2.3 also shows how there is some overlap between the different categories transit priority measures[20]. However, most of this overlap occurs within, rather than across, each of the three top-level categories (*time*, *space* and *other*). *Transit planning and operations* is the only group spanning across top-level category boundaries because *skip-stop operation* is typically considered in the research literature along with priority related to transit stops.

Only a small number of priority measures, such as *AVL* and fare payment systems, appear generally reliant on transit vehicles. In contrast, road user behaviour and compliance appear to be an issue relevant to many measures, particularly *turn and movement restrictions* and many of the types of *transit lanes*. This perhaps suggests that the traffic system influences of communities, elected representatives and institutions (Wall 2017d) are important in transit prioritisation, such as for gaining support across multiple institutions, setting policies and with respect to other non-technical factors. However, most measures appear to be generally reliant on *technology* or infrastructure. Hence, it is perhaps not surprising that techno-rational and infrastructure-centric viewpoints appear to be common in the evaluation and implementation of transit priority, both in the research literature and in practice, as will be discussed in detail in the following section.

[20] For example, *transit-only phases* and *transit signals* might be part of either an *active signal priority* or a *passive signal priority* system, while *malls* might encompass both ROW B *transit malls* and *shared pedestrian malls* in ROW C.

2.3 Transit priority evaluation

The objectives of transit priority implementation are typically to improve the speed and/or reliability of services. However, the implementation of priority measures can have many other impacts or be aimed at other objective, as shown in Table 2.8.

Table 2.8 Impacts and objectives of transit priority measures.

Category	Impact and objectives	Waterson et al. (2003)	Currie (2016a)	Litman (2016)
Transit operations impacts	Easier for transit to pass intersections (e.g. *queue jump lane*)		✓	
	Easier access to stops, terminals and depots		✓	
	Easier access into traffic streams at unsignalised turns		✓	
	More direct routes for transit (*traffic gating*, *turn bans* etc.)		✓	
	Reduced fleet requirements and operation costs		✓	
	Improved efficiency		✓	✓
	Improved transit speed	✓	✓	✓
	Improved transit reliability		✓	✓
	Opportunities for late vehicles to catch up to timetable		✓	
Transit passenger impacts	Reduced travel time for transit passengers	✓	✓	✓
	Reduced delays / improved reliability for transit passengers	✓	✓	✓
	Direct benefits to new riders			✓
Traffic operations impacts	Removal of parking		✓	✓
	Reduced traffic capacity	✓	✓	✓
	Less direct travel routes (in the case of *turn bans*)		✓	
	Improved traffic flow (*traffic gating*)		✓	
	Increased traffic congestion in adjacent lanes			✓
	Increased travel time / delay for other vehicles	✓	✓	
General traffic impacts and behaviour changes	Do nothing	✓		
	Rerouting	✓		
	Retiming	✓		
	Modal change	✓		
	Trip suppression	✓		
Impacts related to mode shift to transit	Reduce car use (transit as a “complete” replacement)	✓	✓	✓
	Reduced peak levels of traffic congestion		✓	✓
	Reduced parking congestion			✓
	Increased / decreased walking, cycling			✓
	Increased transit ridership and fare revenue			✓
	Value provided by having additional options			✓
	Reduced chauffeuring burdens			✓
	Reduced energy use			✓
	Reduced air pollution			
	Reduced noise pollution			
	Reduced automobile business activity			✓
	More crowded transit			✓
Road use efficiency	More efficient use of available road space		✓	✓
	Better use of underused road space		✓	
Social equity	Horizontal equity (users bear the costs of their activities)			✓
	Vertical equity (policies benefit disadvantaged people)			✓
Cost impacts	Capital costs of new lanes construction / signal systems		✓	✓
	Operational costs of priority systems			✓
	Enforcement costs			✓
Safety impacts	Improved safety for transit users / operators		✓	
	Improved safety for other road users		✓	✓
	Increased merging conflicts (where *transit lanes* are short)		✓	
Land development and/or land use	Vehicle travel reductions due to compact land use patterns			✓
	Improved accessibility through increased TOD			✓
	Reduced infrastructure costs due to compact development			✓
	Farmland and habitat preservation			✓
	Problems associated with denser development			✓
Risks	Failure of scheme (i.e. later removed / switched off)		✓	
	Benefits accruing to operators through improved contract performance, rather than to wider system and users		✓	
Strategic objectives	Support for more compact communities			✓
	Support for multimodal communities			✓

Source: Author’s synthesis

Table 2.8 shows twelve categories of transit priority impacts and objective. This long list indicates the wide range of impacts that might need to be addressed and managed during transit priority implementation. Some or all of these impacts might also influence decisions about whether to install or retain a specific priority treatment. However, the relative importance of each impact appears likely to depend on the perspective of each individual decision-maker.

Traffic systems are typically controlled by road authorities, who tend to focus on minimising vehicle delays and may not be interested in favouring transit over other vehicles (Vuchic 2007, p. 243). However, a range of other perspectives on transport evaluation relevant to transit priority implementation are described in the research literature, as shown in Table 2.9.

Table 2.9 Perspectives on transport system evaluation and justifications for transit priority.

Perspective	Transport system evaluated on:	Transit prioritisation is justified if:	Litman (2003)	Ryus et al. (2016)	Litman (2016)
Traffic	The movement of vehicles	Net vehicle delay decreases	✓	✓	✓
Mobility	The movement of people (and goods)	Net passenger travel time decreases	✓		✓
Accessibility	The ease of access to services and activities	It supports mobility or more compact cities	✓		✓
Transit Operator	Transit performance metrics (reliability, speed, operating cost, fleet size, ridership etc.)	Transit performance improves		✓	
Economic efficiency	The total economic performance	It provides net economic benefits considering all impacts			✓
Horizontal social equity	The extent to which users are treated equally	It more fairly allocates road space between users			✓
Vertical social equity	The extent to which the lot of the disadvantaged is improved	the socially disadvantaged, who tend to be transit riders, benefit			✓
Environmental	Performance with respect to environmental goals	Environmental impacts are reduced		✓	
Safety	Crash history	Crash rate is reduced		✓	
Strategic Planning	Performance with respect to longer term strategic goals	It is in accordance with an overall transport plan			✓

Source: Author's summary and synthesis of selected literature

Litman (2016, pp. 10-1) reviews the *bus lane warrants* used by practitioners in various jurisdictions. Many adopt a *traffic* or *mobility* perspective and fix the provision of *bus lanes* to bus frequency or passenger volume thresholds, often in relation to traffic volumes or the number of people travelling in other vehicles. An example of this type of warrant, described as "the most conservative warrant" (Vuchic 2007, p. 245), is that a *bus lane* is justified when the number of people carried in buses in the *bus lane* is greater than the number of people carried in private vehicles in each of the remaining lanes. However, there are problems with these warrant-based approaches, as they:

- assume that policy should react to road usage, rather than drive road usage towards mode share, environmental or other goals;
- are a "one-size-fits-all" approach that may not respond to different priorities or conditions across a network; and
- that rigidly applied minimum warrants based on traffic engineering perspectives can prevent transit improvements as they do not consider other factors such as wider strategic planning and the benefits of increasing transit use (Ryus et al. 2016, p. 40).

Some of the wider benefits of transit priority are, however, considered when evaluation is undertaken using the *transit operator* perspective. This emphasises transit reliability, fleet size and utilization, route productivity, operational cost and other factors that relate to running a transit system (Currie 2016a, p. 474; Ryus et al. 2016). Recent developments in *AVL* technology means that large amounts of data can now be collected, which can allow sophisticated technical analysis from the perspective of transit operators or passengers (Hounsell et al. 2012). However, a problem with evaluation from just the *transit operator* perspective is that it may miss the real challenges for transit priority implementation[21].

Economic efficiency perspectives similarly seek to take the transit operational benefits of priority measures into account, but also seek to understand broader economic impacts on society. Most use travel time impacts to assess priority measures, and analyse mode shifts and traffic flow changes (Currie et al. 2007). The UK Department for Transport, Local Government and the Regions (1997) model is particularly detailed and includes evaluation of: travel time impacts; fuel, capital, maintenance, transit operation, construction and crash costs; and environmental, ridership and reliability impacts. However, while these *economic efficiency* approaches attempt to include as many impacts as possible[22], they remain techno-rationally focussed on finding the 'best' solution from a technical point of view.

Social equity perspectives consider fairness, justice and equality. There are two approaches: 1) *horizontal social equity* is based on the idea that everyone should be treated equally, and so may tend to favour allocating road space to more efficient modes like transit; and 2) *vertical social equity* seeks to improve conditions for the disadvantaged, and so may favour transit priority as transit services are often used by the less well off in society. Pavkova et al. (2016) developed a *horizontal social equity* analysis approach that uses a Lorenz Curve to examine the distribution of speed amongst tram passengers in Melbourne. This technique could be used to target improvements to improve equity amongst transit riders, but appears yet to be used in practice to justify transit priority implementation. More recently, Guzman Jaramillo et al. (2019) apply a social impact assessment to BRT in Quito, Ecuador[23], while Creutzig et al. (2020) have developed a framework for street space allocation based on ten ethical principles. When applied to streets in Berlin this suggested reducing the amount of space allocated to parking and increasing that allocated to cycling, pedestrians and (to a lesser extent) transit (p.9). However, in general it appears that ethical and social equity

[21] For example, the research literature emphasises how *far side stops* mean that passenger boarding and alighting happens after a transit vehicle passes through signals. With less variability in when a bus is ready to pass through the intersection *TSP* is therefore simpler to implement and more reliable. Hence, *far side stops* have been reported in the research literature as "an effective, low-cost way" of reducing delays and reliability problems, and improving the effectiveness of *TSP* (Currie 2016a, p. 489; Ryus et al. 2016, pp. 43-51, 81-7). However, *far side stops* can impact on-street parking supply and so may be unpopular with local businesses and residents. While *far side stops* may be technically effective, the transit priority research literature tends to overlook the difficulties of implementing them in the real world, especially when parking is impacted. An example is the Clarendon Street tram priority pilot project in Melbourne, which ended in a compromise where *far side stops* were removed and on-street parking was restored (Currie & Shalaby 2007) as discussed in Chapter 5.

[22] But again, *economic efficiency* modelling often tends to be done from a *traffic* or *transit operator* perspective. For example, the research literature is yet to broadly consider the overall economic impacts of parking supply removal in the context of transit priority. The seminal work of Shoup (2005) in *The high cost of free parking* shows how parking policies typically distort demand for on-street parking, but there is as yet no research considering how the economic benefits of transit priority (e.g. increased efficiency of transit operations, more transit passengers travelling to/through an area) compare to the potential loss of revenue for local businesses if parking supplies are reduced to prioritise transit (i.e. from fewer car drivers/passengers travelling to/through an area).

[23] Refer to Guzman Jaramillo et al. (2019, p. 228) for further details of other research using this "disparity index approach", which was originally developed in Currie (2004, 2010a).

perspectives on transit priority or street allocation are yet to be widely researched or used in practice for evaluation.

The final evaluation perspective shown in Table 2.9 is that of how well a proposal will align with *strategic planning* objectives. This might involve evaluation against performance indictors or goals set in an official transportation policy, plan or framework. An example is the *SmartRoads* Network Fit Assessment process[24], which is based on the emerging area of Network Operations Planning (NOP)(Wall 2007; Meyrick and Associates 2009; VicRoads 2011; Wall 2017b; Delbosc et al. 2018, p. 4). Related to these *strategic planning* perspectives is the "conceptual model for the 'state of the art' in on-road public transport priority design" (Currie 2016a), shown in Figure 2.4. This is a normative model stating that the level of priority <u>should</u> depend on what the role of transit is according to a city's transportation policy. The model is highly conceptual as "in practice all cities probably exhibit aspects of policy of each of the types…in separate parts of the city" (Currie 2016a, p. 492).

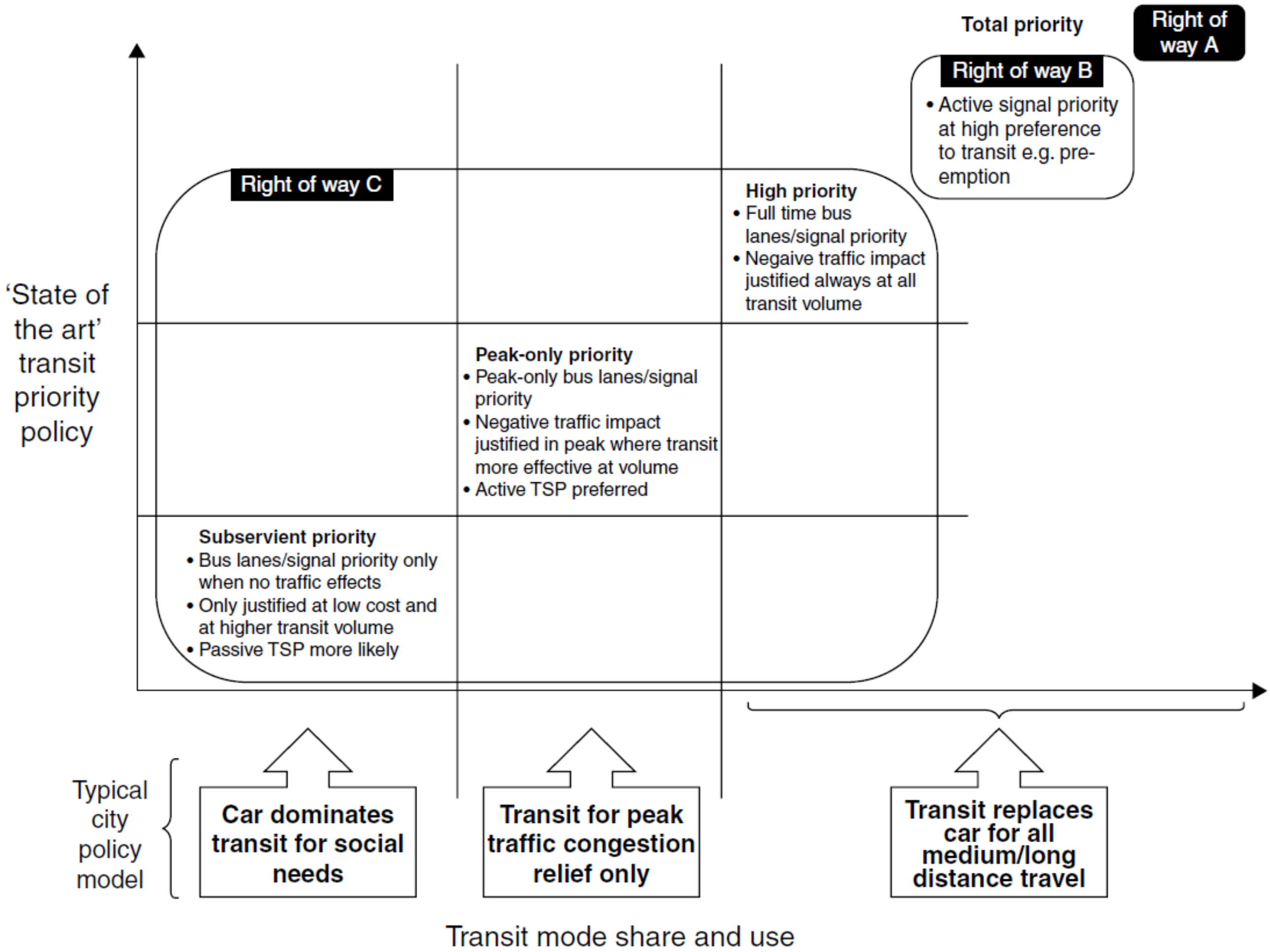

Figure 2.4 Conceptual model for the 'state of the art' in on-road public transport priority design

Source: Currie (2016a), reproduced with permission of the author.

[24] This involves firstly identifying ideal operating priorities across a road network by time of day and mode as a network operating plan; secondly, scoring network performance and identifying shortfalls to the ideal conditions of the network plan; and then proposing and scoring options to identify how best to improve performance given overall network effects and priority weightings.

The 'state of the art' model links transit priority level and policy types, and indicates that *total priority* is not always the appropriate choice. Rather, transit priority implementation needs to be pragmatic, recognising that where transit provides for only social mobility then transit priority measures that have significant impacts on other road uses are not appropriate. Likewise, priority measures that negatively impact other road uses should only be active during periods of peak traffic congestion if the purpose of transit is to provide primarily for commuters.

However, this conceptual model does not explain why some cities or parts of cities might tend to be car-centric and provide transit primarily for social equity reasons or for congestion relief, or be more transit-centric. A key question raised by this model is:

> *If a car-centric city changes its policies to try to become transit-centric does that mean it will implement more transit priority and that implementation will be successful?*

In answering this question, it is appropriate to recall the discussion above of the *strategic planning*, *traffic* and *transit operator* perspectives. If decisions in a city were always made according to the *strategic planning* perspective, then a change of the transport policy might be enough to support increased transit priority. However, regardless of a strategic plan, car drivers (or a motorist's association) and a road authority will likely view any individual proposal from a *traffic* perspective. Likewise, a transit authority and/or operator will bring a *transit operator* perspective to evaluating how a proposal may impact ridership, costs and other transit related factors. Strategic plans, governments and decision-makers come and go; institutions rise and fall; and the balance of political power supporting the *strategic planning*, *traffic*, *transit operator* or any other evaluation perspectives on transit priority implementation will be unique to every decision-making process. "It can…be said that politics is war without bloodshed" (Mao 1967, p. 58) and the reality of land use, transportation and transit policy-making is that it is set in the political, not technical, arena (Mees 2010, pp. 195-201). Consistency with an overall strategic plan may be just one factor in favour of a transit priority measure, and which may not be sufficient to overcome political opposition. On its own changing the policy or strategic plan may not be enough to guarantee successful implementation (Mees 2011).

A strategic transportation plan might direct decision-makers to implement transit priority measures. However, compliance with an official plan may be just one of many factors in the real world of elections, public relations and competing political interests. A politician in a *car-centric city* may find it difficult to be re-elected if transit priority implementation has had negative impacts on the car-using majority of voters. Public decision-making can be influenced by a wide range of political, institutional and other factors, and does not necessarily result in the optimal solution for society at large always being selected. However, with its focus on the technical modelling of traffic, economic and other impacts, the transit priority research literature appears to largely assume that decision-makers will rationally choose the 'best' overall option, as discussed in the following section.

2.4 Critique of transit priority research

The literature reviewed in the preceding sections predominately comes from engineering, planning and other technical research fields. Policies and governmental decision-making are touched on in this literature, notably in the conceptual model developed by Currie (2016a) and in the Litman (2016) review of *bus lane* warrant systems. However, much of the research literature focuses on techno-rational perspectives and modelling[25], which Marsden and Reardon (2017, p. 249) argue transportation research has “focused too much of its attention on…at the expense of understating how, when, if and to what end these tools are actually used”.

In the following, this issue is further explored through a critique of the transit priority literature. Section 2.4.1 assesses a selection of the literature to demonstrate its overall largely techno-rational focus, and discusses how this contrasts to the broader perspectives (and inclusion of consideration of politics, governance and related issues) in literature about planning and the implementation of major BRT infrastructure and systems. This is followed in Section 2.4.2 by a discussion of some of the transit priority literature that engages directly with policy matters. Section 2.4.3 discusses examples from the BRT literature where transit priority researchers appear to have applied the concept of incrementalism, but without making an explicit link to the wide body of research knowledge on that subject in *public policy analysis* and, in particular, the work of Lindblom (1959, 1979). Section 2.4.4 highlights how some research about priority implementation successes appears to focus on only technical and institutional factors, rather than issues of policy. Where it suggests that lessons from these successes can be applied directly elsewhere, this research may be overly hopeful and fail to fully consider the impact of political context and public support on priority implementation outcomes. Finally, Section 2.4.5 returns to the main thrust of this chapter: that there is a need to move beyond techno-rationalism in research and practice relating to the implementation of transit priority measures.

2.4.1 Limited consideration of public policy analysis perspectives

There have already been reviews of the transit priority research reported in the literature. For example, *TCRP Synthesis 83: Bus and Rail Transit Preferential Treatments in Mixed Traffic* (Danaher 2010, pp. 17-30) summarised the major findings from 20 reports, studies and research papers relating to transit priority. That summary is reproduced in Table 2.10, but with the addition of an assessment of the evaluation perspective(s) that are relevant to each[26].

[25] For example, the economic evaluation models reviewed by Currie et al. (2007), the various technical perspectives on transport evaluation (Table 2.9), and even the modelling of the social equity of tram speed distribution across passengers by Pavkova et al. (2016) are all focused on assisting decision-makers to make better and more rational choices. These appear to assume that public decision-making about transit priority implementation actually involves seeking and selecting the ‘best’ option in terms of economics, equity or other perspectives.

[26] This assessment is based on review of the Danaher (2010, pp. 17-30) description of the major findings of each report, study or research paper. For example, the major findings of the “NCHRP Report 143: Bus use of Highways State of the Art (1973)” are reported by Danaher (2010, pp. 17-30) as that “Minimum of 60 buses per peak hour (are required) to justify use of (an) exclusive bus lane, and (a) lane should carry at least 1.5 times the number of general traffic vehicle occupants”. Therefore, this record is classified as having both *traffic* and *mobility* perspectives, due to the description of a *traffic*-based evaluation method (buses per hour) and a *mobility*-based evaluation method (number of vehicle occupants).

Table 2.10 Transit priority literature and key findings reported by Danaher (2010), classified by evaluation perspective

		Evaluation perspective(s)									
Title	**Findings / Conclusions reported by Danaher (2010)**	**Traffic**	**Mobility**	**Accessibility**	**Transit operator**	**Economic**	**Social equity**	**Strategic plan**	**Environmental**	**Safety**	**Policy analysis**
NCHRP Report 143: Bus use of Highways State of the Art (1973)	Minimum of 60 buses per peak hour to justify use of exclusive bus lane, and lane should carry at least 1.5 times the number of general traffic vehicle occupants.	✓	✓								
NCHRP Report 155: Bus Use of Highways: Planning and Design Guidelines (1975)	Suggested values for one-way bus peak hour volumes for priority treatments	✓									
TCRP Report 100: Transit Capacity and Quality of Service Manual 2nd ed. (2003)	Presents bus capacity calculation procedures for mixed traffic and bus lane applications.	✓			✓						
TCRP Report 118: BRT Practitioner's Guide (2007)	Presents examples of calculations to identify the cost and impact of different BRT component					✓					
TCRP Report 90: Bus Rapid Transit Volume 1: Case Studies in Bus Rapid Transit (2003)	Identified travel time, on-time performance, and other benefits associated with bus priority treatments.				✓						
Bus Rapid Transit Options in Densely Developed Areas (1975)	Identified travel time savings ranging from 0.4 to 11.4 min per mile for 20 North American and European bus lane applications		✓								
Bus Semi-Rapid Transit Mode Development and Evaluation (2002)	Identification of three right-of-way categories (A, B, C) for BRT operation on urban streets.				✓						
Toward a Systems Level Approach to Sustainable Urban Arterial Revitalization: A Case Study of San Pablo Avenue (2006)	Identified effectiveness of bus priority treatments and signal timing optimization.	✓			✓						
Characteristics of Bus Rapid Transit Projects: An Overview (2002)	Trade-offs identified between investing in bus priority treatments vs. other BRT features.				✓						
TCRP Report 17: Integration of Light Rail Transit into City Streets (1996)	Set of solutions to address potential conflicts between LRT and general traffic and pedestrians. Location criteria identified for placement/design of LRT alignments along urban streets.									✓	
TCRP Report 26: Operational Analysis of Bus Lanes on Arterials (1997)	Look-up tables and adjustment factors to account for different bus and adjacent traffic volumes, stop frequency, and dwell times, for single and dual bus lanes.	✓			✓						
TCRP Research Results Digest 38: Operational Analysis of Bus Lanes on Arterials: Application and Refinement (2000)	Data collected on bus speeds, site conditions, and traffic signal timing. Adjustments in procedures from TCRP Report 26 to reflect bus platooned operations and incremental traffic delay.	✓			✓						
A New Methodology for Optimizing Transit Priority at the Network Level (2007)	Use of bi-level programming to minimize total travel time in assessment.		✓								
An Overview of Transit Signal Priority (2002)	Provided strategies for deployment of TSP including desired intergovernmental arrangements, and addressing TSP design and operations/maintenance issues. Case studies of TSP impact in eight North American cities.	✓	✓		✓						✓
Improving Transportation Mobility, Safety, and Efficiency: Guidelines for Planning and Deploying Traffic Signal Priority Strategies (2008)	A10-s green extension was evaluated for headways of 15- and 30-min. Bus travel times were found to be reduced by up to 5.8%, bus delays reduced by up to 16.5%, and on-time performance improved by up to 27.9%.	✓			✓						
Comprehensive Evaluation of Transit Signal Priority System Impacts Using Field Observed Traffic Data (2008)	TSP effectiveness measures applied included transit time match, transit travel time, traffic queue length, signal cycle failures, and frequency of TSP calls. Evaluation found improved on-time performance and less total person trip delay with TSP implementation.	✓	✓		✓						
Active Transit Signal Priority for Streetcars: Experience in Toronto and Melbourne (2007)	Toronto streetcar system has seen delay reduction of 12 to 16 s per intersection and travel time savings of 7 to 11 min per route.	✓			✓						
Evaluation of Transit Signal Priority Benefits along a Fixed-Time Signalized Arterial	Evaluation of green extensions and recalls on a 5-s-increment basis within a fixed time traffic control environment. Greatest benefit associated with TSP was found during mid-day period owing to lower traffic volumes and fewer TSP calls.	✓			✓						
Critical Factors Affecting Transit Signal Priority (2003)	A real-time control strategy has the most potential to reduce delays to non-transit traffic	✓									
TCRP Report 65: Evaluation of Bus Bulbs (2001)	Two before-and-after studies conducted in San Francisco involving curbside and roadway analysis. With bus bulbs, pedestrian flow adjacent to stops improved by 11%	✓									

Source: Titles and summary of findings and conclusions from Danaher (2010), perspective assessed by author

Table 2.10 shows that the majority of the reviewed literature emphasise the *traffic*, *mobility* and *transit operator* perspectives. This lends support to the view that transit priority research has tended to have a *techno-rational* focus.

The only research title shown in Table 2.10 as having a *public policy analysis* perspective is *An Overview of Transit Signal Priority* (Baker et al. 2004). This record also has *traffic*, *mobility* and *transit operator* perspectives, and closer examination of this report shows that much of it relates to explaining the technical details, benefits and costs of *TSP priority*. However, one chapter is devoted to “Planning for deployment of transit signal priority” (Baker et al. 2004, pp. 9-13), which broadly covers institutional and governance issues related to *TSP* implementation, operation and maintenance. It recommends that agencies implementing *TSP* should “identify a champion”, “identify the stakeholders internal and external to your organization”, and “establish a regional team to guide the project from a regional perspective” (Baker et al. 2004, p. 10). While these recommendations may provide some guidance to practitioners, they appear to espouse a normative model of implementation with limited connection to *public policy analysis* theory, and without supporting evidence provided by analysis of transit priority implementation in practice[27].

Of course, <u>connections between transit priority implementation and *public policy analysis*-related topics have been made in other literature</u>, beyond just what is included in the Danaher (2010) review[28]. For example, Pulichino (2003); Pulichino and Coughlin (2005) study 11 cases of transit priority implementation using three agenda setting models from Cobb et al. (1976). A key finding is that <u>transit priority policy making can be initiated **without** a policy entrepreneur</u> (Pulichino & Coughlin 2005, p. 85), which may <u>contradict</u> the normative recommendation of Baker et al. (2004, pp. 9-13) for a ‘champion’. This use of agenda setting models by Pulichino (2003); Pulichino and Coughlin (2005) perhaps show the benefits using theoretical knowledge from *public policy analysis* and related fields more widely in the study of transit priority implementation.

[27] For example, the recommendation of “identifying a champion” does not rely on any research into the benefits of having a champion, such as might be available if transit priority researchers had already undertaken research on the specific impacts of ‘champions’ on past projects. Neither is this recommendation connected to established implementation theory, such as the Advocacy Coalition Framework (ACF) (Sabatier 1987, 1988; Jenkins-Smith 1990; Sabatier & Jenkins-Smith 1993, 1999)(see Chapter 3), and it is unclear whether a champion’s role would be to lead a pro-*TSP* coalition, or to be a policy broker negotiating a compromise between competing stakeholders and/or *TSP* proponents. The independence and legitimacy of a policy broker might be damaged if they are also to ‘champion’ *TSP*, which suggests that there are limits to how much championing can be done by public employees of government bureaucracies. Instead the ‘champion’ might be outside the institutions in charge of the road network and, for example, leading a pro-*TSP* advocacy coalition of public transport rider associations, transit operators and environmentalists. However, from outside it appears unlikely a ‘champion’ would have much influence on, or detailed knowledge of, the operation of traffic signal control systems, or be able to effectively advocate for *TSP*. Unfortunately Baker et al. (2004) do not address these issues of where a ‘champion’ for *TSP* should be (i.e. inside or outside the bureaucracy) and what their role is (advocate or semi-neutral policy-broker). Rather, their normative recommendations instead appear to make an *a priori* assumption that a ‘champion’ is sufficient to negotiate impediments to *TSP* implementation.

[28] Further research might involve undertaking a broader systematic literature review of the transit priority, transport planning and transport policy literature. This might provide a better understanding of the extent to which public policy analysis has been considered in transport research more broadly. However, for the purposes of this critique, the focus in this section is generally on the literature included in the Danaher (2010) review as being reflective of the transit priority research at a tactical implementation level and in the engineering-related literature most relevant to this study.

It is also now 10 years on from the Danaher (2010) review, and topics related to policy-making in transit priority implementation are addressed in more recently published research literature. For example, Tanko and Burke (2013, 2015) studied how Brisbane's busways were implemented from the perspectives of four styles of planning: 1. Technical-rationalist, 2. Political influence, 3. Social movement, and 4. Collaborative. Along similar lines to the critique made here, they note:

> *a "key research gap… in terms of how new systems such as busways are first considered by planners and decision-makers, and secondly, how they progress from concept to plan to investment decision, to construction and the planning processes that occur along the way" (Tanko & Burke 2015, p. 231).*

After providing an extensive narrative of the many political and institutional influences[29], they state that "technical analysis does not contribute as significantly as it once did…" and that "planners must now learn to work in other ways within the political framework…" (ibid. p.239). This appears to be supportive of the need to consider broader *public policy analysis* perspectives, as well as looking at the role of planners, on transit prioritisation and the implementation of BRT.

In other recent research, Guzman Jaramillo et al. (2016); Guzman Jaramillo (2017) examine how power is used by planners and others during the implementation of BRT. In tracing the links between planners, decision-makers and other actors involved in the development of systems in Cambridge (UK) and Quito (Ecuador) this research suggests that it is not enough to just involve communities and groups in participatory planning processes. There also needs to be an understanding of how much power is available to different actors. Without this, and engagement from the beginning of planning processes, community involvement in decision-making may not be truly participatory due to some stakeholders having little opportunity to impact decision-making or meaningfully influence events.

These studies (Guzman Jaramillo et al. (2016); Guzman Jaramillo (2017), and Tanko and Burke (2013, 2015)) are examples of research looking at (larger-scale) BRT systems and the factors that can aid or hinder their implementation. This is an area that has had considerable attention from researchers, some of which is focused on comparing BRT to LRT or looking at the technical and non-technical reasons why one mode might be preferred or selected over the other[30]. Narratives of

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[29] They report that the idea of the busways came about after a city councillor who was Chair of Traffic and Transport was encouraged to visit the busway system in Ottawa, and then commissioned a consultant report into adopting the same technology in Brisbane. However, they discuss how the report itself has "negligible evaluation and very little technical analysis" (p.234). Further influences on the project reported in this case study that appear to be non-technical include: how it was a Brisbane City Council project yet "a South East Queensland Transit Authority (SEQTA) had been established, which forced some level of cooperation" between council and the state government; the influence of elections (and the new state government abolishing SEQTA), institutional-related issues that limited planning for railways instead; how there was "only cursory analysis of an LRT option for the corridor" because it was considered to be too disruptive and how in 1996 "planners involved in the state and local bureaucracies both took on an advocacy role… using limited empirical facts, and seeking to persuade the Minister and his office that the busway option was preferable" (Tanko & Burke 2015, pp. 234-7). Taken as a whole, this narrative perhaps highlights the need to engage with public policy analysis, given that the technical details, analysis and evaluation are **only an input** to the decision-making, not necessarily a determining factor.

[30] There has been ongoing debate about the comparative merits of each mode. Some of this surrounds the technical performance and costs of each, but biases about ride quality, the status of buses versus rail and many other issues appear to be influencing decision-making and perceptions

individual BRT implementations also appear in the research literature, with a lot of these providing details of non-technical factors that have influenced decision-making and outcomes[31]. In a high level review of the obstacles for further adoption of BRT Lindau et al. (2014) "conclude that most issues are related to institutional, financial, legal and political sectors". However, in general the BRT literature appears to often seek individual lessons from the experiences of implementing each BRT system, which might help to inform planning elsewhere. Some of this provides connections into planning theory, but connections to *public policy analysis* and related theory appear to be rare, and many of the lessons might be conditional on the local context, governance system, institutional structure etc. that is relevant to any particular BRT implementation effort.

This research also generally appears to look at BRT implementations at larger scales and involving the <u>planning of new lines and networks as major projects</u>. This includes busways and similar types of facilities proposed, planned and implemented at the same sort of scale as new LRT or heavy rail lines, and which operate with a high degrees of *longitudinal-separation* (ROW B) or even *full-separation* (ROW A). When implementing such major projects or considering transport at the system level, as is often considered in the BRT literature, it would seem difficult not to be considering the sort of larger-scale governance, political and institutional factors. This is perhaps typical of broader <u>planning perspectives</u>, which may tend to focus on larger scale transport planning <u>where city governance, institutional structures and politics are fairly central to decision-making</u>. However, as discussed in Section 1.3, the focus of this study is on transit priority for services operating in ROW C*, mixed traffic*, conditions, and this might tend to occur at a more tactical level, such as within an engineering department or more local levels of governance. The critique made here, therefore, focuses more on the <u>lack of *public policy analysis* or related perspectives</u> on institutional, political or other non-technical factors <u>in research focused towards the implementation of individual measures or prioritisation along a corridor to improve an existing service</u>, to which some of the research about larger-scale BRT implementation has less relevance.

Pettersson and Sørensen (2019) make this same distinction from research about large-scale BRT implementation in stating that "there is to the best of our knowledge not any studies on the implementation of priority measures in "conventional" bus services". Their study of the policies, institutional frameworks and politics surrounding the prioritisation of existing bus services in Stockholm and Copenhagen makes numerous comparisons to the issues raised in research about the implementation of larger-scale BRT lines and systems. The differences appear to relate to the

about these two modes (Hensher & Waters 1994; Fernandez 2000; Hensher 2007; Mulley et al. 2014; Hensher et al. 2015; Hensher 2016). The larger point appears to be that despite their similarities BRT and LRT each have roles to which they are better suited than the other, and characteristics (e.g. cost vs ride quality) for which one might be preferred, but "attempts to prove that one of these modes is always superior to the other…are based on distorted facts and biased conclusions…" (Vuchic 2007, pp. 538-44)

[31] For example, Muñoz and Gschwender (2008) provide a detailed narrative and perspectives on the implementation of the *Transantiago* integrated transit system in Santiago (Chile). Likewise, implementations in two Indian cities are reviewed by Rizvi and Sclar (2014), while Nikitas and Karlsson (2015) provide much broader review of BRT around the world. Poku-Boansi and Marsden (2018) provide a review literature on the governance of BRT implementation (p.194) before a case study of a BRT in Gahana and exploration of governance capacity and African BRT more generally. Of note for the critique in this section, is that they suggest that more research is needed into issues of institutional structures and governance, and that their paper might act "as a stimulus to broadening the understanding of the ways in which governance matters to BRT reform in different place" (p.202).

smaller-scale nature of such 'conventional' transit prioritisation, namely: the importance of issues of local amenity, pedestrians and cyclists; the absence of political champions; and different funding and economic imperatives when considering transit priority implementation rather than full-BRT lines and systems. However, Pettersson and Sørensen (2019) also note that more case studies are needed for greater confidence about the generalisability of their results. The critique made here (that there is only limited consideration of public policy analysis perspectives in the transit priority implementation literature) is largely similar as , in general, it appears that there is a need for further studies of how institutional, political and other non-technical factors are relevant to efforts to prioritise and improve on-road transit services.

2.4.2 A focus on institutions and 'buy in'

Where implementation is considered in transit priority literature there appears to be a focus on institutions and institutionalism-based thinking[32]. These examinations of institutional factors in the transit priority implementation literature sometimes appear to simply assume that opposition to transit priority implementation will diminish with time or can be overcome by obtaining 'buy in'[33]. Unfortunately, there have been "examples where the benefits of priority were squandered for the benefit of an improved time performance contract outcome by operators"(Currie 2016a), but this does not appear to have been widely reported. This might suggest that there can be unintended consequences. Institutional structures and systems might provide a disincentive to using transit priority implementation to increase the speed of services for passengers, but this is likely to be a sensitive topic and so challenging to research in depth.

Pulichino (2003, pp. 24-6) discusses how some relatively simple transit priority and facilitation measures, such as changes to *fare collection* or *bus vehicle design*, would only require the input of one institution (the transit operator). Other more complex measures might need to involve the transit operator, traffic departments, public works department, planning authorities, and perhaps even regional or national governments. Hence, the "real challenges for preferential treatment are the management of all the stakeholders…as conflicting interests are likely to (result in) opposition to the implementation" (Pulichino 2003, p. 26). This comes to the same general conclusion as much of the rest of the literature; that stakeholder management is important in priority implementation. However, Pulichino (2003) perhaps, like Currie (2016a), hints that conflict, opposition and mismatched incentives might be encountered more frequently than is hoped for when prioritising transit.

[32] For example, Levinson, Zimmerman, Clinger, Gast, et al. (2003, pp. 188-91) devote four pages to discussing institutions and BRT supportive policies. Likewise, approximately 11% (based on a coding analysis at the section level by author using NVIVO) of the Baker et al. (2004) overview of *TSP* discusses institutional factors in some way.

[33] For example, King (2003, p. 47) suggest that "dialogue and consensus building are effective processes to resolve various concerns, to lead to "buy in" by stakeholders…and to build partnerships for sharing some of the costs of implementing a (*yield-to-bus*) program". This suggests a, perhaps relatively naïve, view of politics and policy development as a process of consensus building, rather than competition for support, power and legitimacy. There may be some jurisdictions in which institutions share the implementation costs of *yield-to-bus laws* or other transit priority implementation, but it appears unlikely that many stakeholders (e.g. an automobile association or road authority) would have much interest in financially supporting the implementation of measures that primarily benefit transit riders and operators.

More recently, Forinash (2020) has used a case study research methodology to investigate successful communications strategies in transit priority projects. This study is based on six interviews and a survey of thirteen North American transit agencies (p. 4-5, 22, 36). It develops a strategic communications toolkit (p. 6-21) based on successful and effective communication processes used by these institutions during the implementation of transit priority measures. Like Pulichino (2003, p. 26), Forinash (2020) highlights the importance of public and stakeholder communication and that "public, political, or media opposition to a project can derail it, or substantially alter desired outcomes"(p.7). However, the focus is again on "stakeholder management…(to build) trust between transit agencies and stakeholders…"(p.7), in a similar manner to how Levinson, Zimmerman, Clinger, Gast, et al. (2003, pp. 188-91), Baker et al. (2004) and King (2003, p. 47) emphasise 'buy-in'[34]. A broader focus on conflict, institutional barriers, politics and other factors might provide further insights into how to avoid or respond to opposition, or limited the risk of derailment during priority implementation efforts.

Public participation in decision-making is discussed further in Chapter 3[39], but the general sense of the literature's focus on stakeholder buy-in appears to be to avoid opposition to transit priority implementations. The emphasis appears not to be on directly and intimately involving the public, politicians or other stakeholders in decision-making about what, how, or whether to implement transit priority. Rather, it appears to be to provide only enough, *token,* stakeholder involvement (c.f. Arnstein (1969)) and legitimacy for the acceptance of priority implementations that agencies have already "identified as (the) best solution" (Forinash 2020, p. 7).

[34] This attitude is evident in the top survey responses to a question about the primary goals of communications about transit priority implementation. "Educate the public" and "disseminate relevant information at appropriate times…" were each responses made by 12 of the 13 surveyed agencies, and 10 agencies responded "create consistent branding/messaging" (Forinash 2020, p. 41).
The full list of survey responses in Forinash (2020, p. 41) to the "primary goals of strategic communications efforts (n=13)" questions are to:

- "educate the public" (12 agencies);
- "disseminate relevant information at appropriate times…" (12);
- "create consistent branding/messaging" (10)
- "gather community feedback on design" (7);
- "develop a planned communication approach" (7);
- "garner political support for changes" (6);
- "garner public support for changes" (6);
- "ensure that the public is meaningfully involved" (6);
- "ensure representation from all communities served" (6);
- "solicit community input to design of project" (4);
- "notify riders of service changes during and after project (4)"; and
- "comply with local, state, and/or federal guidelines for public involvement" (4 agencies).

In general, these reported responses appear to give a top-down and institutionally focused theme for communication and public participation. This is perhaps not surprising, given that they come from a survey of public transit agencies (i.e. institutions focused on **delivering** transit priority implementations and service improvements). However, these reported goals of communications may tend towards *non-participation*[35] or *token*[36] involvement of the public in decision-making[37].

[35] In that: "create consistent branding/messaging" may be analogous to *therapy*; and "garner public support…" may be analogous to *manipulation*[38].

[36] In that: "comply with local, state, and/or federal guidelines for public involvement" may be analogous to *placation*; "solicit community input to design of project" may be analogous to *consultation*; and "educate the public", "disseminate relevant information…", and "notify riders…" is analogous to *informing*[38].

[37] Although the meanings of "ensure that the public is meaningfully involved" and "ensure representation from all communities served" are not entirely clear and might range from as high as direct *citizen control* or *partnership*, to as low as *consultation* or (even) *therapy* or *manipulation*[38].

[38] Direct quotes are from Forinash (2020, p. 41). Remainder is author's assessment of how these might fit into the Arnstein (1969) ladder.

[39] See discussion of the Arnstein (1969) ladder in Section 3.4 and subsequent sections.

2.4.3 Incrementalism by another name

Where there is consideration in transit priority literature of *public policy analysis* concepts there is typically no explicit link made to the corresponding theories and research literature. Section 2.4.1 briefly discussed the lack of linking of "identifying a champion" (Baker et al. 2004, p. 10) to implementation theory. There is a similar example of a missing link in *BRT* research, namely to i*ncrementalism* and research in *public policy analysis*.

BRT perhaps lends itself to incremental approaches to implementation, given the vast range of possibilities between a 'regular' bus and a fully grade -separated *BRT* system. Pettersson and Sørensen (2019) highlight that the "incremental, day-to-day character" of bus priority implementation as perhaps being part of the research that it has not received much attention from transport researchers, who may be more interested in larger-scale (full-BRT or rail based) infrastructure. There is an extended section on incremental *BRT* implementation in Levinson, Zimmerman, Clinger, Gast, et al. (2003, pp. 185-90), but this does not reference the work of Lindblom (1959, 1979) or other public policy analysis research related to incrementalism.

Incrementalism is discussed further in Chapter 3, but in brief Lindblom (1959) introduced the concept that policy typically moves through only small changes from the status quo. This was later refined into four types: *simple incrementalism* (no guiding principal for policy change); *disjointed incrementalism* (small steps in one direction); *strategic analysis* (small steps to an objective); or '*no longer fiddling'* (non-incremental policy change)(Lindblom 1979). The lack of direct connections made this body of public policy analysis research appears to be an opportunity that has been missed in the BRT literature. The types of incrementalism identified by Lindblom (1979) might provide an excellent framework for the discussion of different approaches to *BRT* development, as shown conceptually in Table 2.11.

Table 2.11 Contrasting the approaches to BRT development of Levinson, Zimmerman, Clinger, Gast, et al. (2003, pp. 185-90) with the types of incrementalism described by Lindblom (1979)

Levinson, Zimmerman, Clinger, Gast, et al. (2003, pp. 185-90)		Lindblom (1979)	
Approach	Description	Approach	Description
Packaging BRT elements	Selecting BRT elements (stop types, vehicle types, ROW characteristics etc.) based on demand and available budget	**Disjointed incrementalism**	Incremental policy development towards a long-term goal
Staged Development	Development of an ultimate BRT system as a series of incremental improvements along a corridor, or the progressive development of additional corridors	**Strategic analysis**	Incremental policy development as a series of steps towards a specific objective
Later conversion of BRT to LRT	Potential for an upgrade of a BRT to LRT to increase capacity	**Simple incrementalism**	Incremental policy development as a series of unconnected steps

Source: Author's summary and concept

Packaging BRT elements has similarities to *disjointed incrementalism* as there is a general goal of increasing transit priority, but additional BRT packages are only implemented as demand increases. *Staged development* is similar to *strategic analysis,* where policy develops as a series of stages towards a long-term objective of Full BRT. *Later conversion of BRT to LRT* might likewise have a parallel to *simple incrementalism,* where policy is changed based on current conditions, independent of any long-term plan[40].

2.4.4 Focusing on technical success, rather than political context

Much of the research literature on successful transit prioritisation appears to have focused on the technical aspects of transit priority and encouraged practitioners to attempt direct replication of priority technology[41]. This focus on successful projects means that there appears to be a gap in the current transit priority implementation literature[43]. Transit priority implementation research may have much to learn about communication from implementation failures, particularly given the

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[40] For example, if an LRT conversion is undertaken due to unplanned for increases in demand on a *Full BRT* system, this would be a *simple incremental* policy change unconnected to other steps. Similarly, Ryus et al. (2003, pp. 27-8) note that small-scale incremental implementation of transit priority can be successful and "open the door to…more-challenging projects". This suggests a *disjointed incrementalism* approach. However, again no connection is made to Lindblom (1959, 1979), which appears to be a missed opportunity to leverage existing *public policy analysis* theory.

[41] Even within this, there appears to have been limited consideration of the non-technical factors such as politics and policy-making that supported such successes. For example:

- the development of BRT in Curitiba spurred attempts to directly transfer the technology to New York with buses and tubular bus stops shipped from Curitiba for a trial in 1992, which was successful but not made permanent (Worcam 1993; Pulichino 2003; Pulichino & Coughlin 2005);
- little of the research on Curitiba's BRT system mentions that during the early stages of its development Brazil was ruled by a military dictatorship, allowing "Curitiba's mayor to push for an aggressive implementation, which eventually convinced the citizen(s)" (Pulichino 2003, p. 12);
- in Zürich the 1977 Citizens' Transit Priority Initiative "was the single most important factor…that forced the government to act more boldly that it otherwise would have done" (Nash 2001, p. 65), but only two of Nash's eight "implementation lessons from Zürich" (pp.125-136) directly relate to obtaining and maintaining the support of the public and elected officials, while the others relate predominately to more technical matters such as institutional implementation structures, traffic engineering and technology, capital investments and system level planning;
- Ernst Joos, who was the Deputy Director at the Zürich Transport Authority, suggested that "if you ask the inhabitants of a town which transport policy should be followed, the citizens will not choose the car…" (Joos 1994), but this message for other cites appears overly optimistic given that the Initiative in Zürich passed only narrowly with just 51% of voters in favour, despite 49% of city residents working in the city already riding transit for the journey-to-work (Nash 2001, p. 44);
- More critically, without a political system that allows direct citizen power of decision-making through ballot initiatives even if "citizens will not choose the car" (Joos 1994) there may be no way for citizen's to directly change policy to be pro-transit priority in manner that is legally binding and forces political representatives and institutions to take action, as was the case in Zürich; and
- In the recent development of a communications toolkit for transit prioritisation Forinash (2020, pp. 22-35) appears to focus overwhelming on successful projects and, while there is some discussion of challenges and projects that "…encountered public opposition…"(p.28), "…lacked a strong rapport with the local community" (p.34) or were "delayed, leading to significant dissatisfaction with project among many local stakeholders" (p.34). In one of the case studies reports there was "…a broad desire to limit public disclosures that are perceived as unnecessary to a project's success…"(p.30), while another states that the transit agency focuses on outreach only to "…audience and issues that are adversely impacted rather than seeking feedback on whether projects should be implemented"(p.32). Overall the research focuses on communication:
    - about successful projects;
    - that is focused on managing community expectations during construction; or
    - for the purposes of public information; and
    - there appears to be little exploration of communication during less successful transit priority implementation efforts or implementations that have failed[42], or about communication approaches that help to legitimise transit priority implementation or engage with the public and/or political decision-makers beyond just manipulation or tokenism (c.f. Arnstein (1969)).

Tanko and Burke (2013, 2015), however, provide one example of an exception, having considered non-technical factors extensively in their case study of how Brisbane's busways were implemented.

[42] Notably, one of the communication methods included "A coffee-table book to build a sense of pride in the project among individual key stakeholders" (Forinash 2020, p. 24). Such a book might be a worthy addition to the waiting area, foyer or reception of a consulting engineering firm, government department or other organisation that was involved in a highly successful, visible and popular improvement to transit priority in a city. However, it would seem highly unlikely that a coffee-table book would be produced or displayed prominently and proudly by individual stakeholders or participants if a project was less-than-fully-successful, politically controversial, failed to be implemented, or was later removed.

[43] This is evident when examining the extensive efforts at public communication that were undertaken in the lead-up to the ultimately-only-partially-successful *Clarendon Street Tram Priority Pilot*, which is discussed more generally in Chapter 5. Public communication for this project included a communication kit (VicRoads Media and Events Unit 2004), project announcement by the State Government Minister (Yarra Trams et al. 2004), and information brochures and other public communication and stakeholder engagement efforts, such as VicRoads et al. (2004); Coyle (2005); Kulesza (2005); Smith (2005); Sweeney Research (2005); VicRoads (2005); Victoria State Government (2005). All of these efforts appear to be largely along the same lines as what is recommended in the Forinash (2020) toolkit (although the events of Clarendon Street do not appear to have informed the Forinash (2020) toolkit) but why these did not "stop potential opposition" (p.7) in the case of Clarendon Street is not explored by the research literature.

difficulties often encountered implementing transit priority in practice. However, the literature appears to be mostly focused on learning from implementations that have succeeded, perhaps in part due to relatively favourable starting conditions or political contexts, rather than reviewing less successful efforts or where priority implementation has been politically challenging.

Examples from Zürich, Curitiba and other successful projects that are reported in the research literature may not provide much in the way of practical assistance to practitioners in the context of cities, like Melbourne, where conditions may be less favourable. In a city where transit ridership is low, governmental power is limited, and the transport system is car-centric then success in transit priority implementation is likely to be more difficult to achieve. What is needed is a broader understanding from a *public policy analysis* perspective of how transit priority might be delivered and adapted to cities that do not have a mayor backed by the military or a direct citizen voting system for setting policy together with pre-existing high transit ridership, or where implementation has been challenged or failed entirely.

2.4.5 The need to move beyond techno-rationalism

There has recently been a call for transport policy research to move beyond techno-rationalism:

> *"If we are to understand and advance the state of the art of transportation policy study then there is a need to engage with substantive questions of governance which pay greater attention to context, politics, power, resources and legitimacy" (Marsden & Reardon 2017, p. 249),*

This echoes previous calls in the research literature for a greater engagement with real-world politics, rather than further technical refinement of rational evaluation methods.

> *"The critical ingredients of first-class, 'European-style' public transport are planning and politics, the same factors behind public transport failures across much of the English-speaking world" (Mees 2010, p. xi).*
>
> *"Transport academics have largely ignored the real-world success stories; prestigious journals are instead filled with endless reports on new technologies and the intricacies of mathematical modelling" (Mees 2010, p. 101).*

Mees' research needs to be viewed in context given his overlapping roles in Melbourne as a planning academic, former president of the Public Transport Users Association and "frequent media commentator on public transport issues" (Mees 2000, p. back cover author biography)[44]. Difficulties

[44] Various perspectives on Paul Mees' contributions to academia and advocacy on transport and planning matters are provided by Burke (2013); Dodson (2013); Burke and Dodson (2014); Gleeson and Beza (2014) and (Gleeson 2013). This includes highlighting that "Paul's first entry to the scholarly record was as a public advocate…" (Dodson 2013, p. 394). In the acknowledgement section of *A Very Public Solution* Paul Mees makes note of having been "inspired…to become an 'activist-academic'" (Mees 2000), perhaps indicating that 'activist' and 'academic' were not two separate roles that occasionally overlapped, but two constituent parts of his work. The 'activist-academic' role has been discussed more widely amongst literature about positioning in research, teaching and academia. Detailed exploration of this role is beyond the scope of this study, but readers interested in the topic might start with Grey (2013); Baird (2020); Choudry (2020).

in maintaining independence and negotiating the political arena might well be encountered by academics where they, or their research, approaches transit advocacy. However, urban planners, such as Mees, may also be more at home in the world of policy and politics than engineers.

Planning is often engaged in issues of statutory compliance, objections to development applications, and how planning documents, frameworks and the law combine to guide political and legal decision-making. Local councils, planning authorities, quasi-judicial review boards and other institutions are charged with resolving disputes over how land is used, but planners themselves typically only get to provide advice, assessments and professional opinion as an input to decisions made by others. As such, planners may (like Jane Jacobs (Jacobs 1961; Laurence 2016)) be more likely to engaged with society through advocacy as well as more technical or academic efforts[45]. In contrast, civil engineers are trained in analysis methods and other deterministic modes of thought where what matters is that standards are met, calculations are correct, and structures are sound.

Researchers from a planning background have often brought their skills and the perspective of their profession to questions of transportation policy. Mees provides an obvious example, and the volume that was recently released in his memory (Gleeson & Beza 2014) contains chapters by many other Australian and international researchers with backgrounds in the field of urban planning who tackle issues related to transportation. Urban planning tends to operate at a broader, city-wide scale (rather than the corridor, intersection or site-level at which transit priority implementation is typically considered), although urban planners have also been active in transit priority research[46].

Despite this, there is a clear need for further engagement with politics and policy in transportation research, rather than a myopic focus on continuing techno-rational technology development and modelling. Transit priority implementation "**cannot be viewed from a purely technical perspective**" and "in order for other cities to benefit, it is essential to study policy-making processes" (Pulichino & Coughlin 2005, p. 80)(bold emphasis in original). Similarly, "transport planning depends heavily on political influence…(and) technical analysis does not contribute as significantly as it once did…" (Tanko & Burke 2015). Nash et al. (2020) are perhaps more direct, stating that there is a "battle for street space" and that "the important point is to recognize that implementing public transport priority is a political problem and treat it as such", while Ardila-Gomez (2004) concludes an exhaustive review Curitiba's BRT by stating that:

> *"power is what matters in order to get a plan adopted – certainly much more than "political will" on its own" (p.424).*

[45] Tanko and Burke (2013, 2015) describe four planning styles: "technical-rationalist", "political influence", "social movement", and "collaborative", based on a synthesis of Innes and Gruber (2005); Sager (2009). However, they note that "other styles certainly exist and the literature is replete with minor variations and additions to these themes" (Tanko & Burke 2015, pp. 230-1).

[46] For example, Irazábal (2005) and Ardila-Gomez (2004) consider the politics, policy and decision-making surrounding Curitiba's BRT network from an urban planning perspective and background. This also relates to the distinction made by Pettersson and Sørensen (2019) between research about larger-scale BRT planning research and the (comparative lack of) research about prioritising convention bus services at the smaller scale (see discussion in Section 2.4.1).

2.5 Conclusions

This chapter has reviewed the research literature on types of transit priority measures, their impacts and objectives, and the various perspectives used in their evaluation. It has critiqued current transit priority research and finds it to be dominated by techno-rational approaches, focused on technical evaluation and finding the 'best' option, which other researchers have previously identified as a problem with the field of transport policy more generally. Overall, the existing priority research literature appears to have only limited consideration of *public policy analysis* perspectives, a focus on institutions and 'buy in', a lack of engagement with incrementalism theory despite espousing incremental implementation, a focus on technical success instead of political context, and a need to explore the influence of politics, power and legitimacy on transit prioritisation in the real world.

In practice it is likely that politics, institutions and other (non-technical) influences on public decision-making, together with the actions of stakeholders, actors and the individual decision-makers will drive the allocation of limited road space and (intersection) time. Even if transit priority is actually implemented according to strategic plans or the conceptual framework developed by Currie (2016a) there may still be many different views on what the overall city transport policy actually is or should be. How and whether such policies or normative principles might apply to any individual site appears likely to be influenced more by the perspectives of those involved instead of what might be the 'best' option from a (perfectly objective) technical perspective.

Researchers have looked to Curitiba, Zürich and other successes as leading examples of what can be achieved with 'state-of-the-art' priority technologies. However, this has perhaps missed the great importance of the levels of community support, governance structures and other non-technical factors on transit priority implementation. *Public policy analysis* and related fields have long researched how decisions are made within organisations and by society at large, and these research areas are the subject of the next chapter.

Chapter 3: Literature review: public policy and legitimacy

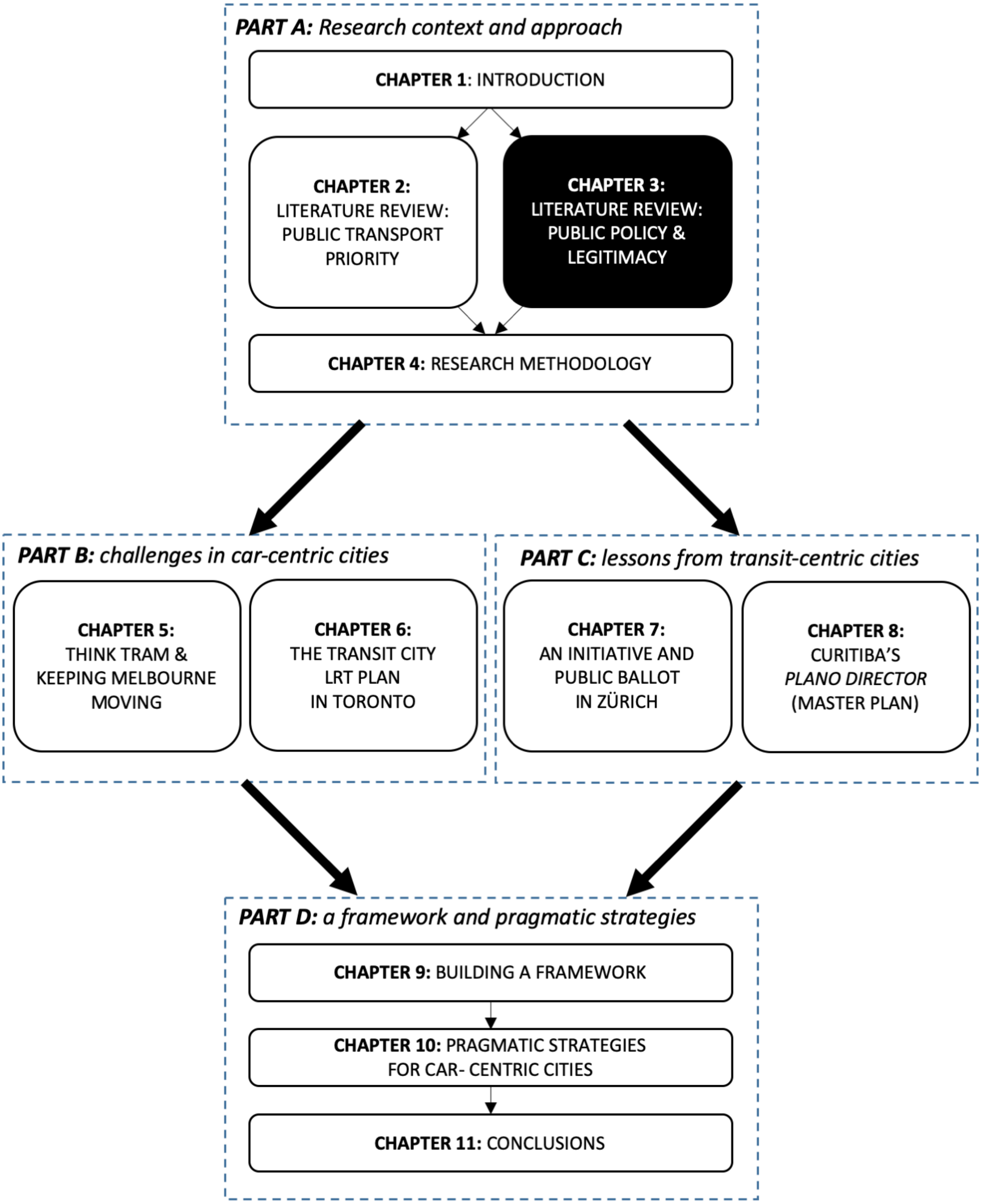

Figure 3.1 Position of Chapter 3 in thesis structure

3.1 Introduction

Chapter 2 discussed how transit priority research has tended to have an emphasis on searching for optimal solutions, technology advancement, and rational evaluation. In the real world, however, the implementation of transit priority measures involves public decision-making, not just the automatic selection of whatever option is 'best' from a technical perspective. Instead, the allocation of road space and intersection time is influenced by politics, institutional practices and procedures, and other non-rational factors.

The preceding chapter closed with a critique of the transit priority research literature. This identified that there has been a lack of engagement with *public policy analysis* and related fields of knowledge. Hence, there is a need to explore how politics, power and legitimacy influences transit priority implementation in real-world contexts. However, first it is important to understand *public policy analysis* and related fields.

While there is a large body of research literature and understanding about public decision-making, politics and similar topics, these areas are not typically considered in detail amongst the engineering disciplines. Transportation policy research does cross over into these topics, but there is a need to further explore public decision-making in transportation, *public policy analysis*, public involvement in decision-making, and *legitimacy theory* prior to applying knowledge from these areas to the study of transit priority implementation. Therefore, this chapter reviews existing research knowledge from transportation policy, *public policy analysis* and related fields that has relevance to transit priority implementation.

The chapter is structured as follows: Section 3.2 explores public decision-making about transport systems, covering topics from *strategic transportation planning* through to *tactical urbanism*, activism and protest. The broad research field of *public policy analysis* is then outlined in Section 3.3. Section 3.4 then briefly discusses research knowledge about public involvement in decision-making, much of which relates to the Arnstein (1969) ladder of citizen participation. Consultation, partnership or direct public involvement is one way in which institutions and governments might seek to increase the legitimacy of their decisions and policy-making, and hence research knowledge related to *legitimacy theory* is reviewed in Section 3.5. Finally, the research gaps that exist between *public policy analysis, legitimacy theory* and related fields **and** transit priority implementation are explored in Section 3.6.

3.2 Public decision-making about transport systems

Public decision-making about roads, transit and other transportation systems occurs at many different levels and in many different ways. There has been a long history of *strategic transportation planning*. This tended to involve large studies seeking to predict future travel demands at the city-level and assess what infrastructure may be necessary to meet or manage such demands, as well as smaller-scale impact assessments for individual sites or projects. At the other end of the scale are the decision of individual users or citizens, either to avoid complying with rules while using a system (e.g. speeding or fare evasion (Currie & Delbosc 2017)) or to protest or otherwise take direct action in an effort to generate change.

This section briefly discusses topics related to public decision-making about transport. It starts with the larger-scale formal *strategic transportation planning* approaches and then works gradually towards smaller and/or less formal methods of influencing transportation policy.

3.2.1 Strategic transportation planning and impact assessments

Rapid urbanisation and motorisation in the post-World War 2 period played a part in the development of frameworks for large-scale *strategic transportation planning*. Various examples include the *classic four-stage model* (sometimes called the four-step model), the *Chicago Area Transportation Study* (*CATS*) planning scheme, the *Urban Transportation Planning System*, and the *systems approach* (Thomas 1966; Dimitriou 1992, pp. 35-44; Mees 2003b, pp. 1-2; Garrison & Levinson 2006, pp. 283-95; Stopher & Stanley 2014, p. 19; McPherson 2017, pp. 796-7). More recently, greater appreciation of the environmental impacts of transportation has led to development of broader *Environmental Impact Assessment* (*EIA*) approaches, which may include triple bottom line assessment of environmental, social and economic impacts[47]. *Transportation/Traffic Impact Assessments* (*TIA*s) are also common, but may tend to be more narrowly focused towards determining whether the impacts associated a proposed site development or new facility can be reasonably accommodated by the road and/or, more rarely, transit systems (Mees 2003b, pp. 2-3; Stopher & Stanley 2014, pp. 132-6; De Gruyter & Wills 2017; Wall 2017a).

These *strategic transportation planning*, *EIA* and *TIA* approaches are now highly developed. However, these might be somewhat peripheral to (political) transport policy-making, such as if proposals or schemes are announced politically prior to technical planning or regardless of technical performance or evaluation results[48]. There also still remains a need to improve the integration of

[47] Examples include the VicDELWP (2018) Environmental Effects Statement (EES) process in Australia, and the Municipal Class Environmental Assessment (MCEA) process in Ontario, Canada (OntarioMECP 2012; Municipal Engineers Association (MEA) 2015).

[48] An example is provided by the Brisbane busways, where “there was a distinct lack of technical-rational analysis in the key busway mode-choice decision” (Tanko & Burke 2015). More broadly ‘announce then justify’ styles of transport policy-making appear to be a challenge in many contexts, such as in examples from NSW where “some Business Cases have not been completed and some not even started before Government has announced that the project is going to proceed”(Douglas & Brooker 2013).

land-use and transportation planning, increase public participation[49], develop implementation tools, and to understand how to resolve local community and political opposition to strategic-level planning outcomes (Colonna et al. 2012; Stopher & Stanley 2014, pp. 309-13; Legacy & Taylor 2018; Ruming 2018). Unfortunately, in general, public involvement in transport planning "has been lumpy and at times disappointing" (Khisty 2000), perhaps reflecting the larger problem of traffic/transport engineering focusing on techno-rational approaches that might be opaque to and exclude non-specialists.

3.2.2 LATM, Placemaking, SmartRoads and Complete Streets

Traffic engineering has historically had a focus on streets as being primarily for <u>movement</u> or <u>access</u> to adjacent land. However, streets are for more than just these two functions. They are also places where people live, walk, cycle, work and play, while at the same time providing for many other purposes. This can often lead to tension between the needs of the local area (access and place functions) and the desire to facilitate through movement (link functions), which might often become a political issue.

Local Area Traffic Management (LATM) emerged out of a need to address such tension, and provide for these sorts of non-traffic functions. In general, it involves the planning and implementation of schemes to reduce the impacts of traffic on the liveability of local neighbourhoods and streets. It is one of the most common processes used for traffic calming (Green et al. 2020, p. 153)[50]. Traffic calming measures include speed humps, road closures, narrowing, chicanes, or turning restrictions (see examples in Figure 3.2). These are typically implemented to reduce the speed or volume of traffic. A traffic calming or LATM scheme might also aim to discourage or exclude through traffic from a local precinct, and limit the use of local streets for 'rat-running' to avoid traffic congestion on arterial roads. However, LATM is about more than just the installation of isolated measures in individual streets. A full LATM scheme typically involves a number of measures across a network that complement each other, address problems of through traffic while maintaining vehicle access to local properties, improve safety, reduce traffic speeds, improve facilities for pedestrians and cyclists, or otherwise improve neighbourhood streets. The *LATM* approach developed out of the challenges of dealing with resident concerns and complaints about high speeds, low safety and poor liveability in local streets. As these residents are generally quite close to their elected local representatives, it is perhaps no surprise that *LATMs* tend to focus on public participation and consultation at all stages of the process (Damen & Millican 2017, pp. 688-95).

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[49] Strategic metropolitan and transport planning appear particularly lacking in this area. For example, Mees (2000, 2003a, 2003b, 2010, 2011) discusses failures in centrally developed, strategic-level transport and metropolitan plans, in part due to minimal public participation and *legitimacy*. Similarly, Bailey and Grossardt (2006) have identified a significant gap between the level of public involvement in decision-making in transportation planning that is <u>desired</u> by the community and the <u>actual level</u> of public involvement that is provided / permitted.

[50] There are many guides, resources and other literature discussing LATM in more depth, including (for example) Westerman (1985); Moses (1989); Brindle (1997); Damen and Millican (2017); Green et al. (2020, p. 153). Different jurisdictions have their own specific approaches, but the various Local Area Place Making (LAPM) schemes in Yarra City Council (2020) might provide an example for readers wanting to see current practices.

Figure 3.2 Common traffic calming and LATM measures: speed cushions and a kerb extension (top left); a chicane and one lane road (centre right) a diagonal road closure across an intersection (centre left); a 'wombat' crossing[51] and kerb extension (bottom right);

Sources: Drdul (2006)(reproduced under the CC BY-SA2.0 license), Pingstone (2003)(public domain image), Drdul (2008) (reproduced under the CC BY-SA2.0 license), and author.

[51] Wombat crossings consist of a zebra pedestrian crossing that incorporates a raised flat-top hump, although use of the term 'wombat' crossing appears to only be typical in Australia and these might be called 'raised zebra crossings' or similar elsewhere. Regardless of its name, this type of treatment combines a measure that slows traffic (the raised platform or hump) with one where vehicles must give way (the zebra crossing).

In part building on the concerns about liveability and environment that *LATM* seeks to address in local streets, more recently this has been expanding to also include more types of roads as **places**[52] for human activity. However, while many placemaking efforts are being implemented with an experimental 'try it and see' approach, traffic engineering generally tends to be conservative, which can limit experimentation and the pace of change (Levinson & Krizek 2017, p. 185), and it is as yet unclear how broadly these new frameworks will be adopted.

Other recently introduced road planning and management approaches, such as *Complete Streets* policies and the *SmartRoads* framework[53], have tended to emphasise stakeholder engagement and public involvement in decision-making (Wall 2007; Jones & Boujenko 2009; Wall 2017b; Delbosc et al. 2018; Smart Growth America 2019). This may be indicative of broader application of *LATM* principles to more than just local roads. However, these approaches are typically still led by traffic engineers, planners and other governmental officials, and so may still be firmly bedded in *techno-rational* evaluation, procedural based decision-making and other formal mechanisms[54].

Underlying much of this appears to be a continuing tension about what streets are 'supposed to be for', and who and what activities are permitted or prioritised. 'Jaywalking' is a relatively recent invention, at least in terms of the length of time that towns, cities and urban communities have existed through history (Norton 2007; Goodyear 2012). However, this and other established norms mean that it is often legal and socially acceptable to operate vehicles in close proximity to fragile human beings at speeds where the consequences of a collision might be death or serious injury(Transport Accident Commission (TAC) 2016; Schmitt 2020)[55].

Much has been written on the many roles of streets beyond facilitating the movement of people and goods (a notable example being "*the death and life of great American cities"* (Jacobs 1961)). However, the idea that streets are primarily to facilitate the movement of traffic appears to still be

[52] For discussion of Link & Place, Movement & Place and the importance of the amenity function in street planning, design and management see Bradbury et al. (2007, pp. 120-1); Jones et al. (2007); Jones et al. (2008); UKDFT (Department for Transport) (2010); Jones (2014); Davis (2017, p. 153); Delbosc et al. (2017); Delbosc et al. (2018) amongst many others. In general, placemaking approaches seek to move road management beyond (more traditional) two functions approach, in which roads are considered as being primarily for through movement and for providing access to adjacent properties, to a recognition that street environments might fulfil many different other roles as well, including being a place for activities within the road reserve itself (e.g. cafes providing for on-street dining activities; street benches providing a place to relax, people-watch or to just be part of society; street trees providing shade and habitat for animals, etc.)

[53] Delbosc et al. (2018) provide summaries and a direct comparison of the *Complete Streets* and *SmartRoads* approaches. *Complete Streets* policies been introduced in many cities across the USA since the mid-2000s. These policies focus on designing and managing streets so that they can be safely used by all users. *SmartRoads* is a framework developed by VicRoads in Melbourne, Australia, which has a similar multi-modal focus and is based around evaluating performance against a network operating plan. Chapter 2, Section 2.3.2 briefly discussed *SmartRoads* as an example of a *strategic planning* evaluation perspective. *SmartRoads* is an example of a *Network Operations Planning* approach. These seek to "monitor the performance of road networks, identify gaps in performance and service delivery, and determine which measures may best address those gaps most efficiently against the needs of a broad range of road users" (Meyrick and Associates 2009, p. i). *Networks Operations Planning* frameworks and approaches are discussed and compared by Wall (2007); Meyrick and Associates (2009); Weeratunga and Luk (2010); Wall (2017b) and various others.

[54] A case study of Melbourne's *SmartRoads* framework is reported by Jones (2018). VicRoads (road authority) staff interviewed in the study "noted that *SmartRoads* was designed to facilitate (the making of difficult decisions) as it was developed to remove politics, as much as possible, out of the consensus development process" (p.252). However, in the conclusion it is noted that "network operating planning reflects a pragmatic technique to engage what is ultimately a complex, contested and value-based answer" with respect to how roads are allocated (p.254). It is unclear, however, what happens if decision-making steps outside the framework and into more political arenas, or if such consensus development processes do not lead to an actual consensus.

[55] Contrast this to workplaces that involve the operation of heavy machinery in close proximity to people, such as (for example) warehouses where there can instead be an expectation that "forklifts and people don't mix" (WorkSafe Victoria 2010).

fairly firmly entrenched in many places. In *"Streetfight; handbook for an urban revolution"* Sadik-Khan and Solomonow (2017) describe the approaches used to move New York City towards broader and more balanced use of public road space. This may point towards the broader and emerging roles for transportation professionals, beyond just keeping the traffic moving. However, similar efforts to reclaim urban space from automobiles have often come from outside of transport-focused institutions, governance structures and engineering and planning professions, as discussed in the following.

3.2.3 Street reclaiming, tactical urbanism and street art

Beyond the 'official' ways of making streets less focused towards accommodating traffic that are discussed above, there are the more contentious approaches to making changes and public decisions about road environments. Through these stakeholders and members of the public may seek change using 'direct action'. Sometimes such efforts are encouraged by or led by government actors, but all of them have at least some grounding in challenging the status quo and stepping outside of formal, legal or typical processes.

Street reclaiming (Engwicht 1999) is a movement about citizen's recovering the streets on which they live and work from vehicle traffic, and so is closely related to the *LATM* approach[56] (Damen & Millican 2017). The emphasis in *street reclaiming*, however, is often on 'softer' approaches or interventions that are designed, built and maintained by residents themselves, with little involvement of local government or other officials. Even simple interventions, like leaning a child's bike against the kerb, chalking hop-scotch markings on the road surface or simply sitting on the nature strip might be a way that residents could seek to influence passing motorists to slow down, and psychologically or physically reclaim their street (Engwicht 1999, pp. 86-122). *Slow Your Street, a how-to guide for pop-up traffic calming* (Trailnet 2016) describes a similar approach led by a non-profit and local communities in partnership or actively seeking permits from city planners and engineers.

Street reclaiming, traffic calming and similar approaches are in part influenced by the concepts of shared space. Much of this is built on the work of Hans Monderman, a Dutch traffic engineer, who "has inspired or been echoed by a growing number of projects that, in essence, try to replace the traffic world with the social world" (Vanderbilt 2008). The European *'woonerf'* (Figure 3.3) provides

[56] A challenge in this area is that many of the terms used and concepts discussed overlap. In general, however, *street reclaiming*, the *Reclaim the Streets* movement (see Jordan (2009), and similar or related concepts appear to emphasis politics or equity issues, and taking public space back from automobiles so as to improve urban life. For further details see, for example, discussion of "street reclaiming strategies and the situated politics of children's mobilities" (Fotel 2009), the *Street Reclaiming* book by Engwicht (1999), and the Victoria Transport Policy Institute (2015) Transport Demand Management (TDM) Encyclopedia entry for *street reclaiming*.

an example, with this Dutch word translating to “living street” (Cambridge Dictionary 2020)and describing a street environment where traffic is restricted to walking pace and the space is shared[57].

Figure 3.3 An old Dutch street turned into a woonerf

*Woonerf*s, shared zones and similar types of streets are now often formally implemented with official signage, and detailed guidelines on how and when they are allowed (e.g. Vicroads (2015, pp. 7-9)). They have effectively been institutionalised into current traffic engineering practices in many places. However, the first *woonerf* was actually invented as a citizen initiative, but then “quietly ignored” by the local municipality as “advocates pursued its formal acceptance” (Lydon & Garcia 2015, p. 28)(emphasis added). Hence, as well as responding to the dominance of the car in many public environments, such initiatives appear to have their historical roots in members of the public challenging the status quo of street space allocation through direct action.

Tactical urbanism is a new term for activities that appear similar to *street reclaiming*, and which may be permitted or encouraged by governmental authorities, or done without any official involvement

[57] “As Grotenhuis put it ‘all traffic participants in a woonerf are considered equal, and... the pedestrian is a bit more equal than the others’” (Cambridge Dictionary 2020). These spaces are based around the idea that it is “people who live in cities and that cars were merely guests” (Vanderbilt 2009, p. 191), and there are various equivalents in other countries (e.g. ‘home zones’ in the UK, ‘shared zones’ in Australia and sometimes ‘play streets’ (Guttenberg 1982; Collarte 2014; Tandogan 2014; Play Australia 2020)).

or approval. Measures include *guerrilla gardening*[58], *pop-up parks*, *chair bombing*[59], *pop-up cafes* or *food trucks*, and *intersection repair* using do-it-yourself linemarking or non-traditional objects to calm traffic in ways that do not look ‘official’ (Alisdairi 2014; Lydon & Garcia 2015; Blumgart 2016). These types of projects are “one way to bring planning proposals and concepts to a wider audience”, but can also be a way for projects to be tested at the small scale or for citizens to bypass “municipal bureaucracy by protesting, proto-typing, or visually demonstrating the possibility of change” (Lydon & Garcia 2015, p. 12). A recently released guide for the implementation of “tactical transit lanes” (UCLA Institute of Transportation Studies 2019) provides a review of examples and best practices for applying this type of approach to *bus lanes*, but appears to be aimed primarily at implementers already within cities and transit agencies. Small *pop-up parks* appear to have likewise been adopted into formal and institutional planning activities through “innovation spotting” and simultaneous independent activities as part of the “creation of a “climate of change” in San Francisco” (Davidson 2013). The city’s Parklet Program followed on from earlier efforts to improve public space and built plazas, and was inspired in part by the first *PARKing Day*.

PARKing Day started in 2005 when a San Francisco design firm independently built a park (complete with roll-out grass) in a parking space, but then completely removed it when the parking meter expired (Morhayim 2012, pp. 52-71; Lydon & Garcia 2015, pp. 132-42).

> *“When a metermaid asked what they were doing, they pointed out that they had fed the meter and were simply occupying the rented space” (Lydon & Garcia 2015, p. 134).*

Similar temporary and more permanent conversions of small amounts of road space to public use are now widespread[60]. Sometimes these are legitimised by paying the parking fee, just as someone would pay to park their car. Other times it is facilitated through creative use, repurposing or finding loopholes in the systems that govern the use of road space[61].

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[58] *Guerrilla gardening* refers to the taking of over of otherwise unused public space, such as in a nature strip or an unused lot, to grow plants, flowers, produce or otherwise gardening. This is often done as a community activity and without formal permission from the governmental authority, landowner or agency that controls the space.

[59] *Chair bombing* refers to the sudden placement of new seating in public spaces, such as on the sidewalk, in car parking spaces or at bus stops, again often without formal permission and sometimes using found objects or reused chairs rather than the mass produced generic park benches or architecturally designed street furniture often used by local governments or as part of formal urban design projects.

[60] For example, there is a recurring open streets festival in Toronto (Open Streets TO); the City of Melbourne (2018) recently had a temporary pop-up park in the Central Business District (CBD), and San Francisco has a city-wide parklet programs (Davidson 2013).

[61] Parking spaces have also been used as temporary office space (Williams 2019), and the “Parkcycle Swarm” involves bicycle-powered mobile parklets that can be parked in car spaces or other public areas (Roke 2017, pp. 174-5). Another example is provided by parents in Bristol, UK, who similarly made use of existing legislation that allowed for temporary road closures for neighbourhood street parties. However, they closed roads to traffic to allow children to play in the street for a few hours each day. This unanticipated repurposing of existing legislation has since been adopted as a Department of Health funded tactic for improving street life and allowing children to play in over forty streets in Bristol and other cities (Lydon & Garcia 2015, pp. 40-1).

Similar repurposing of existing legislation might potentially be used to convert general road space to exclusive transit use. For example, a transit agency might simply pay parking meters to reserve road space for the exclusive use of a bus. This might pose some practical difficulties, but could turn a profit given the high costs of operating transit services and the often-low costs of on-street parking[62]. However, whether this would be a legal use of transit agency funds, politically acceptable, or a legitimate use of parking within the regulations is unclear.

[62] The sometimes counter-intuitive nature of financial cost-benefits in transit is demonstrated in Currie and Reynolds (2016). This study showed how converting trams to front-door only boarding to combat fare evasion in a proof of payment system would instead result in a large financial loss due to additional operational costs caused by longer dwell time and the need to buy additional vehicles to maintain service frequencies.

In *The Help-Yourself City; Legitimacy & Inequality in DIY Urbanism*, Douglas (2018) discusses the equity problems in tactical urbanism and street reclaiming approaches that skirt the fringes of the law. Those in a position of social privilege can create a *parklet*, build a street bench out of found materials, or otherwise be ignored or even actively assisted by local government to change public space. However, for some minorities even "hang(ing) out on an illegal bench…is not viable" due to fear of being arrested, sued or otherwise caught up in what might be perceived as an illegitimate activity (Douglas 2018, pp. 102-6).

As well as the potential consequences of being caught undertaking unsanctioned *tactical urbanism*, there is also the problem of official opposition and reaction. An example is provided by the local government response to a piece of pop-up street art in Strachan Lane in the Melbourne CBD in 2017. The City of Melbourne claims to be "a strong supporter of 'legitimate street art'", but quickly removed the unsanctioned work because it "may be slippery" or "create a visual distraction" (despite the artist using non-slip paint)(Florance & Anderson 2017). It is unclear why this piece was labelled as illegitimate by the City, other than its location was on the ground instead of a wall. The artist responsible has previously won the Archibald People's Choice Award and so would appear to have some artistic legitimacy, and Melbourne has a long and celebrated history of street art culture (Dovey et al. 2012; Freeman & Pukk 2018). However, the boundaries between street art, graffiti and vandalism are unclear:

> *"What differentiates a graffitist from a vandal is not well documented and can often come down to the opinion of the individual viewing the effects and under what conditions. Street art for example, although a form of vandalism, is considered more artistic and less destructive when compared to other acts of vandalism...Graffiti is, therefore, best understood as a complex interaction between society's infrastructures and human behaviour whilst considered within its environmental context." (Killen et al. 2017, pp. 2-3)*

What is art[63], what is legitimate expression and what is forbidden is not always clear cut. *Street reclaiming, tactical urbanism* and street art all push at the boundaries of what is allowed or accepted in the road reserve (both legally and practically). While *street reclaiming*, *tactical urbanism* and other similar approaches sometimes may involve cooperation with government, if that fails then it may be time to turn to activism, protest or even "direct action with hammers" (Dobson undated-c).

3.2.4 Activism, protest and direct action

Advocacy, protest and direct action about road use is particularly visible surrounding issues of cycling, cyclist safety and bicycle infrastructure[64]. The underlying issues often relate to whether

[63] Not something that will be answered here in an engineering thesis.

[64] For example, research about the politics of cycling and cycling infrastructure includes studies of: political successes and failures in bicycle infrastructure implementation (e.g. Hill (2010); Siemiatycki et al. (2016)); the legitimacy of the bicyclist as a road user (Delbosc et al. 2019), the

cyclists are *legitimate* road users and advocates pushing back against the status quo supremacy of the automobile[65]. However, political activism, direct action and protest about public transport does not appear to have the same intensity, perhaps due to the much lower risk of death for transit passengers compared to other road users (Litman 2014, 2019b). Transit advocates may also have a split focus. Unlike in bicycle advocacy where there is generally a clear and consistent enemy (the car), transit advocates are sometimes allied with, but at other times protesting against operators and their decisions[66]. This split is openly acknowledged in some research literature that "is written for activists as well as experts…(as) many of the best transport policies were adopted as a result of public protest" (Mees 2000, p. 7).

Anti-transit protests occassionally occur, particularly around opposition to transit priority implementation[67]. However, pro-transit protests of a similar scale to the Critical Mass, the World Naked Bike Ride and other pro-bike movements appears to be rare and unlikely[68]. That said, direct action in support transit priority is not entirely unknown. A recent 'viral' social media clip sparked some direct action and protest in support of *bus lane* regulations in Seattle. The original video showed a woman in Seattle apparently spotaniously deciding to stand in the roadway to force drivers out of an *exclusive bus lane*. This inspired others to later undertake similar actions as a protest, by then armed with red flags (KOMO News 2019). In response, the original social media post was "flooded with negative comments from motorists all across the U.S., some of them downright hateful and offensive", highlighting that drivers may have an "inflated sense of entitlement" (Gorgan 2019) over road space, regardless of the traffic laws. Whether transit practitioners can more broadly marshal activism, direct action and protest to support and legitimise transit priority implementation, and fight back against the supremacy of the car, however, remains unclear.

Critical Mass and World Naked Bike Ride movements, and slogans such as "We Are Not Blocking Traffic, We Are Traffic!" (Furness 2010; Lunceford 2012, pp. 74-89; Morhayim 2012; Henderson 2013); and how "Ghost Bikes" act as both memorials of cyclists killed in road crashes and as political statements on the inadequacy of governmental and road authority efforts towards cyclist safety (Ferguson 2008, pp. 169-87; Margry & Sánchez-Carretero 2011).

[65] Since the invention of jaywalking (Norton 2007; Goodyear 2012) the prevailing narrative has been that roads are for cars. When pedestrians, cyclists and other vulnerable road users are hit by these fast moving, one-to-two ton pieces of metal then it is they, not the vehicle drivers, whom are often blamed (see for example (Margolis 2012)). This narrative suggests crashes and road fatalities are unavoidable 'toll' of mobility, but is challenged by the Vision Zero initiative, which emerged from the Netherlands and Sweden in the 1990s. These new Safe Systems approaches (PIARC 2015) instead place "responsibility for safety on the transport system builder and managers, not the individual road users" (Lyndon & Turner 2017, pp. 563, 70). However, institutional boundaries may mean that research knowledge about how human factors impact the driving task is not fully informing road system management, particularly in enforcement where narratives of road user error and negligence may continue to prevail (Reynolds 2019).

[66] The Public Transport Users Association (PTUA) in Melbourne provides an example of this dual and sometimes conflicting advocacy role. They have been 1) in favour of higher frequencies and providing a "defence of buses" (Public Transport Users Association 2019), but also 2) held a mock funeral and protest march in opposition to the tram operator's consolidation of stops to provide level boarding disabled access (Public Transport Users Association 2005).

[67] For example: the recent implementation of Toronto's King Street Transit Pilot was met with pro-car protests including obscene ice sculptures (Harris 2018) and a street hockey game (O'Neil 2018); traders in Acland Street, Melbourne, held a mock funeral to protest the loss of car parking due to a planned change to a tram terminus that would have improve transit priority and provide disabled access (Carey 2013); and an artist pulled a Routemaster bus along a street for four hours to protest against Transport for London's *bus lanes* and fines for non-compliance (Anonymous 2004).

[68] The World Naked Bike Ride has an aim of "exposing the unique dangers faced by pedestrians and cyclists" (World Naked Bike Ride 2009) and the negatives of car dependancy. Meanwhile, on transit, there is a similar dress code for Global No Pants Subway Ride (Improv Everwhere 2019), but this event seems to be more about **doing something on** transit than actually **campaigning for** improved transit.

3.3 Public policy analysis approaches

The field of *public policy analysis* developed in the early twentieth century around the idea that governments can 'solve' problems by making policies[69], and a need to better understand decision-making and governance (Parsons 1995, p. 17). There have been three broad periods in *public policy analysis* research:

1. an early period when the field was dominated by *rationalism* and *institutionalism*;
2. a shift of focus towards *political approaches* and the behaviour of individual decision-makers as a greater understanding developed about how humans always not always completely rational[70]; and then
3. a shift back towards analytical approaches and *new institutionalism* (Parsons 1995, pp. 271-84; Turnpenny et al. 2013).

Research into policy and decision-making is now a huge cross-disciplinary field with a "wild and ever-escalating cacophony of decision-making theories, models, processes, tools, techniques, and approaches" (Fitzgerald 2002, p. 2). Appendix A includes a synthesis of public policy analysis approaches described in a selection of the literature. Unfortunately, the large number of models and approaches can be a challenge for understanding *public policy analysis* as a whole, particularly with respect to how each relates to others and because many of them overlap to various extents. However, major approaches that are discussed in much of the literature include:

- ***Rationalism***, in which policy is determined using a series of steps in which decision-makers are seeking to choose the 'best' option;

[69] The term 'policy' has a lot of different meanings, including:
- "a field of activity;
- a general purpose;
- specific proposals;
- decisions of government;
- formal authorisation;
- a programme;
- an output;
- an outcome;
- a theory or model; and
- as process (Hogwood & Gunn 1984, pp. 13-9).

More simply stated policy is "an attempt to define and structure a rational basis for action or inaction"(Parsons 1995).

[70] For an in-depth discussion of the limits of how well normative models of rationalism can describe actual human decision-making see Tversky and Kahneman (1986). This paper, from the field of behavioural economics, discusses how the key assumptions of expected utility theory[71] (*cancellation*, *transitivity*, *dominance* and *invariance*) are not consistent with the findings of empirical studies of human decision-making. For example, the assumption of invariance[72] has been found to be violated in the way that people make different choices when the outcomes of medical treatments are described in terms of mortality risk instead of survival rates (pp.S254-5), and the way that people are adverse to perceived, rather than actual, financial loses (pp.S254-7).

[71] One of the key concepts underlying economic theory is that rational decision-makers are assumed to seek outcomes that maximise utility (i.e. choose options with the best outcomes).

[72] The assumption of invariance is that the 'best' option will always be chosen regardless of how it is presented (Tversky & Kahneman 1986, p. S253).

- ***Institutionalism***, which focuses on how organisational structures and procedures influence decision-making;
- ***Incrementalism*** and ***adaptive*** approaches, where only a narrow range of policy alternatives are considered, and policy advances as a series of small, incremental changes from the status quo;
- ***Political approaches***, where policy is formed through a process of bargaining between stakeholders, decision-makers and other actors; and
- ***the 'garbage can' model***, where decisions emerge from a combination of problems (looking for solutions), solutions (looking for problems) and people (looking for something to do), but once a decision is made the reasoning and supporting evidence is lost and any subsequent decisions start afresh with a different set of problems, solutions and/or people[73].

These models and each of the major *public policy analysis* approaches are briefly described in the following sections.

3.3.1 Rationalism

Rationalism assumes that decisions are made through a process of identifying problems, setting objectives, searching for alternatives and then choosing the 'best' option. Four different types of rational decision-making are:

- ***full rationality*** – in which all potential options are identified, evaluated and compared (Janis & Mann 1977; Huber 1981; Hickson 1987; Lyles & Thomas 1988; Eisenhardt & Zbaracki 1992; Parsons 1995; Turpin & Marais 2004; Caramani 2011; Peters 2011);
- ***bounded rationality*** (or 'satisficing') – in which potential options are identified one at a time until one that meets some minimum criteria for acceptance is identified (Janis & Mann 1977; Eisenhardt & Zbaracki 1992; Parsons 1995; Turpin & Marais 2004);
- ***elimination by aspects*** – in which options are eliminated one by one, based on criteria ordered according to importance, until only one option remains (Janis & Mann 1977); and

[73] This list is similar to that developed by Lyles and Thomas (1988). However, they use the term *avoidance* rather than *institutionalism* to describe how bureaucracies sometimes use procedural approaches to try to avoid making decisions. Also, rather than the '*garbage can'* model they include the similar *decisive* model, which focuses on deciding what actions to take rather than how to resolve problems (Lyles & Thomas 1988, pp. 138-9). Das and Bing-Sheng (1999, p. 759) state a preference for the Lyles and Thomas (1988) list as it covers the most important approaches and is ordered from the most to least structured process (i.e. from *rationalism* to *decisive / 'garbage can'*). Stopher and Stanley (2014) adopt a similar listing although, like many others, consider *bounded rationalism* / *satisficing* as being distinct from *rationalism*, and also include *mixed scanning* instead of *the 'garbage can' model*. Further research might seek to understand how each of these, and the many other public policy analysis approaches shown in Table A.1 (Appendix A), might have relevance to transit priority implementation or the extent to which transport policy researchers have engaged with these approaches.

- ***quasi-satisficing*** – in which an 'obviously' acceptable option is chosen without other alternatives being considered (Janis & Mann 1977)[74].

Chapter 2 discussed the *rational* evaluation perspectives that are used to assess the impacts of transit priority implementation. Evaluation may involve *bus lane warrants* (Litman 2016), *cost-benefit analysis* and *economic modelling* (Currie et al. 2007), or *multi-criteria evaluation* to assess how well a proposal aligns with *strategic planning objectives*, a *network operating plan* or other goals[75]. These types of transit priority evaluation approaches are likely to be aimed at some form of *fully rational* or *boundedly rational* decision-making process. An example of an *elimination by aspects* decision-making approach in transit priority implementation is provided by the widespread use of *bus lane warrants*[76].

<u>*Policy cycle models*</u> are often used together with *rationalism* to interrogate or set decision-making processes. There are many variants, but in all *policy cycle models* policy is assumed to change through time through a never ending cycle of issue identification, decisions, implementation, and post-implementation evaluation. This post-implementation evaluation may identify new issues or problems, leading to another round of decision-making and implementation (Parsons 1995; Althaus et al. 2013; Stopher & Stanley 2014, pp. 48-54). How *full rationality* and the *policy cycle* might apply to transit priority implementation is shown in Figure 3.4 and described in the following.

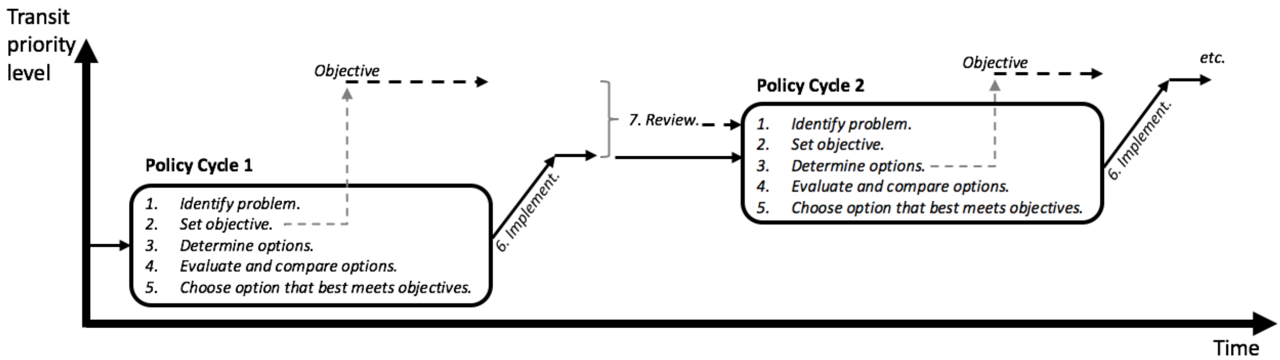

Figure 3.4 Rational model of transit priority implementation

Source: based on Reynolds et al. (2017)

The model shown in Figure 3.4 starts with transit priority at some existing level. Policy Cycle 1 then: (1) identifies problems, (2) sets an objective, (3) determines options, (4) evaluates and compares options, (5) chooses the option that best meets the objective, and (6) implements that option, which

[74] Other rational or semi-rational approaches to decision-making include:

- the use of heuristics, or 'rules of thumb', to shortcut decision-making (Parsons 1995, pp. 355-8; Schwartz 2010; Jones & Thomas III 2015, pp. 277-8);
- the use of intuition, mental simulation, metaphor and storytelling. These are often used by firefighting commanders, blitz-chess player and others who have to make significant decisions very quickly, but have also been found in the decision-making processes used by design engineers when time is less critical (Klein 1999, pp. 3-4); and
- many other frameworks, decision support systems and processes (see discussions in Janis and Mann (1977); Huber (1981); Parsons (1995); Das and Bing-Sheng (1999); Klein (1999); Turpin and Marais (2004); Knill and Tosun (2011) and many others).

[75] See Chapter 2, Section 2.3 and Litman (2003); Wall (2007); Meryrick and Associates (2009); VicRoads (2011); Currie (2016a, p. 474); Litman (2016); Ryus et al. (2016); Reynolds et al. (2017); Wall (2017a, 2017d, 2017b); Delbosc et al. (2018, p. 4).

[76] Installing a *bus lane* may be either accepted or eliminated based on whether a specific threshold of bus frequency, passenger volume or other criteria is met (Vuchic 2007, p. 245; Litman 2016; Ryus et al. 2016) .

changes the level of transit priority. Figure 3.4 shows an instance where the implemented transit priority level does not meet the desired objective level. A (7) review might follow the implementation and identify the failure to meet the desired objective as a new problem to be resolved in Policy Cycle 2. Subsequent policy cycles might involve new issues or new objectives, as the level of transit priority continues to change over time[77].

Unfortunately, the research literature suggests that *rationalism*-based approaches do not necessarily result in better decision-making (Klein 1999). This is because *rationalism* gives an illusion that policy implementation can be controlled, that decision-makers have perfect information, and that decisions will be unbiased (Das & Bing-Sheng 1999). *Rationalism* and the policy cycles are also artificial, simplified and untestable, and do not fully explain how policy development moves from one stage to the next (Parsons 1995). As discussed earlier, Marsden and Reardon (2017, p. 249) have highlighted the need to move away from focusing so much on such *techno-rationalism* based models in transport policy research. *Public policy analysis* has long since made this shift, as discussed in the following.

3.3.2 Institutionalism

Institutionalism considers how the structure of organisations and relationships between institutions influence decision-making (Huber 1981, p. 4; Shrivastava & Grant 1985; Parsons 1995; Turpin & Marais 2004, p. 145; Caramani 2011; Peters 2011). It encompasses a large body of research including: governance and governmental structures (Althaus et al. 2007, pp. 12-31), *organisational institutionalism* (Greenwood 2008; Greenwood et al. 2017), and *legitimacy* in organisations (Johnson 2004).

Institutional structures and how they impact decision-making have been widely researched in transportation, land use planning and related fields[78]. Unfortunately, transit priority implementation often exists in an extremely complicated structure of overlapping institutional responsibilities, powers and influence. Power and authority are typically centralised in governmental bodies, but these exist at different levels with overlapping ministerial responsibilities for different parts of road and transit networks, management of different parts of road reserves (traffic lanes, on-street parking, footpaths etc.), enforcement and other activities. There are then a large number of agencies, actors and people in between central decision-makers setting and policy

[77] Note that the rational model presented in Figure 3.4 is effectively a normative model of how transit priority decision-making should ideally be undertaken, rather than a descriptive model that seeks to show how transit priority decision-making actually occurs in the real world. This distinction and its implications are discussed more fully in Reynolds et al. (2017). In short, however, literature on rationalism and the policy cycle acknowledges that in the real-world the steps might not occur in order, or might involve doubling back partway through a cycle. As with most models Figure 3.4 is a simplification of processes that are more complex in the real-world.

[78] For example:

- Mees (2000, 2010) includes discussion of transit agency structure and its influence on service provision and planning;
- Dickey et al. (1983); Levinson and King (2019, pp. 275-333) and many other authors discuss institutional relationships in transport and transport planning; and
- De Gruyter (2017) describes how legislation, government and law overlap and influence traffic engineering.

enactment in the real world (Stopher & Stanley 2014, pp. 40-1, 57). This is demonstrated in Figure 3.5, which shows a model of transit priority implementation based on *institutionalism*.

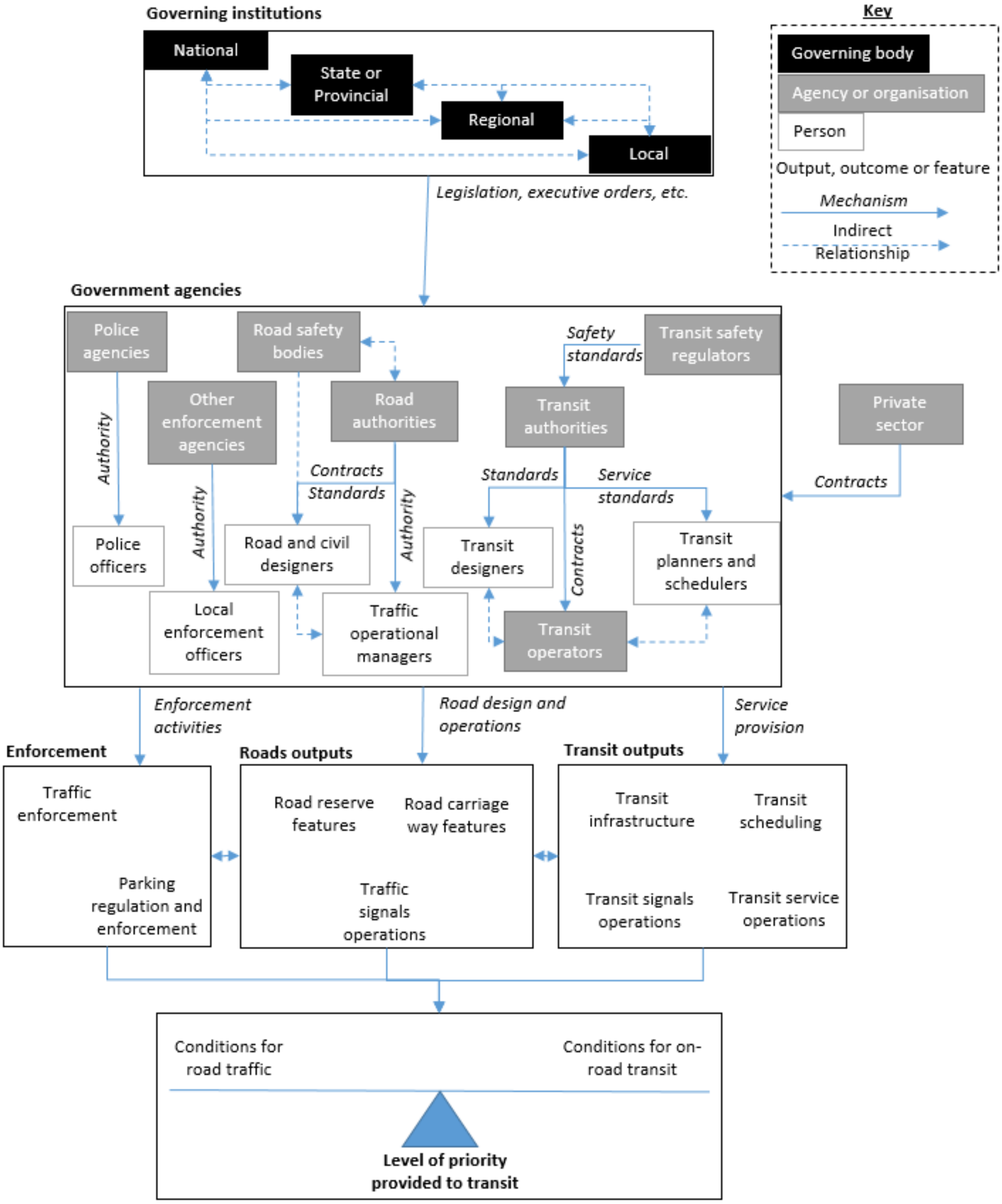

Figure 3.5 Institutional model of transit priority implementation

Source: Reynolds et al. (2017)

The model in Figure 3.5 shows the level of transit priority as being influenced by: 1) *enforcement activities*; 2) outputs related to *road design and operations*; and 3) outputs related to *transit service provision.* These three areas are under the control of police, road authorities and transit authorities, respectively, through a complicated web of authority, contracts and standards dictated by legislation and executive orders at the local, regional, state or national levels. Unfortunately, the institutional and governance structures surrounding transit priority may, in reality, be even more complex than what is shown in Figure 3.5[79].

One notable area of overlap that appears relevant to transit priority implementation, and transport policy-making more generally, relates to *organisational institutionalism*. This area of research has addressed questions of legitimacy within institutions[80]. Its relevance relates to how what gets included in a transport project appraisal can vary significantly over time and to meet the requirements of different infrastructure or budgetary decision-making or advisory bodies (Douglas & Brooker 2013). Hence, institutional rules for undertaking cost-benefit analysis, warrant calculations, business case costings and benefit evaluations, and other (otherwise 'rational') analysis might play a large part in determining what proposals are considered technically, financially and/or economically reasonable, and which are not[81]. Regardless, such determinations of technical reasonableness and legitimacy may only provide one input into a government's annual budget

[79] For example, Curnow (2006) describes how a tram separation strip in Royal Parade, Melbourne was appealed to the Victorian Civil and Administrative Tribunal on heritage grounds, and so therefore required a quasi-judicial process to be formally and finally approved for implementation and retention. Similarly, Bow (2016) discusses the long running "Battle of St. Clair" in Toronto, which saw a project to separate streetcars from general traffic variously approved at City Council, then by the Ontario Municipal Board, then by the Minister for Municipal Affairs, then taken to court where an injunction halted construction, approved by the court, and then finally implemented after the end of the period in which a further appeal to a higher court was permitted. These sorts of judicial bodies are not shown in Figure 3.5, but could be considered to be in a separate box next to 'governing institutions' depicting 'judicial institutions'.

Additionally, Figure 3.5 does not include the sorts of agencies and institutions that might be in charge of governmental budgeting, financing, the development of business cases and the like, which might be part of developing implementation programmes or projects. Neither does it include the broader lobbying organisations (e.g. motorists, cyclist or public transport users advocacy organisations), infrastructure advisory agencies (e.g. Infrastructure Australia) or other bodies who might seek to influence either the higher-level policy and spending decisions of government institutions (top box, Figure 3.5), the actual 'ground-level' decisions made by designers, project managers and similar actors during implementation (middle box), or the media and other external institutions that might influence implementation. In part this is because of a need to reduce the complexity of Figure 3.5 itself, but also because these sorts of advocacy coalitions, lobbyists and other bodies who might influence transit priority implementation and policy-making are perhaps more relevant to the sorts of models that are developed through political approaches to public policy analysis and, in particular, *implementation theory*, which is discussed in more detail below in Section 3.3.4. As discussed above (in the introduction to Section 3.3) there are a wide range of models and approaches in public policy analysis, many of which overlap, and it is perhaps not surprising that *institutionalism* and institutionalism-related concepts often appear elsewhere given the importance of agency and government structures to public decision-making. Full review of all of these areas, such as governance theory, and the extent to which they have been used in the broader transportation planning and policy literature is beyond the scope of this chapter. However, there has already been some discussion of transport literature that does consider wider issues of governance, power, institutional structures, politics and related factors, particularly with respect to the implementation of BRT systems and networks, in Section 2.4.1.

[80] See Deephouse and Suchman (2008); Greenwood (2008); Deephouse et al. (2017); Greenwood et al. (2017) and further discussion of legitimacy theory below in Section 3.5

[81] For example, Infrastructure Australia "has not accepted 'WEB [Wider Economic Benefit] factoring' unless 'detailed analysis has been undertaken' such as for the Cross River Rail in Brisbane and work by the Victorian Government on Melbourne Metro" (Douglas & Brooker 2013). Not allowing a factor to be included without such detailed analysis might be one approach to encourage greater use of more detailed analysis in the preparation of submissions. However, lack of detailed analysis does not mean that the wider economic benefits, which might often be particularly important in justifying a transit improvement proposal, does not exist. Rather, it might just mean that there are not enough time and/or resources to develop such a proposal to the level necessary for Infrastructure Australia to accept as legitimate the claim of wider economic benefits in making funding recommendations to government.

Section 2.3 in the previous chapter discussed the various *traffic*, *mobility*, *accessibility*, *economic efficiency* and other *perspectives on transport system evaluation* at length, and suggested that there may often be particular emphasis on minimising vehicle delays. Such a focus may overlook the problem of induced traffic (Hills 1996), and how project benefits arising from travel time savings across a large number of automobile users might not be realistic when "expanding congested roads attracts *latent demand*, trips from other routes, times and modes, and encourage longer and more frequent travel" (Litman 2019a, p. 2). There appears to be much focus on modelling traffic volumes, level of service, changes to travel times etc. in project assessment, but "conventional transport economic evaluation tends to overlook and undervalue many transit benefits" (Litman 2015). This is despite the significant role of transit in improving health, social and community outcomes, and other areas, which (even) include significantly reducing traffic congestion (Aftabuzzaman et al. 2010; Currie 2018, p. 26). The suggestion made here is that including these sorts of benefits in project appraisal is not considered 'legitimate' because of established rules and norms for how such appraisals should be done.

preparation cycle, which is likely to be also informed by many other (and likely more political) factors, including the need to cater to voters[82].

Unfortunately, there remain many "institutional barriers to sustainable transport" (Curtis & Low 2012), and institutional complexity has real, and often negative, outcomes for transit priority implementation. For example:

- Levinson, Zimmerman, Clinger, Gast, et al. (2003) highlight the challenges of "achieving effective enforcement, and overcoming fragmentation of responsibilities and conservative agency attitudes" in BRT operations;
- Currie and Shalaby (2007, pp. 35, 7) describe the failure of tram priority measures in Toronto due to lack of compliance and the inability of transit operators to enforce road rules; and
- Currie (2016a, pp. 489-90) discusses instances where "benefits of priority were squandered for the benefit of an improved time performance contract outcome by operators", and that more broadly:

> *"…in practice many traffic signal priority systems had been withdrawn because road authorities failed to see net benefits (Currie 2006)…(while) historical bias towards road authorities limit the design, scale and benefits of priority schemes as a result of limited 'road based' thinking"* (Currie 2016a, pp. 489-90).

Clearly institutional structures can impede transit priority implementation as support is required within many different organisations for installation and continued operation[83]. Institutional structures also tend to be resistant to change. Forming a new Transit Priority Implementation

[82] See, for example, *The Politics of Congestion Mitigation* (Taylor 2004), which suggests that "public officials tend to exaggerate the consequences of (widely unpopular) metropolitan traffic congestion for political gain" and "cynically use congestion as a rationale for funding for high-profile, politically-popular transportation (and, increasingly, public transit) projects".

[83] The concepts of *isomorphism*, *diffusion* and *decoupling* that are used in *organisational institutionalism* are relevant to the problems of 'road-based' thinking. *Isomorphism* is the idea that "organizations conform to 'rationalized myths' in society about what constitutes a proper organization…(and) as more organizations conform to these myths they become more deeply institutionalized" (Boxenbaum & Jonsson 2017, p. 77). A road authority is likely to be staffed by traffic engineers who are focused on traffic movement, reducing vehicle delay, and the myth that roads are solely for cars (Norton 2007; Goodyear 2012). *Diffusion* of "ideas, practices and prescribed structures among organizations within an organizational field" is now thought to cause institutional isomorphism (Boxenbaum & Jonsson 2017, pp. 77-8), as might be seen in the plethora of engineering standards, guidebooks and other resources that apply (separately) to road and transit authorities.

Decoupling is where organizations "seek the legitimacy that adaptation to rationalized myths provides while they engage in technical 'business as usual'" (Boxenbaum & Jonsson 2017, p. 78). Applying this to transit priority, a road authority might implement *TSP* because it is 'high-tech', 'multi-modal' and something a modern road authority should be doing. Yet later, the *TSP* system might be quietly withdrawn in a return to the usual business of optimising traffic signals to reduce vehicle (rather than passenger) delay. An example may be that some of Australasia's BRT systems lack *active TSP* and/or separated bus facilities (Currie & Delbosc 2010, 2014), and higher levels of service branding tends to be more prevalent on those that lack key BRT features (Hensher et al. 2019). In this instance better branding might be an attempt to provide the additional *legitimacy* of being a modern BRT, while in reality the service is not much better than a regular bus operated as per 'business as usual'.

More broadly the reporting of "the Zürich model" (Joos 1989, 1990) and "Curitiba, the cradle of Bus Rapid Transit" (Lindau et al. 2010b) or proposals of these as a model for other cities (such as Halifax (Dera 1995)) perhaps provide examples of efforts toward *policy convergence*, *diffusion* and/or *transfer* (see Andersen (2011); Knill and Tosun (2011) and others) with respect to transit prioritisation. Similar processes are described in the planning literature (although using different terminology perhaps emphasising the individual in learning about others' experiences, bringing back ideas from overseas study tours etc.) and in the example of how Brisbane came to adopt Ottawa-style busways (Tanko & Burke 2015, pp. 230, 4).

Authority with overarching powers might be challenging in practice[84], and navigating institutional structures appears likely to be a challenge for priority implementers regardless of their role[85].

3.3.3 Incrementalism

An alternative approach to attempting large changes to policy to support transit priority implementation might be to instead gradually improve conditions for transit over time, through a series of small steps. In two highly influential papers Lindblom (1959, 1979) described policy change as involving:

- *simple incrementalism*, where there are small changes in policy but not in any particular direction;
- *disjointed incrementalism*, where there are small changes in accordance with a long-term goal or vision;
- *strategic analysis*, where policy moves in small steps to reach a long-term objective; or
- *'no longer fiddling*', where *rationalism*-based methods are used to assess a broader range of options and change may be non-incremental.

How these various types of *incrementalism* may be applicable to transit priority implementation is discussed in the following, with Figure 3.6 showing a model based on *simple incrementalism*. In *simple incrementalism* the level of transit priority changes over time by small amounts. Each decision is independent and considers only a small range of options[86]. Over time transit priority might go up or down as individual projects are implemented, or as reactionary decisions are made. There are many possible outcomes, but significant improvements would appear unlikely if independent decisions are made using simple *incrementalism*.

[84] The Level Crossing Removal Authority (2020) in Melbourne provides an example of a special purpose organisation that has been formed for the purposes of delivering a particular type of project. Various types of special purpose organisations, public-private partnerships (PPP or P3), or joint venture organisations have been widely discussed in the research literature (e.g. AECOM Consult Team (2007); Macek et al. (2017)). PPPs are often used to build and/or operate new transit services (e.g. the Capital Metro Agency is a standalone delivery agency for the recently completed Canberra LRT (Transport Canberra 2019)). However, there appears to have been little implementation of transit priority for existing transit services through special purpose organisations with broad powers and authority.

[85] There are also larger questions of what transit priority implementers, and more general transport and broader policy-makers, are trying to achieve by implementing priority measures. Perhaps it might be an effort to move from a 'transit mostly for social purposes' city to 'transit for congestion relief' or 'transit replaces car' type of city, as per the three categories used in the 'state of the art' model discussed in Section 2.3 (see Figure 2.4). Alternatively, it might be related to broader public policy issues such as environmental sustainability or the tax-burden of providing government services. The cases discussed in later chapters perhaps show how the success or otherwise of transit priority implementation, and the idea to put transit priority on the policy agenda in the first place, is influenced by much broader concerns, including those relatively unrelated to transportation. More detailed examination of the existing literature on transport policy, institutional structures and governance might be an avenue for future research. This might include the exploration of why transit priority can become an issue in broader public and political policy arenas at all. See also discussion of research into political theatre, political games and political system discussed in Section 3.5.4.

[86] For example, Figure 3.6 shows Decision 1 selecting a small increase in transit priority, rather than maintaining the status quo or decreasing transit priority by a small amount. However, there is no overall direction or guiding principle under *simple incrementalism*. At each decision point the level of transit priority might go up, stay the same, or go down, and Figure 3.6 shows the do nothing option being selected in Decision 2, and then Decision 3 selecting a decrease in transit priority.

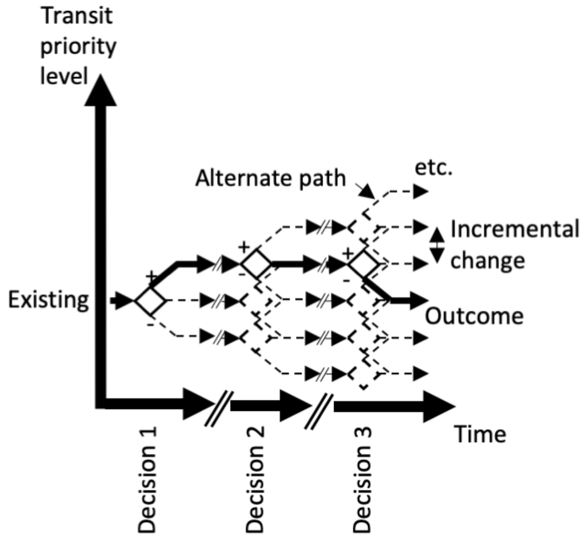

Figure 3.6 ***Simple incrementalism***

Source: adapted from Reynolds et al. (2017)

This contrasts to *disjointed incrementalism*, where transit priority levels should always incrementally increase as shown in Figure 3.7.

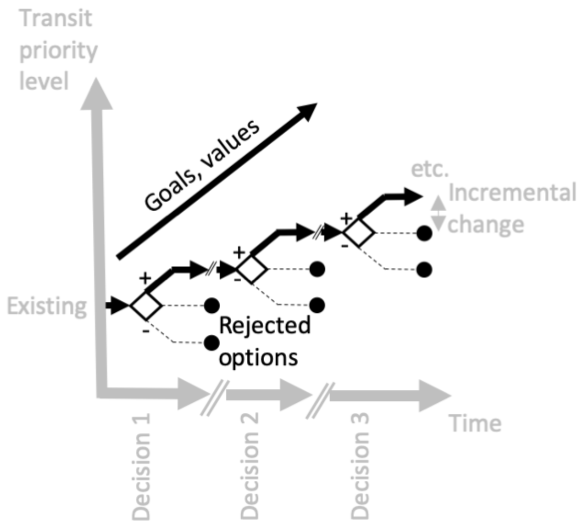

Figure 3.7 ***Disjointed incrementalism***

Note: grey indicates items unchanged from Figure 3.6.

Source: adapted from Reynolds et al. (2017)

Under *disjointed incrementalism* the level of transit priority would also change by small amounts through a series of sequential decisions. However, *disjointed incrementalism* includes an overall goal or vision of increasing transit priority. As such, at each decision point an incremental increase in transit priority would be selected and implemented without end.

This contrasts to *strategic analysis*, the third and final form of *incrementalism* described by Lindblom (1979), where small changes are made to gradually move towards a specific objective, as shown in Figure 3.8

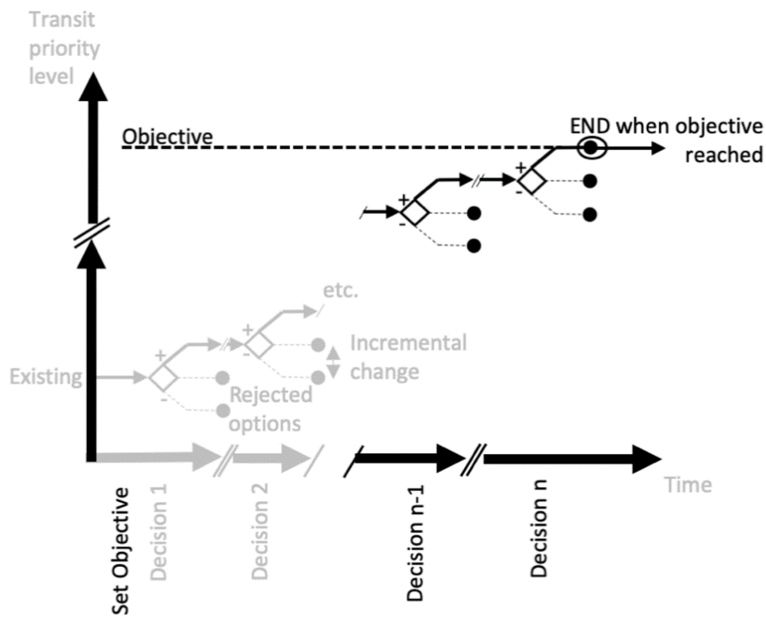

Figure 3.8 ***Strategic analysis***

Note: grey indicates items unchanged from Figure 3.7. Source: adapted from Reynolds et al. (2017)

Strategic analysis is largely similar to *disjointed incrementalism*, but a specific objective guides each decision, rather than a general goal. Hence, once this objective is reached no more changes are made. If the objective is to increase transit speed by a certain amount, then once that amount is achieved no further transit priority would (need to) be implemented.

Many metropolitan or transport planning documents have goals, visions or objectives that seek to increase transit priority, speed and/or reliability. For example, the *Melbourne 2030* plan included policies to:

> *"Upgrade and develop the Principal Public Transport Network and local public transport services…(and) improve the operation of the existing public transport network with faster, more reliable and efficient on-road and rail public transport"* (VicDoI 2002, p. 134).

A challenge, however, is that these types of policies may not provide sufficient *legitimacy* or public and political support for real-world changes. Just having goals, values or objectives might not be enough to support the incremental implementation of transit priority. The underlying strategy itself needs public *legitimacy*. For example, in *Who Killed Melbourne 2030* Mees (2011) argues that:

> *"Because the Department of Infrastructure officials who prepared Melbourne 2030 did not have to share power… they were able to confine the public consultation process preceding release of the strategy to the production of woolly generalities and to make all the substantive decisions in private without any public input…the result guaranteed that the strategy would* ***have no public legitimacy*** *and would depend for its survival on the whims of planning ministers…"* (emphasis added)(Mees 2011, p. 7).

While *disjointed incrementalism* and *strategic analysis* models look forward to how goals, values or objectives might help practitioners implement transit priority, *path dependency* and *policy feedback* instead look at how previous decisions might lock policy into only advancing in a particular direction. *Path dependence* is caused by "increasing returns, self-reinforcement, positive feedbacks, and lock-in" (Page 2006), but there can also by negative feedback, which has the potential to "undermine the political, fiscal or social sustainability of an existing policy regime" (Weaver 2010)[87]. Four key features of *path dependency* are that:

1. at the beginning there were multiple possible outcomes;
2. the path may have been set by a minor event;
3. the order of events matters; and
4. the path is resistant to change (Marier 2015, pp. 402-3).

Illustrative examples in the context of on-road transit are provided by recent directions for the Toronto streetcar and Melbourne tram networks. Both appear to exhibit *path dependency* flowing on from initial choices about how to provide level-boarding access to meet disabled accessibility legislation. In Melbourne, disabled access to trams has been addressed through new low-floor trams and the building of new raised platforms at stops. In Toronto, in contrast, a decision was made to buy new low-floor streetcars that have retractable ramps that reach down to street level, and so there is no need to undertake a large program of stop upgrades[88].

Path dependence may also have significant relevance to transit priority implementation at the broader city-scale. Vuchic (2007, pp. 55-66) describes 10 evolutionary steps in urban transport system development, from walking through to freeways and fully automated transit[90], but making the conversion from BRT to LRT, steps 6 and 7 respectively, appears to be difficult in practice (Henry & Dobbs 2009; Henke 2013). A city may find itself largely committed by prior decisions to a particular

[87] An oft-cited example of *path dependency* is the continued use of the QWERTY, rather than DVORAK, keyboard layout. Because they are in widespread use most people learn on QWERTY keyboard. While DVORAK keyboards are more efficient for typing as the letters that are used more frequently are easier to reach, the effort of switching is unlikely to be worth the marginal benefits for most people, meaning that QWERTY keyboards will continue to be what most people use and therefore what most people will learn to type on (Marier 2015, p. 402).

[88] Members of the Melbourne disability lobby thought that "vehicle lifts will not meet the requirements of DDA legislation because not all people with disabilities can use lifts" (Currie & Shalaby 2007, p. 34). This has led to a large ongoing program to convert the approximately 1,800 tram stops in Melbourne to have platforms that allow level boarding access to low-floor trams. This has had significant secondary impacts on tram priority, streetscapes, dwell times and other aspects of the tram network and city streets (Currie & Smith 2006; Currie & Shalaby 2007; Currie & Reynolds 2010; Currie, Tivendale, et al. 2011; Currie et al. 2012; Currie, Delbosc, et al. 2013; Diemer et al. 2018; Reynolds et al. 2018).

Providing disabled access to Toronto's streetcars is complicated by an unusual 4 ft, 10⅞-inch track gauge[89], track alignment and some steep slopes (Currie & Shalaby 2007, p. 35). While some raised platforms have been installed, the TTC has adopted a retractable ramp design on its new low-floor streetcars, which allows direct access to/from the road surface level for wheelchairs (Toronto Transit Commission 2017). As a result, there is no need for an extensive and expensive program of stop re-building in Toronto to provide step free access. However, it also means that Toronto may be missing out on opportunities for *bottom-up* implementation of transit priority measures during a (*top-down*) disabled access improvement program, such as have been successful in Melbourne (Reynolds et al. 2018).

[89] Track gauge is another example of *path dependency*. The City of Toronto adopted 'English carriage gauge' in part to prevent use of the streetcar tracks by heavy railways back in the age of steam, but is now shifting to standard gauge for new (isolated) routes to allow interoperability and compatibility with modern LRT systems elsewhere in the region (Kalinowski 2010). Incompatibility of gauge has long been a problem in Toronto, and similarly between different states and rail systems in Australia (Levy 2015). Typically, these issues trace back to an initial decision to adopt a certain track gauge, and then the later overwhelming challenges associated with transitioning large legacy networks to standard gauge.

[90] The ten steps are: 1. Walking only; 2. Private vehicles; 3. Addition of common vehicles (taxis); 4. Widening of roads to provide arterials; 5. Introduction of buses; 6. Separation of modes (transit in ROW B); 7. Guided technology (LRT); 8. Grade separation (freeways); 9. Rapid transit (transit in ROW A); and 10. Automation of transit.

transit mode, or a ROW A, B or C transit network, setting it on an inescapable path of high or low levels of support for prioritising on-road transit. Similarly, a city may find itself on a *car-centric*, commuter-*transit-centri*c or all-day-*transit-centric* policy path, thereby limiting what type of transit priority is appropriate, legitimate or politically acceptable (c.f. Currie (2016a)).

That said, such paths may not be inescapable or guaranteed not to shift. *Punctuated Equilibrium Theory*, sometimes referred to as *punctuated incrementalism*, considers how "policy-making systems remain stable until the signals from outside exceed a threshold, and then they lurch forward…(, but) afterward they resume "equilibrium""(Jones & Baumgartner 2012). This view of policy change may be helpful for understanding how a transit network might need to shift from providing from social transit to focusing on commuter services as traffic congestion increases, or from there to an all-day anywhere-to-anywhere operating model. *Punctuated Equilibrium Theory* has already been applied to understanding how increasing public concerns about the negative consequences of urban sprawl and shifted political leanings amongst suburban voters in Toronto, and provided a policy window for change towards, and support for, new smart growth policies (Eidelman 2010). However, it does not appear that such approaches have been widely used by researchers to study transit priority, or the political demands and levels of support that might be needed to change from one path to another.

3.3.4 Political approaches

Political approaches to *public policy analysis* consider how decisions are influenced by the strategies, actions and power of individual participants through bargaining, negotiation and compromise (Huber 1981, p. 3; Das & Bing-Sheng 1999, p. 758; Turpin & Marais 2004, pp. 145-6). Easton (1965) provided an early model of how the political system outputs decisions based on demands and support, which is adapted to transit priority implementation in Figure 3.9.

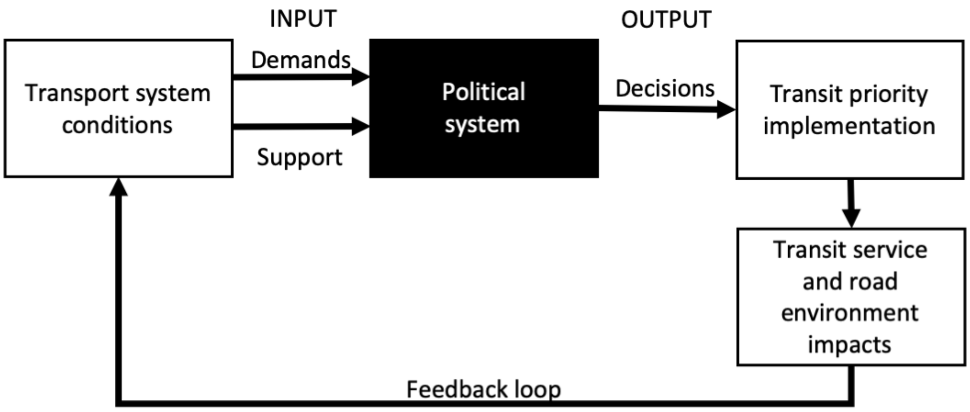

Figure 3.9 Political system model of transit priority implementation

Source: adapted from Reynolds et al. (2017)

The model in Figure 3.9 shows existing transport system conditions giving rise to demands and support for change. For example, a slow bus route may lead to demands for a *bus lane*, supported by the transit operator and passengers. These demands and support provide input to the political system, which acts as a 'black box'[91] outputting decisions that result in implementation. However, transit priority implementation can have both positive and negative impacts, and so the amount of priority might not always increase during the implementation phase. Figure 3.9 shows a feedback loop connecting the impacts of transit priority implementation back to the transport system conditions and new demands and support for change. It is through this loop that a new *bus lane* may result in additional traffic congestion, leading to demands that it be removed.

The model in Figure 3.9 (and the Easton (1965) model on which it is based) are relatively simple and do not explain how the 'black box' of the political system operates. *Implementation theory*, however, is a related area of public policy analysis that focuses on how and why political systems make decisions and how policy is implemented. It includes *top-down*, *bottom-up* and *hybrid* approaches that place different levels of emphasis on central policy makers versus 'street-level' implementers (Sabatier 1986; Parsons 1995, p. 469; Pülzl & Treib 2007), which are described in the following.

Top-down implementation theories emphasize the importance of central government policy decisions, with implementation being a "process of interaction between the settings of goals and actions geared to achieve them" (Pressman & Wildavsky 1984). *Strategic transportation planning* approaches, discussed in Section 3.2, are inherently *top-down*. However, there are difficulties both using this approach **for implementation and** as a framework **to understand** implementation. Stopher and Stanley (2014, pp. 322-9) discuss Melbourne's top-down approach to transportation planning, while Mees (2010, p. 159) suggests that "some of the most damaging urban transport decisions…have been top-down measures imposed by higher-level governments". More generally, top-down views tend to disregard the impact of implementers, other stakeholders and the private sector on the formulation and implementation of policy (Sabatier 1986; Pülzl & Treib 2007). Top-down models are also "difficult to use in situations where there is no dominant policy (statute) or agency, but rather a multitude of governmental directives and actors, none of them preeminent", and these models may also ignore or underestimate the strategies used by lower-level actors to get around or subvert central policies (Sabatier 1986, p. 30).

In contrast, *bottom-up implementation theories* emphasize the discretion that 'street-level' bureaucrats have in applying policy. This discretion can be used to obtain outcomes that are quite different to those desired by policy-makers (Parsons 1995, p. 469), which nonetheless can be of benefit due to local implementers being closer to the real problems than central decision-makers (Pülzl & Treib 2007, p. 92). *Bottom-up* approaches have been highlighted in transport research[92],

[91] Black box implies that only the inputs and outputs can be determined, with the internal workings that connect inputs to outputs remaining hidden from understanding.

[92] *LATM*, *street reclaiming* and *tactical urbanism*, discussed in Section 3.2, all suggest *bottom-up implementation*. Similarly, New York's Sustainable Streets Plan, which includes efforts to install bus priority, bicycle facilities and public space, is highlighted by Stopher and Stanley (2014, pp. 328-9) as a *bottom-up* approach to transport policy and implementation. Another example is provided by De Gruyter et al. (2015), who applied both *top-down* and *bottom-up* approaches to explore the impact of travel plans on residential developments.

and are relevant due to the discretion and control that designers, engineers, operations staff and others have over the implementation and operation of priority measures.

However, *bottom-up* approaches are likely to underestimate the influence of central policy makers over institutional structures, and other indirect factors that influence street-level implementers[93] (Sabatier 1986, pp. 34-5). *Hybrid implementation theories* grew out of efforts to combine *top-down* and *bottom-up implementation* approaches and understand the influences of both central policy and street-level implementers on implementation and decision-making. The *Advocacy Coalition Framework* (ACF) is one of the most developed *hybrid* approaches (Parsons 1995, p. 195). It was created and developed in the late 1980s and 1990s[94], and emphasises on how *policy-oriented learning* and *advocacy coalitions*[95] of like-minded people / groups influence policy change (Weible & Nohrsted 2013). The ACF has been applied across a wide range of areas, including transport research[96], but it does not appear that the ACF or *implementation theory* more broadly have yet been applied to transit priority implementation. However, Pulichino (2003); Pulichino and Coughlin (2005) have used *agenda-building models*[97], which have similarities to *implementation theory*, to study transit priority. They find that transit priority implementation tends to come about due to central decision makers (the *mobilization model*) or parties with *inside access.* Out of the 11 cities studied, Zürich is the only one where priority implementation was due to an *outside initiative*.

3.3.5 The ‘garbage can’ model

The ‘*garbage can’ model* sees policy making as a relatively unstructured process in which a ‘problem looking for a solution’, ‘solutions looking for problems’ and ‘people looking for something to do’ are combined into a decision-making process (the figurative and eponymous ‘*garbage can*’). Once the decision emerges from the ‘*garbage* can’ everything else is lost as people move on to other things, analysis and reports are filed, and ideas and understanding fade away (i.e. the *‘garbage can’* is emptied). Therefore, any subsequent decision-making process on the same issue starts afresh with a new problem, a new set of solutions and new people who may not have been involved in the previous round. These people may not gain full insight into why previous decisions or policies were made, may neglect previously proven solutions in favour of the latest fad, or may end up re-inventing old ideas anew (Huber 1981; Das & Bing-Sheng 1999, pp. 771-2; Turpin & Marais 2004, p. 146). It is, however, important to note that the name of this model refers to how leftovers in the ‘*garbage can*’ are thrown away after a decision is made, not to the quality of decisions that might emerge from a decision-making process.

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[93] Including factors of which even participants themselves may be unaware.

[94] See Sabatier (1987, 1988); Jenkins-Smith (1990); Sabatier and Jenkins-Smith (1993, 1999).

[95] In the ACF actors are aggregated into a number of *advocacy coalitions* who “share a set of normative and causal beliefs and who often act in concert” (Sabatier 1988, p. 133). These coalitions adopt strategies that further their policy objectives within the policy subsystem. Conflicting strategies are normally mediated by *policy brokers* who are seeking to find a reasonable compromise and reduce conflict while forming policy.

[96] Including social, economic, health, environmental and energy topics (Weible & Sabatier 2007), research about disabled access regulatory requirements (Perkinson 1997), passenger rail policy in the USA (Perl 2012) and the deregulation of the bus industry in the UK (Tesseyman 1999).

[97] *Agenda-building models* are related to the work of Nelson (1984) on organisational decision-making and how issues come to put on the decision-making agenda, and include three models developed by Cobb et al. (1976): the *outside initiative*, *mobilization* and *inside access* models. The *outside initiative* model involves the issue being put on the agenda by parties external to a decision-making institution, somewhat similar to the advocacy coalition concept. The *mobilization model* is similar to *top-down implementation theory*, and involves action by a political or institutional leader. *Inside access* may be similar to *bottom-up implementation* as it involves people in an organisation pushing the agenda.

This model may have relevance to the way that priority measures are often delivered through discrete projects or programmes. These might combine a discrete group of traffic engineers, transit planners and many others to implement transit priority at a site or along a corridor. However, once the priority measures are implemented the members of the project team move on, the supporting analysis might be published in an unread report or simply lost. Further transit priority implementation efforts might then involve a completely different project team, perhaps favouring new solutions based on the latest technology rather than seeking compatibility with previous efforts, despite facing similar problems.

The larger point, however, is that *the 'garbage can' model* and all the other *public policy analysis* approaches provide different lenses through which to consider transit priority implementation[98]. Similarly, concepts from *political models* about demands and support, *advocacy coalitions* and *policy brokers* might help to suggest how transit priority implementation might be easier in cities with more transit users, while *incrementalism* and *path dependency* might help to explain why a shift in *strategic objectives* might not be enough on its own to transition from *car-* to *transit-centric city* transport policies.

Political support, governance structures, and how the public might be included or excluded are likely to be important to transit priority implementation. Most practitioners need to include some form of public consultation or information when undertaking projects. The next section, therefore, discusses the research literature about public involvement in decision-making.

[98] For example, the *garbage can model* might suggest that decisions emerging from a '*garbage can'* containing mostly traffic engineers may result in very different policy directions than if transit advocates were directly involved in the process If the *people* involved predominately have a *traffic* perspective it might be that the focus of the *problem* they are seeking to address is vehicle delay, and that transit prioritisation is unlikely to be one of *solutions* they might consider. In contrast, a policy-making exercise involving mostly transit advocates might focus on *accessibility* and *transit* (passenger) perspectives when framing the *problem*, and might bring *solutions* of *BRT*, other transit prioritisation or subway construction.

3.4 Public involvement

Somewhat separate to *public policy analysis* is the research area that examines public involvement. Much of this is framed around *Arnstein's ladder*[99] (Arnstein 1969), which describes the level of public participation in terms of an 8 rung ladder, as shown in Figure 3.10.

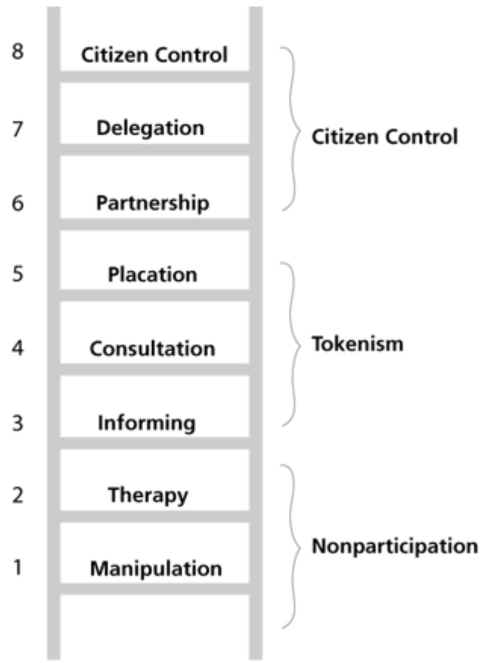

Figure 3.10 Arnstein's Ladder

Source: Dobson (undated-b)[100], based on Arnstein (1969).

The rungs at the bottom of the ladder are *manipulation* and *therapy*, which describe *nonparticipation* in which interaction is aimed at reducing public opposition to a pre-determined decision. *Informing*, *consultation* and *placation* describe degrees of *tokenism* where the public is somewhat involved, but only allowed a small part in actual decision-making. At the top of the ladder are *partnership*, *delegated power* and *citizen control*, which describe different degrees of direct *citizen control* over the decision-making process.

The *LATM* process, *SmartRoads* and many other road management approaches include some form of community consultation and stakeholder engagement (Jones et al. 2007; UKDFT (Department for Transport) 2007; Jones & Boujenko 2009; UKDFT (Department for Transport) 2010; Jones 2014; Damen & Millican 2017, pp. 690-5; Wall 2017b; Delbosc et al. 2018). However, the level of public involvement in transportation decision-making appears to generally be towards the lower rungs. Lack of public involvement has been found to lead to the *Arnstein Gap*, where there is a desire for

[99] Many researchers have extended or provided variations on *Arnstein's ladder*. These include a new ladder from Connor (1988) that suggests that public education leads to the resolution of policy disputes, a three-rung extension to *Arnstein's ladder* by Wondolleck et al. (1996, p. 250) that considers the reaction of citizens to collaborative processes, another extension considering the role of social learning (Collins & Ison 2009), and a revised ladder and matrix of citizen participation developed by Kopetzky (2009, p. 182). More recently, the International Association for Public Participation (IAP2 2012) has described the five levels of *inform*, *consult*, *involve*, *collaborate*, and *empower*, in order of increasing public involvement (Stopher & Stanley 2014, pp. 57-8).

[100] This image is from *The Citizen's Handbook*, which allows sharing under the Creative Commons Attribution-ShareAlike 3.0 Unported License (Dobson undated-a).

delegation or *partnership* levels of community participation in transportation planning, but a reality of only *token* involvement through *consultation* or simply being *informed* about pre-determined decisions. This can subsequently lead to hostility or apathy towards planning processes (Bailey & Grossardt 2006). Insufficient public involvement can also lead to transport plans failing due, in part, to a lack of public legitimacy[101] (Mees 2011, p. 7). Public involvement in transport decision-making is about "providing people with their right to be involved in decisions that affect them and/or about which they are concerned" (Stopher & Stanley 2014, p. 57). However, this may not always be possible in complex transportation matters because "…the public often has a hard time understanding the issues"[102] (Levinson & King 2019, p. 289).

Distinguishing *NIMBYism*[103] from legitimate protest can also be a challenge (Lidskog & Soneryd 2000, p. 1465). However, regardless of the merits of local objections these may be discounted or opposed by engineers and other specialists who tend to favour of the output of technical models over community experiences, leading to an adversarial relationship between the community and implementers (Lidskog & Soneryd 2000, p. 1465). Similar adversarial relationships are evident in some of the strategies for road pricing implementation, which include *conflict avoidance* through *trial schemes*, *direct confrontation* and even Machiavellian *political calculation and positioning*, alongside some efforts at *consensus building* (Isaksson & Richardson 2009).

Perhaps for many technical experts public opposition is just one more problem to be defeated, managed, limited or avoided. When an engineer has already designed an option that is *techno-rationally* the 'best' solution, it might be difficult to then consider alternative points of view from a broader community that might mis-understand, disagree with or have a different perspective on the proposal. However, Booth and Richardson (2001) have argued that "transportation planning has reached a crossroads over the future of public involvement" and that *legitimacy* needed to be "re-established for the next generation of unavoidably controversial transport policies" (p.149).

There appears to have been progress in addressing these issues in the almost twenty years since the publication of Booth and Richardson (2001)[104]. However, transport planning and transit priority implementation appear likely to continue to be controversial and potentially lacking in *legitimacy*. The next section, therefore, discusses research focused around *legitimacy theory*.

[101] The example of the *Melbourne 2030* strategy (VicDoI 2002; VicPCD 2008) and its associated transport plan (VicDoT 2008) is highlighted by Mees (2011) as having lacked *legitimacy* due to a centralisation of power within the bureaucracy, a *top-down implementation* approach, and a "flawed consultation process" that did not allow public input on any of the meaningful decisions. However, like Bailey and Grossardt (2006), the Mees (2011) analysis is not explicitly grounded in political science theory, but rather provides an isolated case study of one of Melbourne's many city plans. This is symptomatic of the lack of an explicit link being made in the transportation research literature to public policy analysis theory, which was discussed in Chapter 2.

[102] Such as how there is little public support for congestion pricing to relieve traffic congestion. This is despite transport economic theories supporting this approach instead of the building of more road capacity (Levinson & King 2019, p. 289), which tends to simply induce more traffic (Hills 1996; Litman 2019a).

[103] Not In My BackYard (*NIMBY*) is a term used to describe protests against a proposal that are made due to the its proximity to or its direct impacts on the protestor themselves, rather than the content of the proposal itself. A *NIMBY* is someone who may claim to be neutral or in favour of an initiative, as long as it is implemented somewhere else or applies only to others (Macquarie Dictionary 2017).

[104] See, for example, efforts to adapt deliberative democracy approaches to strategic city planning, as described in Legacy et al. (2014).

3.5 Legitimacy theory

Legitimacy underlies engineering practice[105], but *legitimacy theory* appears to be rarely discussed in transit priority implementation or transportation engineering research or practice. Meanwhile, *legitimacy* is an important topic in political science and related research areas because it "affects power, and power matters because it creates the ability – on some views, is just the ability – to get things done" (Meyer & Sanklecha 2009, p. 2). National and local institutions often gain or maintain their *legitimacy* through democratic election processes, or have a hold on power and sovereignty through delegated power, authority or other means. However:

> *"Politicians and authorities are constantly trying to legitimise their decisions and actions or the structures of political power in general. If successful, legitimacy assures that political rule is more than merely the raw power of coercion or the strategic force of inducement. It is safe to say that, without an understanding of political legitimacy, we cannot understand politics and its dynamics."* (Netelenbos (2016, p. 1) in the introduction *to Political Legitimacy beyond Weber*).

Legitimacy is widely studied in International Relations because there are no democratic election processes or sovereignty that can *legitimise* international organisations. They must instead rely on other sources of *legitimacy* (Buchanan & Keohane 2009, pp. 29-31). Support for the actions of international organisations such as the United Nations (UN) and the World Bank is influenced by their *legitimacy,* but also the widespread belief in their *legitimacy*[106]. Similarly, the *legitimacy* of the International Criminal Court (ICC), the Nuremberg Trials and other instruments of international justice is a complicated mix of their ability to:

- be objective and impartial in trials of alleged war criminals;
- be seen to be objective and impartial, and
- to have the support of powerful nations[107].

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[105] For example:
- designs are considered *legitimate* when they meet or exceed *engineering standards*;
- *engineering standards* are considered *legitimate* because they are based on extensive research and experimentation that has been undertaken to determine the appropriate factors of safety or other technical characteristics that are considered reasonable to ensure the safety of the public;
- the engineering research and experimentation that supports these *engineering standards* is considered *legitimate* because it is based on a tradition of scholarship, peer-review and a body of knowledge built up over decades and centuries by appropriately trained engineers and scientists; and
- an engineer's judgement and opinion are considered *legitimate* and of greater value than a layperson's when discussing matters in their field of expertise due to the education and experience an engineer has acquired, which is sometimes *legitimised* through a formal licensing system.

[106] A counter-example is provided by the need to reform the United Nations Human Rights Commission in 2006 because it "had been discredited by the membership of states that notoriously abuse human rights, with Libya serving as chair in 2003" (Buchanan & Keohane 2009, p. 44).

[107] See, for example, the discussion in Hafetz (2017) of:
- claims of *victor's justice* about the Nuremburg and Tokyo trials following World War 2 as prosecutions were "expressly limited" to only people from the defeated nations;
- challenges to *legitimacy* and fairness in the selection of defendants following conflicts in Rwanda, Sierra Leone, and Kosovo (amongst other examples); and

Governmental bodies may also lack *legitimacy*, such as due to a failure to provide for basic human rights and freedoms (Miller 2009). International Relations research suggests that there may even be a moral justification for waging war in the name of "forcing a people to be free" (Applbaum 2009). Whether it is morally acceptable to forcibly implement *bus lanes* and push people onto transit to free them of traffic congestion, however, remains an open question[108]

Legitimacy theory has a grounding in philosophy and, in particular, in the works of Max Weber (Meyer & Sanklecha 2009, p. 2; Netelenbos 2016). It might at first glance appear to be a long way from *legitimacy* to the technical engineering tasks of implementing and managing transit priority systems. However, a transit priority measure will likely require sufficient political, institutional and public support to be seen as *legitimate* in the eyes of politicians, road authorities and ultimately (in democracies at least) the voters at the next election.

There are a wide range of different, overlapping and often conflated terms used to describe *legitimacy*. It is sometimes treated as dichotomous, with something being either *legitimate* or *illegitimate* (Deephouse & Suchman 2008). Alternatively, *legitimacy* can be considered to be a continuous variable, or as discrete ordered categories such if something is either:

- *accepted* - "taken for granted"*;*
- *proper* - "judgements (are) reached in a more deliberative fashion, as in evaluations of propriety";
- *debated* - there is "active disagreement"; or
- *illegitimate* - it "should cease to exist" (Deephouse et al. 2017, p. 33).

The relevance of these four levels of *legitimacy* to on-road transit and transit priority measures is clear, as:

- the presence of buses on public roads is typically taken for granted and *accepted*[109];
- transit priority implementation often involves some form of technical analysis and an approvals process to determine whether a proposed measure is *proper*[110];

- problems resulting from China, Russia and the USA choosing not to join the treaty that formed the ICC (United Nations 1999), meaning that war crimes committed in their territory or by their nationals are either outside the court's jurisdiction or can be blocked by veto in UN Security Council.

[108] Levinson and King (2019, p. 290) jokingly suggest a benevolent dictator as a solution to the problems of investment in politically popular but unsustainable car and suburban focused transport infrastructure. Motorist opposition to *bus lanes* appears to be provide insufficient *casus belli* for a revolution, but in the words of Sammy J (2020) "Hookturnistan forever"!

[109] Contrast this to the "dehumanisation of cyclists…" (Delbosc et al. 2019), which suggests that cyclists are not always *accepted* as valid road users and members of society. This *debate* and active disagreement about cyclists on roads (Furness 2010; Lunceford 2012, pp. 74-89; Morhayim 2012; Henderson 2013) was discussed previously in relation to Critical Mass and other direct action and political movements relating to transportation systems.

[110] See Section 2.3 in Chapter 2 for discussion of the various evaluation perspectives on transit priority. Typically, these types of evaluations are undertaken to determine whether transit priority implementation is *proper* under an *accepted* evaluation perspective. For example, by being shown to meet an *accepted bus lane* warrant a proposed *bus lane* would be demonstrated to be *proper*.

- *debate* and active disagreement about proposed or implemented transit priority appears to be a common occurrence; and
- transit priority measures have ceased to exist where they have been found to be *illegitimate* due to poor technical performance, lack of public and institutional support or opposition[111].

There are many different types or sources of *legitimacy*. It can be thought of through two independent dimensions: *authorisation*, describing how **the process** of making a decision is acceptable and/or fair; and *endorsement*, where **the decision itself** is acceptable and/or fair (Johnson 2004, p. 4). Along similar lines, Hurrell (2005) defines five dimensions: 1) legitimacy as process; 2) legitimacy as values; 3) legitimacy as specialist knowledge; 4) legitimacy as effectiveness; and 5) legitimacy as reasons and persuasion (Narlikar 2009). Unfortunately, like in much of *public policy analysis*, there are a wide range of overlapping and similar terms used to describe *legitimacy* and its dimensions. A complete review of International Relations, law, political science, philosophy and the many other fields that examine *legitimacy* is well beyond the scope of this chapter. However, key types of *legitimacy* and examples of their relevance to transit priority implementation are:

- *normative legitimacy*: the law requires a *bus lane*;
- *sociological legitimacy:* there is a widespread view there <u>should be</u> *bus lanes*;
- *legitimacy through consent:* there was a vote in favour of a *bus lane*;
- *legitimacy through reasonableness:* buses carry many people, so a *bus lane* is reasonable;
- *unconditional duty*: buses must always have a *bus lane*;
- *conditional normative support:* there should be *bus lanes*, but not if parking is lost; and
- *legitimacy as trust*: the engineers say there should be a *bus lane,* so there should be a *bus lane* because we trust their assessment that this is the best thing to do.

Technical analysis is relevant to many of these types of legitimacy. A bus lane might be considered *reasonable* because it has been determined through technical analysis to be the most efficient option. Alternatively, whether a bus lane is considered legitimate may be *conditional* on it meeting a technical warrant. However, the extent of technical analysis required and how each type of

[111] For example, the removal of *TSP* by road authorities who “failed to see net benefits” (Currie 2006; 2016a, pp. 489-90), and the removal of transit priority measures in Stud Road and Clarendon Street in Melbourne, which are discussed in detail in Chapter 5.

legitimacy might influence transit priority levels is likely to be contextual and vary based on many factors. These might include: the governance system; institutional structures; and the policy-making arena in which a priority-related decision is being made[112].

Legitimacy appears to be multi-facetted, highly contextual, and not something that can easily be quantified. Despite this, the existing research literature provides a significant body of understanding and insight into how something might become legitimate or illegitimate. The following sections, therefore, discuss some each of the above types of legitimacy in more detail.

3.5.1 Normative and sociological legitimacy

Normative legitimacy is where an institution has a "right to rule" (Buchanan & Keohane 2009, p. 29), typically through a chain of authority descending from a formal constitution, through political representatives and then in accordance with the rule of law. For instance, a *bus lane* might have *normative legitimacy* if it in accordance with strategic policy, has been implemented in accordance with planning legislation and has received the required approvals from the local council, road authority or other governance institution. *Sociological legitimacy*, in contrast, is where an institution "is widely *believed* to have the right to rule" (Buchanan & Keohane 2009, p. 29). For instance, there may not be a widespread belief that a *bus lane* should be implemented if people impacted by loss of parking, added traffic congestion or other negative effects object to a change to the status quo**.**

A lack of *sociological legitimacy* for transit priority implementation, despite their being *normative legitimacy*, may help to explain why opposition sometimes occurs through external political avenues, outside of a project's public consultation processes[114]. *Normative* and *sociological legitimacy* may also impact transit priority implementation within government authorities themselves. Institutional boundaries are widely recognised as an impediment to transit priority implementation (Pulichino 2003; Baker et al. 2004; Pulichino & Coughlin 2005; Currie 2016a; Ryus et al. 2016; Reynolds et al. 2017), such as where there are "conflicting ideologies of the traffic

[112] For example, technical analysis to determine that a bus lane is warranted might be required to make its implementation *normatively legitimate*). However, this would require a legislative or regulatory instrument to already exist that sets such a hurdle. Even then, there might be debate within an road authority or other engineering-focused policy-making arena about whether such technical analysis (which, for example, might have been prepared by an external consultant working on behalf of a transit authority proposing a bus lane) is *legitimate* based on detailed review of whether the assumptions, modelling decisions etc. are *reasonable*[113].

However, if the decision about whether or not to implement a bus lane is instead being made in a more general public policy-making arena, such as at a local council meeting, technical analysis might simply be considered *legitimate* because of *trust* in engineering experts to have 'done the maths' correctly. Such technical analysis might also not be all that important to a political decision-maker. They might instead be more concerned about the level of *public consent* for a new bus lane or whether following a possible (*normatively legitimate*) policy goal to improve transit might have to be *conditional* on, for example, the amount of local opposition to loss of parking.

[113] A somewhat common conclusion to Transport Impact Assessment reports is something along the lines of 'the proposed development can be reasonably accommodated on the road network'. Alternatively, there may be a list of proposed improvements to the road network (e.g. new lanes, new intersection controls etc.) that would allow a proposal to be 'reasonably accommodated' without significant impacts to other road users. Similarly, technical analysis related to the implementation of transit priority measures often seeks to determine whether, on balance, the negative impacts are reasonable given the benefits provided by prioritising transit. This might include assessment of whether traffic delays (due to reduced capacity for general traffic if, for example, an existing lane is converted to exclusive bus use) remain above a 'reasonable' threshold, whether the costs of construction are 'reasonable' given the expected financial or economic benefits (e.g. Benefit Cost Ratio (BCR) > 1), or some other technical measure of reasonableness (e.g. a bus lane warrant, net travel time impacts etc.). In transport, however, there appears to often be a lot of 'shades of grey', rather than a clear-cut boundary between 'reasonable' and 'not reasonable'.

[114] This links back to the discussion in Section 3.4 of the *Arnstein Gap* and how the public might become disillusioned with public involvement processes that exclude them from meaningful involvement in decision-making.

engineers vs the public transport planners”(Currie 2006, p. 14). Road authorities might often be in the best position to exercise their (*normatively legitimate*) direct powers over traffic lights and the operation of TSP to preference traffic flow, which may be why “some bus planners have suggested that bus lanes are preferable” (Currie 2006, p. 14). A *bus lane* clearly demonstrates that buses are the only legitimate users of that road space. In contrast, the TSP research literature expends considerable effort on eliminating or minimising the impacts of transit priority on other road uses[115], perhaps due to the *sociological legitimacy* of the idea that roads are for cars (Norton 2007; Goodyear 2012) and the dominance of *traffic perspectives* in evaluation.

3.5.2 Consent

> *“It is the consent of persons within a state to the authority of the state that legitimates the state with respect to those persons”* (Meyer & Sanklecha 2009, p. 3).

Legitimacy by consent in democratic countries often occurs through systems of political representation and the *delegation* of *citizen control*[116]. The public votes to decide who shall be their political representatives. These representatives then oversee the various bureaucratic processes involved in the operational management of transportation networks, as well as themselves directly making major decisions through legislative processes or executive powers.

Legitimacy by consent can be interpreted in two ways:

- *historical consent* suggests that because the outcomes of a decision-making process have been accepted in the past then if the same process is used again the outcomes will again be accepted; and
- *hypothetical consent* assumes that because “hypothetical parties in the hypothetical position might have hypothetically consented to certain rules” so will actual parties in that position (Meyer & Sanklecha 2009, p. 3).

However, *historical* or *hypothetical consent* alone may not be sufficient for *legitimacy* (Meyer & Sanklecha 2009, pp. 3-5). For instance, just because a *bus lane* was acceptable in the past does not mean that it will be acceptable in the future. Nor will transit priority measures necessarily be acceptable or obeyed, either hypothetically or in reality, just because they have been accepted or obeyed somewhere else.

An immediate way of testing whether there is *legitimacy by consent* is to have direct *citizen control* over decision-making. This approach was relevant in Zürich, where citizen’s directly voted for a ballot initiative calling for transit priority implementation[117] (Nash 2001, 2003). However, processes

[115] For example see Wu and Hounsell (1998, pp. 572-5); Hounsell et al. (2000); Baker et al. (2004); Hounsell et al. (2004); Currie (2006); Danaher (2010); Beatley (2012, p. 119); Ahmed et al. (2016); Ryus et al. (2016, pp. 26-7).
[116] Comes from *Arnstein’s ladder*, as discussed in Section 3.4.
[117] Discussed in detail in Chapter 7.

that enable such direct public involvement in road management appears to be rare in practice. Additionally, in *car-centric cities* it would appear unlikely that technically warranted or otherwise *reasonable* transit priority measures would obtain *legitimacy by consent* from a majority of (car-using) voters.

3.5.3 Legitimacy by reasonableness, or as unconditional duty

Legitimacy by reasonableness relates to the *service conception of legitimacy*[118] (Meyer & Sanklecha 2009, pp. 5-6) and concepts of the fairness of outcomes[119] (Netelenbos 2016, pp. 226-30). An example relevant to transit priority is that by "the most conservative warrant" (Vuchic 2007, p. 245) a *bus lane* is *reasonable* if the number of bus passengers exceeds the average number of people per lane in private vehicles. More generally, in congested conditions it would be *unreasonable* for a bus full of people to be given the same importance as a car with a single occupant.

Typically, a traffic fine for driving in a *bus lane* will apply regardless of whether or not a bus is actually delayed. This is an example of an *unconditional duty* (Netelenbos 2016, pp. 62-9) or a "content-independent obligation to obey" (Meyer & Sanklecha 2009, p. 6). A traffic law (with *normative legitimacy*) may require other drivers to stay out of a *bus lane*, regardless of whether the *bus lane* itself is *reasonable*, although there may be exceptions that allow other vehicles to enter the *bus lane* when *reasonable*[120]. Despite a reliance on compliance with traffic laws for the effectiveness of many transit priority measures, *legitimacy by reasonableness* and *unconditional duty* do not appear to have been used to study transit priority. However, the results of empirical research of driver attitudes to tram lanes in Melbourne (Currie 2009, p. 66) provides some indications of how *legitimacy by reasonableness* and *as unconditional duty* may relate to transit priority. This study found that:

- 16% of drivers would not drive in tram lanes because it is illegal – perhaps responding to their *unconditional duty* to obey the law;

[118] "...an authority is legitimate for a person when (a) by obeying its orders that person will do better at acting for the reasons that she ought to act for independently (the normal justification condition), and (b) the authority takes those independent reasons into account when it issues its directives (the dependence conditions)"(Meyer & Sanklecha 2009, pp. 5-6). A translation into the context of transit priority might be:

- If the impacts of letting a bus full of passengers go in front of them are small; then
- it is something that car drivers should be doing anyway, so that
- a lot of passengers are not delayed by a much lower number of people in cars; therefore
- it is reasonable for a road authority to install a *bus lane*; if
- there are a lot of bus passengers; and
- the negative impacts on private vehicles are reasonably small.

The comparison of the large number of people on the bus who would be stuck in traffic versus a smaller number of people in private vehicles who might be momentarily delayed if the bus was to go first is the normal justification condition. The road authority having taken this into account when deciding whether to install a *bus lane* is the dependence condition.

[119] See Johnson (2004, p. 4) and concepts of *authorisation* (describing how the process of making a decision is acceptable and/or fair) and *endorsement* (where the decision itself is acceptable and/or fair).

[120] For example, in Victoria other road users are allowed into a *bus lane* for up to 100 metres when turning, to overtake a right turning vehicle, to avoid an obstruction, or if they are a cyclist (VicRoads 2019a).

- 30% of drivers reported that they would not drive in the tram lanes to avoid delaying trams – suggesting that tram priority has *legitimacy by reasonableness* for these drivers; and
- 10% and 2% of drivers did not drive in the tram lane so to avoid crashes or a possible fine, respectively – perhaps suggesting more utilitarian reasons for complying with the rules.

Enforcement and education programs can provide additional incentive for drivers to comply with transit priority, at least in the short term (Currie 2009, p. 67). However, many aspects of traffic engineering appear to have consistent compliance problems[121]. Unfortunately, *legitimacy theory* does not appear to have been widely applied to the study of traffic laws. It may be that for many road users the need to obey traffic laws is accepted in principle, but in practice their individual behaviour is more related to the magnitude of likely consequences for non-compliance and whether they consider a traffic law to be *reasonable* under the circumstances. This relates to the conditionality of legitimacy, which is discussed in the following.

3.5.4 Legitimacy as conditional normative support

<u>*Conditional normative support*</u> refers to how an idea might be supported only under certain conditions. For instance, increasing transit's speed and reliability might receive widespread support, but only if it does not involve removing parking to install a *bus lane*. Likewise, transit improvements are often touted as a way of reducing traffic congestion and supported by many, as long as it is <u>someone else</u> who switches to transit (Levinson & King 2019, p. 199).

Netelenbos (2016, pp. 71-113) discusses how *conditional normative support* relates to political conflict across the arenas of the <u>*political system*</u>, <u>*political game*</u> and <u>*political theatre*</u>. The *political system* describes the governance, electoral processes, and other practices that are used to elect and install governments, which typically have active support through the normative rule of law and unconditional legitimacy. However, in the day-to-day *political game* decisions are cognitive and conditional on what various actors are willing to actively trade for political support. Politics itself can also be a form of *theatre* where the "actual result of political decisions….is not about interest satisfaction but about symbolic satisfaction"(Netelenbos 2016, p. 105) of *normative* goals in front of a relatively *passive* electorate[122].

Conditional normative support appears to be relevant to *NIMBYism,* in which opposition to a proposal is typically *conditional* on the proximity to someone's backyard or interests, rather than to the content of the proposal in general. People may be indifferent to a proposal or policy direction,

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[121] For example, speed enforcement (Amanda et al. 2005, p. 406), pedestrian behaviour (Jason & Liotta 1982; Norton 2007), cyclists' compliance with red lights (Johnson et al. 2011; Johnson, Charlton, et al. 2013), and attitudes and behaviours related to cyclists' use of streets (Basford et al. 2002; Longhurst 2015).

[122] There is typically a period of time between 1) a policy announcement, 2) the impact of a policy being felt by the voters and 3) the voters having an opportunity to actively engage with the system through voting (Netelenbos 2016, p. 113) (p.113). As such *political theatre* can be more about being seen by a passive electorate to be doing something in line with normative goals, rather than actively changing the real world.

as long as its impacts are *not in my backyard*. *NIMBYism* is discussed in transportation research[123], but does not appear to have been widely considered in the context of *legitimacy theory* or transit priority implementation.

3.5.5 Legitimacy as trust

Legitimacy as trust is based around the idea that politics is a process of coordination and communication, with *legitimacy* expressed through organisational structures, power allocation and a "subjective leap of faith" (Netelenbos 2016, pp. 119-68). This type of *legitimacy* is relevant to many areas in civil engineering that are highly technical and so effectively opaque to most of the general public[124]. The engineering profession has a *trusted* role in society, and non-engineers often have little to no involvement engineering matters except as clients or in the event that there is a failure and a need for a public enquiry to restore confidence[125]. *Legitimacy* underscores much of the work that engineers do. Technical processes such as design reviews, regulatory body approval processes and compliance with design codes are used to demonstrate that designs or other technical work can be trusted[126].

In transportation, many decisions remain almost solely within the scope of engineering practice[127]. However, not all decision in transport policy are made by engineers. For many policy-making processes technical analysis may be just one of many inputs[128].

The *Dunning-Kruger effect*[129] (Dunning 2011) may help to explain why many people can feel comfortable engaging in debate about transportation policy, despite having little understanding of traffic and transportation engineering. Most people travel daily and so may have strong opinions about how the system should be operated or made better, and enough exposure to give them

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[123] Including, for example, how *NIMBYism* intersects with sustainable urban development (Kenworthy 2006), transportation planning (Richardson & Haywood 1996; Mees 2003a; Legacy 2015; Legacy et al. 2017), tactical urbanism (Lydon & Garcia 2015), bus services (Vuchic et al. 1994; Weitz 2008) and stops (Martin 2014, p. 14), transit oriented development (Nieweler 2007; Cervero & Dai 2014), and transit priority (Pulichino 2003) amongst many others.

[124] For example, building structural safety remains a highly technical field in which the engineering profession's role is "protecting the public" (Ellingwood 2001, pp. 170-5).

[125] For example, the Royal Commission into the Failure of West Gate Bridge (Barber 1971).

[126] Further examples include the licensing and accreditation systems are sometimes used to determine who is *legitimately* an engineer and can therefore be *trusted*. Similarly, *the ritual of the calling of an engineer* is a "ceremonial 'initiation' devised by [Rudyard] Kipling and undertaken by generations of engineers on qualification in Canada" (Fox 1994) in which an oath is taken reflective of the *trust* placed in engineers to design and oversee construction where error or oversight can potentially have life and death consequences.

[127] For example, the road safety impacts of phase lengths, yellow and all-red periods at traffic signals have been widely researched (Kennedy & Sexton 2009, pp. 18-22) and engineers typically have the final say over signal timing settings.

[128] For example, the public debate over red light cameras in Texas, USA, involved conflict between the role of these cameras as a road safety measure versus as a tool for revenue raising (Hayden 2009). Another example, from Victoria, Australia, is how the setting of speed limits was reported on by a parliamentary committee (made up of members of parliament, rather than engineers) who heard from road safety researchers and other technical experts, but also from municipal authorities, an automobile club and bicycle interest groups (Road Safety Committee Victorian Parliament 1995).

[129] The *Dunning-Kruger effect* is a theory from social psychology that people with low expertise tend to overestimate their skill levels, in part because they are ignorant of their own ignorance. This "meta-ignorance" can be hidden by basic misconceptions or the use of "reach-around knowledge" through which relatively uninformed people might think that the small amounts of knowledge they have about a topic are enough for them to make sound judgments on that topic (Dunning 2011, pp. 256-9).
However, "there is a threshold (of knowledge) that has to be met for people to make inappropriate claims of expertise" (Dunning 2011, p. 259). This may suggest why there might be greater *trust* in engineering judgement in some areas than in others. For example, structural or geomechanics engineering may be more likely to be 'left to the experts', whereas most people have some knowledge of transportation through daily use as a passenger, driver, cyclist or pedestrian, and so may feel somewhat qualified to make judgements about speed limits, red light cameras or other aspects of the system.

confidence that their viewpoint is correct, regardless of what any technical analysis or studies might say:

> *"Everyone, citizen and politician alike, believes themselves an expert on their own commute, (which is true) and on transport problems generally (which is not) …Due to daily failures of transport systems, which are political problems, there is a great deal of scepticism about the competence of transport professionals. Just as respect for expertise has diminished in other sectors of American society, the respect for the engineers and planners has fallen farther than it has deserved. No sector is perfect, but the recommendations of most transport engineers and planners and economists when not being leaned on by politicians are generally far better solutions than those actually implemented"* (Levinson & King 2019, pp. 352-3).

Transportation technical analysis may not have as much *legitimacy through trust* as other, more opaque, engineering fields (particularly if the techno-rationally 'best' option put forward does not match someone's anecdotal experience as a driver, passenger, cyclist or pedestrian). This lack of *trust* is a problem for transit priority. For example, Ryus et al. (2016, p. 133) suggest that it may sometimes be necessary to share a *bus lane* with high-occupancy vehicles, taxis and bicycles "to give it a greater appearance of being used", as if drivers stuck in traffic congestion observe a seemingly empty and unused *bus lane* next to them they may question the *bus lane*'s *reasonableness*[130]. This may be in part due to a lack of *trust* in the engineers and road managers responsible for its implementation, but also through the *Dunning-Kruger effect* and a *traffic*, rather than *mobility*, perspective on efficiency:

> *"The public, and even most of the transportation authorities and planners, are blinded by the attraction of the "free space" between buses on exclusive busways. They do not understand that "filling the space" with the automobiles and other vehicles deteriorates the performance of buses…" (Vuchic et al. 1994, p. 33).*

If you are used to driving a car then "filling the space" with vehicles might seem like the way to increase road use efficiency. What is hidden is that <u>road use efficiency is a function of people per unit of time, **not** vehicles per unit of space</u>. However, transit priority research literature is yet to link this misconception explicitly to the Dunning-Kruger effect or other theories from social psychology.

Some research highlights the importance of public education in transit priority implementation, perhaps as a way to build *trust*. However, there is an emphasis on "designing a transit priority system that <u>minimizes **perceived** inefficiency</u>" (Nash 2001, p. 34)(emphasis added). This may suggest hiding

[130] "The problem is that a single exclusive transit lane with one fully loaded bus or tram every two minutes carries more people than a lane completely filled with cars – but the transit lane looks empty compared to the auto lane. This generally enrages those in the congested auto lane, and they argue that the transit lane is inefficiently used" (Nash 2001, pp. 33-4).

from, rather than directly addressing, challenges to the legitimacy of transit priority implementation that are based on public misunderstanding.

This, therefore, appears to be the challenge for practitioners in transportation engineering generally:

> *How can practitioners gain the legitimacy as trust needed to support techno-rationally findings of how best to manage, operate and improve traffic and transit systems?*

In some technical fields, such as structural engineering, there may be sufficient *trust* to allow decision-making by engineers alone, and so implementation might proceed almost solely on techno-rational grounds. However, the general public, politicians and most members of society have daily exposure to transportation systems, and so may consider that they can make sound judgements that are as valid or have more validity than engineering judgement about what is the 'best' way to improve conditions. Hence, technical evidence may not be believed, considered definitive, or otherwise have the *legitimacy* that is needed to support transit priority implementation when public decisions are being made about transportation systems.

3.6 Conclusions and research gaps

Chapter 3 has explored *public policy analysis*, public involvement in decision-making and *legitimacy theory.* It started, in Section 3.2, with an exploration of public decision-making in transportation, ranging from *rationalism*-based *strategic transportation planning,* through the *bottom-up* approach of *tactical urbanism*, and finally to political advocacy, activism and direct action that seeks to change how road systems are used and managed through more radical means. Despite this range of activity, transport policy research tends to focus on quantitative analysis in a manner that is "…indicative of a dominant techno-rational approach" (Marsden & Reardon 2017, p. 248). There are isolated examples of research and engineering practices that cross over these boundaries[131]. However, the concepts and research from *public policy analysis* and related areas do not appear to be widely applied in transportation research and practice, and this appears to be a significant gap in the literature.

Urban planning research appears to be much more at home in the political and policy-making fields. Jacobs (1961), Mees (2000, 2003a, 2010, 2011), Legacy et al. (2017); Legacy and Taylor (2018), Lerner (1996, 2007, 2014, 2018) and many other planners tackle policy and politics in their research and professional work. Traffic engineering may be starting to address some of these issues, but there remains a strong techno-rationalism flair. Meanwhile battles for the right to use the street bubble away beneath the surface, and the prioritisation of on-road public transport is just one issue seeking *legitimacy* in the sometimes highly political contests surrounding road use.

Chapter 2 concluded with a critique of transit priority research. This found that the transit priority research literature has:

- a limited consideration of *public policy analysis* perspectives;
- a focus on *institutions* and 'buy in';
- a lack of engagement with *incrementalism*;
- a focus on technical success instead of political context; and
- a lack of engagement with the real-world issues of politics and power.

This chapter has reviewed *public policy analysis*, *legitimacy theory* and related areas. These research areas are clearly very relevant to transit priority implementation. However, there appears to have been little use of *public policy analysis* and *legitimacy theory* to understand how and why transit priority might succeed or fail in different cities or political contexts. It is unclear whether transit priority implementation is more likely to succeed using *strategic transportation planning*; *bottom-up* approaches such as *tactical urbanism;* or approaches such as *Network Operational Planning* that

[131] For example, and as discussed in this chapter: there is an emphasis on public involvement in *LATM* schemes; *agenda-building models* have been used to study transit priority implementation (Pulichino 2003; Pulichino & Coughlin 2005); and the *Arnstein Gap* has been identified as a problem in transportation planning (Bailey & Grossardt 2006).

seek to combine *top-down* policy implementation with *bottom-up* community and stakeholder engagement.

Some *strategic transportation plans* have lacked public legitimacy and failed (Mees 2011) and there is a gap between the level of public involvement desired and the levels delivered (Bailey & Grossardt 2006), leading to a lack of *legitimacy* and a “crossroads over the future of public involvement” in transport planning (Booth & Richardson 2001). However, *street reclaiming*, *LATM* and *tactical urbanism* approaches that actually do emphasise public involvement, citizen control and/or independent unsanctioned action have not been widely adapted to transit priority implementation. Such approaches may not be desirable, successful or even possible as, unlike in bicycle advocacy, there does not appear to be any widespread political or social movements supporting greater levels of transit priority. Regardless of the *normative legitimacy* of *bus lanes*, drivers may have an “inflated sense of entitlement” (Gorgan 2019) and sense of *sociological* or *unconditional legitimacy* around the idea that roads are primarily for moving cars. Whether transit priority implementation can be supported and legitimised through activism, direct action, and protest movements remains unclear, but appears unlikely.

While *rationalism* based approaches are widely used in assessing transit priority proposals, <u>*public policy analysis* research</u> suggests that these approaches do not necessarily result in better decisions or respond to the complexity of real-world decision making (Parsons 1995; Das & Bing-Sheng 1999; Klein 1999; Marsden & Reardon 2017). Theoretical models of *institutional*, *incremental, political*, and *garbage can* transit priority implementation (Reynolds et al. 2017) remain untested against empirical experience. However, institutional factors have led to the removal of *TSP* systems, the benefits of transit priority helping contract performance rather than service delivery and the limitation of transit priority through road focused perspectives (Currie 2016a, pp. 489-90), so these non-rational models clearly have relevance. Despite the right of the public to be involved in decisions that affect them (Stopher & Stanley 2014, p. 57), members of the public may struggle to really understand the issues surrounding transit priority implementation, but still believe that they are an expert (Levinson & King 2019, pp. 289, 352-3). This is evidence by the ‘empty *bus lane*’ problem (Vuchic et al. 1994, p. 33; Nash 2001, pp. 33-4), which transit research has long been aware of but has not yet linked to the *Dunning-Kruger effect* (Dunning 2011) or other non-engineering research. Instead of using *social learning* approaches to address the basic misconceptions about moving people rather than vehicles, transit researchers have instead suggested making *bus lanes* ‘appear’ to be full (Nash 2001, p. 34; Ryus et al. 2016, p. 133). Such approaches appear unlikely to help to build *legitimacy through trust*.

<u>*Legitimacy*</u> is at the heart of engineering practice and transit priority implementation. <u>Processes</u> around implementing a new *bus lane*, and the <u>outcome itself</u> need to be *reasonable* and fair to obtain *authorisation* and *endorsement*, respectively. The law may require a *bus lane* (*normative legitimacy)*, but whether there <u>should be</u> a *bus lane* (*sociological legitimacy*) might rely on an election outcome (*public consent*), a *bus lane*’s *reasonableness*, the amount of parking that is lost

(*conditional*), and the level of *trust* in technical advice that a *bus lane* is the 'best' option overall. Despite this, theoretical knowledge about *legitimacy* does not appear to be informing transit priority implementation research or practices.

There are clearly wide research gaps between *public policy analysis, legitimacy theory* and related areas; and transit priority implementation. The key Research Gaps (RG) that relate to this study are a limited understanding of:

RG1: how public policy analysis, legitimacy theory and related research relates to transit priority implementation;

RG2: why some cities have transit priority supportive policies, but others do not;

RG3: whether simply changing the transport policy is all that is needed for transit priority implementation to be successful; and

RG4: how to successfully prioritise on-road transit services in the political and institutional contexts common in *car-centric cities*.

Research methodologies for exploring these gaps are discussed in the next chapter.

Chapter 4: Research methodology

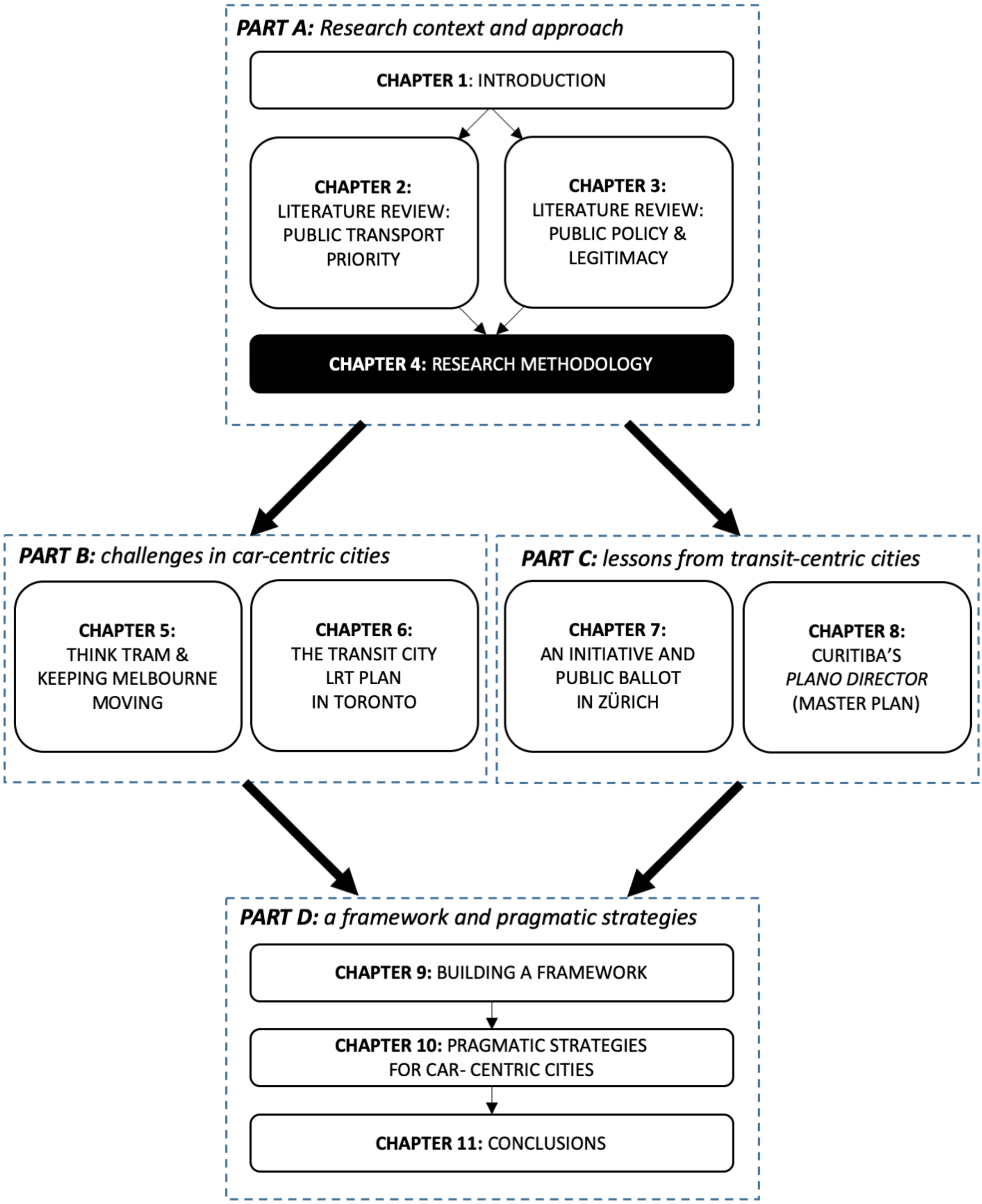

Figure 4.1 Position of Chapter 4 in thesis structure

4.1 Introduction

Chapter 2 closed with a critique of transit priority research, which found the literature to be dominated by techno-rationalism. There appears to have been limited consideration of *public policy analysis* perspectives in transit priority research and practice. Incremental implementation has been suggested in the BRT literature, but without connection to *incrementalism*, and this is generally symptomatic of transport policy's technical focus at the expense of political context, power and legitimacy. Chapter 3 addressed this thorough an exploration of the areas that appear to have been neglected by discussing public decision-making in transportation, *public policy analysis*, public involvement in decision-making and *legitimacy theory*. Chapter 3 closed with an identification of the gaps in research understanding that lie at the **intersection** of transit priority implementation **and** *public policy analysis*, *legitimacy theory* and related fields.

These gaps provide motivation and direction for this study. They relate to a limited understanding of: (**RG1**) how public policy analysis, legitimacy theory and related research relates to transit priority implementation; (**RG2**) why some cities have transit priority supportive policies, but others do not; (**RG3**) whether simply changing the transport policy is all that is needed for transit priority implementation to be successful; and (**RG4**) how to successfully prioritise on-road transit services in the political and institutional contexts common in *car-centric cities*. What is needed next, therefore, is a research approach by which to address these gaps.

This chapter, therefore, details the methodology adopted in this study to address these gaps in knowledge. It discusses the research objectives and questions for this study, and provides a justification for why a case study approach has been selected for this particular study. The motivations for the selection of each case are outlined, including the sampling approaches that have been adopted. Finally, this chapter outlines the overall study design, research objectives and the individual questions that are put to each case and implementation.

This chapter is structured as follows: Section 4.2 outlines the research aims, objectives and questions and how these relate to the identified research gaps. Section 4.3 discusses case study research methodology and why this approach has been selected. Section 4.4 describes the study design and includes details of the unit of analysis, case sampling approach and the implementations that are examined in later chapters. The limitations of the study design are discussed in Section 4.5 prior to a conclusion in Section 4.6. Further details of the methodology are also discussed in Appendix A.

4.2 Research aim, objectives and questions

The overall aim for this study is to:

Research Aim: *Identify strategies to improve transit priority implementation in car-centric cities.*

Strategic plans in *car-centric cities* might have *normative* objectives to increase transit mode share and limit budgetary expenditure. However, acceptance of measures implemented towards such objectives may instead turn out to be *conditional* on not making the status-quo worse for the average (or lowest-common-denominator) car-driving voter. The first Research Objective (RO) for this study, therefore, is to:

> **RO1:** Understand the challenges for strategic-planning-based transit priority implementation in *car-centric cities*.

But, what about strategic plans calling for transit prioritisation that have been successful? There may be insights available from *transit-centric cities* where on-road transit now has high levels of priority over other traffic. While the literature has focused on technical matters, the second research objective of this study is instead to:

> **RO2:** Identify the influence and contribution of legitimacy to successful transit priority implementation strategies, plans and initiatives in *transit-centric cities*.

Having explored what works and what does not work to legitimise transit priority implementations that are called for in strategic-level transportation plans the study then moves to:

> **RO3:** Make connections between transit priority implementation **and** *public policy analysis* and *legitimacy*.

The final objective for the research is to build strategies for practitioners seeking to put theory into practice. The objective is therefore to:

> **RO4:** Characterise approaches and strategies for legitimising priority implementation in *car-centric cities*.

Each of these Research Objectives is broadly relevant to the Research Gaps that were described in the preceding chapter. However, the gaps are wide and this thesis does not aim to completely fill the intersection of transit priority implementation, and *public policy analysis*, *legitimacy theory* and related fields. Rather, the Research Objectives outlined above are focused around increasing understanding around the use of strategic transport planning approaches to support priority implementation, and how to increase the likelihood of successful implementation in *car-centric cities*.

These four Research Objectives each lead directly to four Research Questions (RQ) for this study, which are:

> **RQ1**: Why has strategic priority implementation had mixed results in *car-centric cities*?
>
> **RQ2**: Why is the implementation of transit priority effective and *legitimate* in *transit-centric cities*?
>
> **RQ3**: How can *public policy analysis*, *legitimacy theory* and related research knowledge be used to better understand transit priority implementation?
>
> **RQ4:** How can transit priority be successfully implemented in *car-centric cities* (where prioritising bus, streetcar or tram services generally lacks legitimacy)?

These Research Questions map one-to-one with the Research Objectives. They also provide specific direction for the selection of a research methodology and a study design, which are discussed in the following sections.

4.3 Research method and study design

The research questions and topic suggest the use of social science methods. Yin (2009, p. 8; 2014, 2018) provides detailed guidance about the selection of an appropriate social science methodology, as shown in Table 4.1[132].

Table 4.1 When to use each research method, and relevance to this study

Method	Research question	Control of events?	Contemporary events?	Relevant to this study?	
Experiment	how, why?	Yes	Yes	No	There is no way to control a priority implementation in this study, so an experiment is not possible.
Survey	who, what, where, how many, how much?	No	Yes	No	Surveys do not relate to the how or why forms of research questions that are the focus of this study. Using a survey might result in an assessment of what people think about transit priority and legitimacy, rather than being based on how and why events have occurred in practice.
Archival analysis	who, what, where, how many, how much?	No	Yes / No	No	Some relevance, but transit priority implementation material is unlikely to be in archival material alone. Neither does archival analysis relate to the how or why forms of research questions that are the focus of this study
History	how, why?	No	No	No	Some relevance, but focus is on (relatively) recent events.
Case study	how, why?	No	Yes	**Yes**	**Relevant** as: the research questions are in the form of how and why; there is no way to have full control over a transit priority implementation during this study; and the focus here is on (relatively) recent events.

Source: COSMOS Corporation as shown in Yin (2009, p. 8)(columns 1-4)
Author's assessment (columns 5 &6)

RQ1 and RQ2 are 'why' questions, while RQ3 and RQ4 are both 'how' questions. However, as transit priority implementation is a large endeavour it is not possible to adopt an experimental approach for this study. The focus here is on (relatively) recent transit priority implementations so the use of historical methods is not relevant. This suggests adopting a case study methodology for this study.

4.3.1 Case study research

Case study research is a scientific method that involves examining a small number of cases in great detail, while at the same time seeking to generalise the findings to more than just those cases that are examined (Yin 2009; Barratt et al. 2011, p. 329; Ketokivi & Choi 2014; Yin 2014, 2018). Case study methodology is a widely used and developed approach that can have a very high impact[133] (Eisenhardt 1989; Voss et al. 2002). It is particularly useful when theory in the field of study is only at an early stage (Bonoma 1984; Benbasat et al. 1987; Eisenhardt 1989; Cavaye 1996; Darke et al. 1998; Meredith 1998; Stuart et al. 2002; Voss et al. 2002), as is the current situation here.

The research literature identifies a very wide range of advantages of case study methodology, as shown in Table 4.2. Of particular relevance for this study is that case study methodology allows research to be grounded in real-world context, but also strongly connected to existing theoretical knowledge. It also allows research to go to great depth, which can help in understanding causal factors.

[132] A full review of social science research methods and additional details of the adopted methodology are included in Appendix B.

[133] For example, *The death and life of great American cities* by Jane Jacobs (1961) used a case study research approach and has had a significant impact on the understanding of urban planning and related fields.

Table 4.2 Advantages of case study research methodology discussed in selected research literature

Advantages	Benbasat et al. (1987)	Bonoma (1984)	Eisenhardt (1989)	Dyer et al. (1991)	Cavaye (1996)	Darke et al. (1998)	Meredith (1998)	Stuart et al. (2002)	Voss et al. (2002)	Denscombe (2007)	Barratt et al. (2011)	Eisenhardt and Graebner (2007)	Ketokivi and Choi (2014)	Yin (2009, 2014, 2018)
An empirical research method that is well grounded in real-world context	✓	✓		✓		✓	✓	✓	✓	✓				✓
Useful when context is critical	✓	✓				✓		✓	✓		✓			✓
Allows strong connection to existing theory			✓						✓					✓
Allows great depth of research that can help in understanding casual factors	✓	✓				✓	✓	✓	✓	✓				✓
Widely used and developed approach						✓			✓	✓	✓	✓	✓	✓
Can help to explain ‘how’ and ‘why’						✓			✓	✓	✓	✓	✓	✓
Can be high impact			✓						✓					✓
Has high validity amongst practitioners		✓							✓					
Mixed methods and multiple data sources allow triangulation to strengthen findings	✓	✓	✓				✓	✓	✓	✓	✓	✓		✓
Can involve multiple researchers in providing a range of perspectives	✓		✓						✓		✓			✓
Can be used in small scale research of a single case or with only a single researcher										✓				
Useful when research and theory in the field of interest is at an early stage	✓	✓	✓		✓	✓	✓	✓	✓					
Useful if variables of interest are unclear	✓		✓		✓		✓							✓
Useful if there are more variables of interest than data points (i.e. cases)														✓
Appropriate methodology at any stage of research or theory development					✓			✓						✓
Can be used if there is no control of events	✓					✓	✓			✓				✓
Can be used if replication is not possible														
Can be used to study (recent) historical or current events, or in a longitudinal study									✓					✓
Is useful for when there are time lags								✓						
Particularly appropriate for studying implementation and organisations						✓								
Alternative to quantitative methods	✓	✓					✓	✓			✓			
Can produce testable theory			✓											
A flexible approach that can change as needed	✓		✓					✓	✓					✓
Adaptive, rather than closed														✓
Allows for drift	✓	✓							✓					
Allows for designed research	✓	✓	✓						✓					✓
Allows prediction	✓	✓							✓					
Can be used for disproving theories.	✓	✓	✓						✓					

Source: Author’s synthesis

Case study methodology is particularly flexible as the research approach can change during the study as the understanding of a phenomenon develops. However, it also allows for designed research, prediction and the structured testing of theory (Bonoma 1984; Benbasat et al. 1987; Eisenhardt 1989; Stuart et al. 2002; Voss et al. 2002; Yin 2009, 2014, 2018). Case study methodology can be used in exploratory, descriptive, theory generating, theory testing or theory elaboration research. However, it is also used in a range of non-research activities, including for evaluations, teaching cases, record keeping, and in journalism and popular literature (see Appendix A, Table B.2). Unfortunately, this has led to widespread confusion as to what formal case study research actually is, and how it differs from other uses of the term ‘case study’ (Bonoma 1984; Darke et al. 1998; Yin 2009, 2014, 2018). This can include confusion with other methods, and misunderstanding the differences between case study sampling versus sampling for ‘statistical significance’ in other forms of research, which can sometimes lead to a lack of acceptance of case study research as a valid research methodology (see Appendix B, Table B.3).

Case study methodology can in fact achieve scientific rigor through controlled observations, logical deductions, replicability and generalisability (Eisenhardt 1989; Meredith 1998; Stuart et al. 2002; Voss et al. 2002; Denscombe 2007; Siggelkow 2007; Yin 2009, 2014, 2018). In the same way that investigators "may choose to attain a "$p < .0001$" or even more stringent level" when a very high level of certainty is required, so might a case study researcher "press for five, six, or more replications" of a single case study if a very high degree of certainty is desired (Yin 2018). Although there is extensive literature on case study methodology and its validity as a research method, there remains challenges to getting case study research published due to widespread misunderstanding or opposition from those who "simply regard their own methods as superior" (Eisenhardt & Graebner 2007, p. 26). Despite these challenges and limitations, adopting case study methodology allows researchers to <u>go into great depth to understand a complex phenomenon</u>, rather than investigating a larger number of cases to only a shallow level (Denscombe 2007, pp. 54-5).

Studies and comparisons of individual cases, cities and projects are <u>already widely used in transportation research</u>. For example:

- many authors have compared the performance of transit systems in different cities using data from the *Millennium cities* database (UITP 2001), the *Mobility in cities* database (UITP 2015a), or the Urban Integrated National Transit Database (Florida Transit Information System 2018)[134];
- there is a large body of Light Rail Transit (LRT) and Bus Rapid Transit (BRT) research that has compared systems across multiple cities[135]; and
- Thomson (1977); Cervero (1998); Mees (2010) and many other researchers have used multiple case study designs to compare transportation systems and policy in different cities[136].

This established history of transportation research comparing across different cities lends weight to the adoption of a similar cross-case comparison methodology for this study of transit priority implementation.

[134] Examples of research that uses these databases and a multiple city comparative approach include Vivier (2001); Pulichino (2003, p. 11); Steriu (2015); UITP (2015b, 2016) and Currie and De Gruyter (2017).

[135] Examples include Garcia and Yamamoto (1994); Apel and Pharoah (1995); Levinson, Zimmerman, et al. (2003a); Pulichino (2003); Irazábal (2005); Hidalgo and Graftieaux (2008); Currie and Delbosc (2010); Danaher (2010); Hidalgo and Carrigan (2010); Vincent (2010); Wright (2010); Currie, Ahern, et al. (2011); Currie and Delbosc (2011, 2014); Mulley et al. (2014); Novales et al. (2014); Olesen (2014); Currie and De Gruyter (2016) and Ingvardson and Nielsen (2018).

[136] Of particular relevance to the cases selected in this study (see Section 4.4.3) there is a significant body of research comparing public transit in Melbourne and Toronto, including Mees (2000); Currie and Shalaby (2007, 2008); Woo (2009); Currie et al. (2012). As Melbourne and Toronto have similar urban densities, similar historical connections to the UK as English-speaking major cities in Commonwealth nations, and extensive tram/streetcar networks it is perhaps not surprising that the transportation systems in the two cities have been directly compared in previous research.

4.4 Study approach

Case study research is inherently flexible. The initial, tentative selection of cases, questions, propositions and other aspects of the study design can all change as the study develops and findings begin to emerge (Benbasat et al. 1987, p. 371; Eisenhardt 1989, p. 536; Stuart et al. 2002, p. 425; Yin 2009, 2014, 2018) and "it is not uncommon for the research question to evolve over time and for the constructs to be modified, developed or abandoned during the course of the research" (Voss et al. 2002, p. 201). Bonoma (1984, pp. 204-5) describes how case studies initially involve "drift", as the researchers "learn from naturalistic phenomena as they present themselves". Voss et al. (2002, p. 216) similarly describe how hypothesises are shaped thorough "an iterative process, whereby the emergent themes, frameworks or hypotheses are compared with data from each case". A study moves to a more formally designed stage "with the development of a tentative explanation of the divergent observations so far collected" (Bonoma 1984, pp. 204-5), development of a case study protocol, and sometimes a pilot study undertaken to help to "develop relevant lines of questions - possibly even providing some conceptual clarification for the research design as well" (Yin 2018).

Evolution, drift, iteration, design and revision have all been part of the development of this study. However, this process is not described in detail in this thesis. Rather, the following outlines the final study approach that has been adopted, and which more directly led to the study's findings.

4.4.1 Unit of analysis

Defining a unit of analysis provides clarity about the boundaries of what is being studied in each case (Benbasat et al. 1987; Yin 2009; Barratt et al. 2011; Yin 2014, 2018). Unfortunately, the boundaries of an individual instance of 'transit priority implementation' can vary extensively. An implementation might involve anything from the installation of a single measure through to a city-wide program or plan for prioritisation. Defining the unit of analysis in terms of 'an instance of transit priority implementation' is therefore not feasible.

Hence, in this study a 'case' is defined using geographical location, with the primary unit of analysis being **a city**[137]. This thesis therefore describes case research about **cities that have implemented transit priority**. Each individual instance of transit priority implementation that is examined is embedded within the larger context of a city, as discussed in the following.

4.4.2 Type of study design

There are four types of case study designs: *single holistic*; *single embedded*; *multiple holistic*; and *multiple embedded* (Yin 2009, p. 50). *Holistic* and *embedded* studies differ based on whether there

[137] Unfortunately, cities themselves do not always have clear boundaries, and statistical and governance boundaries do not always match up to land use patterns, particularly along the fringes, However, because this is a study of transit priority implementation rather than cities themselves a precise geographical boundary definition for each case was not considered necessary. In general, this study adopts the same definitions for the limits of each case study city as those used by local statistical agencies or those used by the authors of source material. This means that each case city is considered to include both the central municipality and any surrounding local government authorities that are part of the same 'agglomeration', major city statistical area or city-region.

is a single unit of analysis or whether sub-units of analysis are also considered. *Single* and *multiple* case study designs differ based on the number of cases studied. This study adopts a *multiple embedded* study design. Transit priority implementations are the sub-units, which are embedded within cities as the main unit of analysis. Multiple cases are included in the study to respond to the need to compare transit priority implementation in different cities to answer RQ1 and RQ2, and to deliver a generalised response to RQ4.

4.4.3 Sampling approach

The case research methodology literature provides guidance on case selection and the sampling approaches that might be adopted, as shown in Table 4.3[138].

Table 4.3 Case selection and sampling approaches discussed in selected research literature

Case selection and sampling approach	Benbasat et al. (1987)	Eisenhardt (1989)	Darke et al. (1998)	Meredith (1998)	Stuart et al. (2002)	Voss et al. (2002)	Denscombe (2007)	Eisenhardt and Graebner (2007)	Barratt et al. (2011)	Ketokivi and Choi (2014)	Yin (2009, 2014, 2018)
Theoretical sampling:	✓	✓		✓	✓			✓	✓	✓	
polar extremes		✓		✓	✓	✓	✓	✓	✓	✓	✓
similar results (replication)	✓	✓				✓		✓	✓		✓
opposite results		✓			✓	✓		✓	✓		
a leading example		✓	✓		✓	✓		✓	✓		
a critical case		✓	✓	✓			✓				✓
a particularly revelatory case		✓		✓		✓		✓			✓
a representative (or typical) case		✓			✓	✓	✓				✓
a longitudinal study (a case studied over time)											✓
a particularly unusual case							✓				✓
Random sampling		✓							✓		✓
Convenience sampling	✓				✓	✓	✓		✓		✓
Forced case selection							✓				
Opportunistic sampling							✓	✓			✓

Source: Author's synthesis

This study primarily uses a *theoretical sampling* approach, based around selecting cases based on the *polar extremes* of *transit-* versus *car-centric cities*[139] and successful versus not-as-successful

[138] Much of the literature emphasises the need for a *theoretical sampling* frame where cases are chosen because they are: *particularly revelatory*; *unusual*; *representative* of typical conditions; or if there are other reasons that make them "particularly suitable for illuminating and extending relationships" (Eisenhardt & Graebner 2007). *Random sampling* of cases is explicitly rejected by Eisenhardt (1989, p. 537) as "neither necessary, nor even preferable", while Yin (2018) highlights it as an example of a common misapplication of statistical methods to case study research. Denscombe (2007) warns against selecting cases based solely on *convenience*, which "should only come into play when deciding between equally suitable alternatives" (p.34). However, practicality is a factor, with both Stuart et al. (2002) and Yin (2018) suggesting that local subjects should be selected for pilot case studies. Sometimes there is not a choice, with external funding arrangements or other requirements resulting in *forced case selection* (Denscombe 2007, p. 35). *Opportunistic sampling* relates to selecting cases based on having an unusual opportunity for access, or the case having been a 'one-off' event (Denscombe 2007, p. 35; Eisenhardt & Graebner 2007, p. 27; Yin 2018).

[139] Various transit and car mode splits are reported for all four cities included in this study, as shown in Appendices C and D. In general, however, the transit mode share for all trips in (Greater) Melbourne is 10.5% (Loader 2019), while in the Greater Toronto and Hamilton Area (GTHA) it is 16% (Transportation Information Steering Committee (TISC) et al. 2018). For the journey-to-work transit mode share is 18.15% (Loader 2018) and 18% (Transportation Information Steering Committee (TISC) et al. 2018) in Melbourne and Toronto respectively.

Transit mode shares in Zürich and Curitiba are in the order of 40-45% for all trips and 75% for the journey to work (see details and sources in Appendix D, Table D.2 and Table D.6).

This study does not draw a distinct quantitative boundary between *car-* and *transit-centric cities* (see further discussions of this issue in Section 4.5, 9.5.2, 11.3.1 and 11.5.3). However, the large differences apparent in the transit mode splits between Melbourne and Toronto, and Zürich and Curitiba provide the basis for the classification of the four cities into these two groups.

outcomes from strategic-plan-led implementation efforts. *Convenience*, *forced, and opportunistic sampling* were also relevant to the selection of cases in this study.

Many cities have implemented transit priority measures, and there are many alternatives that might have been selected[140]. In general, those selected have a history of transit priority implementation [*leading examples*], are familiar to the researchers [*opportunistic sampling*], and had good availability of and coverage in literature material [*convenience sampling*]. More details of the case selection are included in Appendix B, including a mapping of the selected cases to relevant sampling approaches (see Table B.9), while more detailed descriptions of the cases themselves are included in the relevant chapters later in this thesis. The selected cases and the *theoretical*, *convenience*, *forced*, or *opportunistic* rationales for their selection are discussed in the following section. Relevant sampling approaches are *highlighted in italics and surrounded by* [*square*] *brackets*.

Selected cases (cities)

Melbourne, Australia was initially chosen as the researchers are based there and the funding for the study also came from a Melbourne-based road authority [*convenience* and *forced sampling*]. Melbourne has extensive radial networks of both heavy and light rail, with the largest mixed-traffic tram (streetcar) system in the western world (Currie & Shalaby 2007). It is well known for its iconic historic W-class trams, which still provide service on selected routes (Wilson & Budd 2014). However, Melbourne is really a *car-centric city*. Much of the metropolitan area consists of sprawling suburbs in which most of the population is served primarily by buses, many of which are only very lightly patronised (Currie 2016b, 2017; Jacks 2019a).

Melbourne's efforts at using top-down initiatives and strategic-level transport and land use plans to support transit prioritisation have not always been entirely successful. The *Tram Priority Program* (later *Think Tram*)(Yarra Trams et al. 2004) was initiated out of directions set in the *Melbourne 2030* plan for "sustainable growth" (VicDoI 2002). However, *far side stops* installed as part of the pilot scheme in Clarendon Street, South Melbourne, were removed following a compromise with local stakeholders (Currie & Shalaby 2007, p. 36) and the overall results of *Think Tram* itself were well short of what was targeted (Currie, Goh, et al. 2013). More recently, the *Keeping Melbourne Moving* program (VicDoT 2008; Whittaker 2009) led to the installation of *bus lanes* on Stud Road. However, parts of these were eliminated in fulfilment of an election promise after a change of state government (Public Transport Users Association 2011)[*unusual* or *revelatory sampling*].

Toronto, Canada was a logical second inclusion as a case study city. There are many similarities between Toronto and Melbourne (including population, density, geographical size, history,

[140] A list of potential cases was assembled at an early stage in the development of the case study protocol for this study. This list was developed primarily from review of transit priority implementations that have already been reported in the research literature. For example, review of Levinson, Zimmerman, et al. (2003a) provided a list of 26 cities where BRT has been implemented, which were initially considered for inclusion in this study.

importance as centres of governance, culture, quality of life and language)[*sampling for replication*] and there is already extensive research directly comparing the two cities[141]. Toronto also has a mix of heavy rail, streetcar/tram and bus networks despite being generally car-dominant due to large areas of low-density suburban development.

Toronto has similarly had challenges and setbacks in transit priority implementation (Currie & Shalaby 2007)[*sampling for replication*], including the abandonment of the *Transit City* plan. *Transit City* laid out a scheme to prioritise on-street buses and build seven new LRT lines across the City of Toronto (City of Toronto & Toronto Transit Commission 2005; Moore 2016; Bow 2017a), but was cancelled after the election of Mayor Rob Ford (Kalinowski & Rider 2010). However, one of the LRT lines (the *Eglinton Crosstown LRT*) is still going ahead and is currently under construction in a form that is largely similar to that envisaged by *Transit City* (Toronto Transit Commission 2010), despite opposition and pushes for further changes to reduce impacts on private motorists (Bow 2017a, 2018). More recently extensive transit priority has been implemented along the King corridor in the Downtown, which was trialled during the *King Street Transit Pilot* and ultimately adopted on a permanent basis (City of Toronto 2019b)[*unusual* or *revelatory case*].

The next two cases were chosen to include places with highly successful track records of transit priority implementation [*polar extremes* of Melbourne and Toronto]. **Zürich, Switzerland**, has had a long running programme of transit priority implementation [*leading case*] following the passing of the 1977 *Citizens' Transit Priority Initiative* in a public vote [*unusual* or *revelatory case*], which provided the strategic policy direction, initial funding and political support (Nash 2001, 2003; Nash et al. 2018). Zürich is included as an example where there have been high levels of legitimacy for transit priority implementation in a democracy, with direct *citizen control* of (some) decision-making.

Curitiba, Brazil, likewise has had a long running and well-known history of transit priority implementation [*replication*]. The city's high capacity BRT network has been examined in a large body of research literature, much of focuses on technical innovations and the city as a leading example for transit systems elsewhere [*leading case*]. The importance of Mayor Jaime Lerner to the success of BRT in Curitiba has been highlighted by many authors, but he was first appointed (rather than elected) while Brazil was ruled by a military dictatorship [*unusual case*]. He served three non-consecutive terms as mayor, including being directed elected for his third term in 1992 after the country's shift back to democratic national government (Smith & Hensher 1998, p. 140). Curitiba is of particular interest due to the mix of authoritarian and popularly-elected governments, and Lerner's long running involvement and leadership, which provide insights into how power and legitimacy can support transit priority implementation [*unusual* or *revelatory case*]. However, perhaps less well known is that throughout the long period over which BRT system has developed the city has been guided by its *Plano Diretor* (Master Plan). This plan has helped to set the strategic

[141] See listing of examples of previous research comparing Toronto and Melbourne shown in footnote 136 on page 95.

direction for transportation and land use towards a linear development along various 'structural axes' (Pulichino 2003; Ardila-Gomez 2004; Duarte 2013; Rosário 2016).

The selection of four cities fits within the four-to-ten range recommended by many authors[142]. While, more cases can "augment external validity and help guard against observer bias…(and) create more robust and testable theory than single case research" (Barratt et al. 2011, p. 231), with too many " it quickly becomes difficult to cope with the complexity and volume of the data" (Eisenhardt 1989, p. 545). As discussed in the following, this guidance has informed the selection of sub-units, with only seven individual instances of transit priority implementation included across the four cases in this study.

Selected sub-units (implementations)

Each of the selected case study cities have had long and complex histories of transit priority implementation. Any attempt to study transit priority implementation as a whole in each of the cities would have led to overwhelming complexity and a huge volume of data. As such, this study has adopted an *embedded* study design and only examined selected implementations in each city. Importantly, it should be noted that this research does **not** attempt to describe **all** transit priority implementation in the case study cities. Neither does the study attempt to exhaustively catalogue variations of transit priority implementation. Rather, cities and individual transit priority implementations are included where these can **add value** to the study.

The sub-units are discussed in more detail in the relevant chapters that follow. However, Table 4.4 summarises the selected sub-units (implementations) and how they map to outcomes.

Table 4.4 Mapping key case study cities and implementations to outcomes

	Case (unit of analysis)		Implementation	Outcomes		
City	transit- centric	car-centric	(sub-unit of analysis)	unsuccessful	mixed	successful
Melbourne		✓	Clarendon Street Pilot & Think Tram		✓	
			Stud Road Bus Lanes	✓		
Toronto		✓	Transit City & Eglinton Crosstown LRT	✓		✓
Zürich	✓		Citizens' Transit Priority Initiative			✓
Curitiba	✓		*Rua des Flores* mall			✓
			Structural axes and busways			✓
			Bus boarding tubes			✓

Source: Author's assessment.

Melbourne has two sub-units: the partially-removed *Clarendon Street Tram Priority Pilot*, which was part of the *Think Tram* program; and the unsuccessful implementation of the *Stud Road Bus Lanes*. Only one implementation in Toronto is studied in detail in this study; the cancelled *Transit City LRT plan*, but this includes the currently-under-construction *Eglinton Crosstown LRT* and so is perhaps an example of a (net) mixed outcome. The successful *King Street Transit Pilot* is briefly discussed in Chapter 10, but for reasons of brevity has not been formally included as a sub-unit in this study. For Zürich, the study again uses only a single embedded sub-unit: the successful 1977 *Citizens' Transit Priority Initiative*. Like *Think Tram* and *Transit City*, this Initiative has led to the implementation of

[142] Including Eisenhardt (1989); Cavaye (1996); Darke et al. (1998); Meredith (1998); Stuart et al. (2002); Barratt et al. (2011).

many individual measures, but for the purposes of this study it is examined at a high level with the focus on the city-wide events.

Curitiba has had a long history of transit priority implementation since Mayor Lerner's initial appointment as mayor in 1971 and the earlier development of the *Plano Diretor* city plan. In this study events in Curitiba are broken up into three sub-units. Surprisingly, the first sub-unit actually involves the implementation of the *Rua des Flores* (street of flowers) **pedestrian** mall, rather than the implementation of transit priority measures. However, the pedestrian mall is an important part of the Curitiba story as its ultimately successful implementation (despite challenges from motorists and other stakeholders) helped to build *legitimacy* to support the later successful implementation of the *structural axes and busways*, which is the second sub-unit in Curitiba. The third sub-unit of analysis is the successful implementation of a new system of *direct bus services and bus boarding tubes*. Despite these tubes being an iconic and well-known feature of Curitiba's BRT, they were not actually introduced until the 1990s, some 20 years after the first *busway* was built[143].

4.4.4 Overall study design

This study is structured around a *multiple embedded* design, which encompasses four cases as shown in Figure 4.2.

[143] The argument made in *Time, policy, management; governing with the past* is "that time is a vital, pervasive, but frequently neglected dimension in contemporary public policymaking and management"(Pollitt 2008, p. xi). Time is clearly relevant in transit priority implementation itself, but also has significance to the selection of the cases studied in this research. Implementation of transit priority across the selected cases spans a huge time frame, ranging all the way back to the mid-20th century when Zürich was voting on the *Tiefbahn* ballot proposal (see Chapter 7) and Curitiba was abandoning the *Agache Plan* and beginning to develop the *Plano Diretor* (see Chapter 8), through to the present. In fact, Chapter 10 briefly discusses the *King Street Transit Pilot* in Toronto, which was ongoing (and visited) during the course of this research, and has only recently been made permanent.

There would clearly be benefits to restricting the selected cases to a group that occurred contemporaneously to each other. However, on balance there appeared to be greater benefits to be had by including the *leading examples* of Zürich and Curitiba in this study, which necessitated examining historical events. Further research might seek to more fully understand current priority implementation practices in Zürich and Curitiba in depth (although Nash et al. (2020) provide a recent update of further progress in Zürich, which has been incorporated into Chapter 7).

The successes in Zürich and Curitiba might, in part, be an example of "processes that simply take a long time" (Pollitt 2008, p. 16). The order in which events have occurred (ibid. p. 20) also appears relevant given that this study is interested in why efforts to replicate transit-priority-based technological solutions (from Zürich and Curitiba) in other contexts have not necessarily been as successful as might have been expected. This implies looking back further into the past in Zürich and Curitiba when these systems were starting to be implemented there.

Of course, there are many differences between mid-20th-century Europe or Brazil and conditions in Australia or Canada today. However, the disadvantages of looking at implementation across different time periods appear to be outweighed by the benefits of a greater understanding of how and why Zürich and Curitiba got to where they are, and what this might tell us about where to go from today in other cities.

This issue is also addressed, in part, through the process of generalising from the cases. See the discussion of the duality criterion in Appendix B (Table B.5), Section 9.5 and Section 11.3.3.

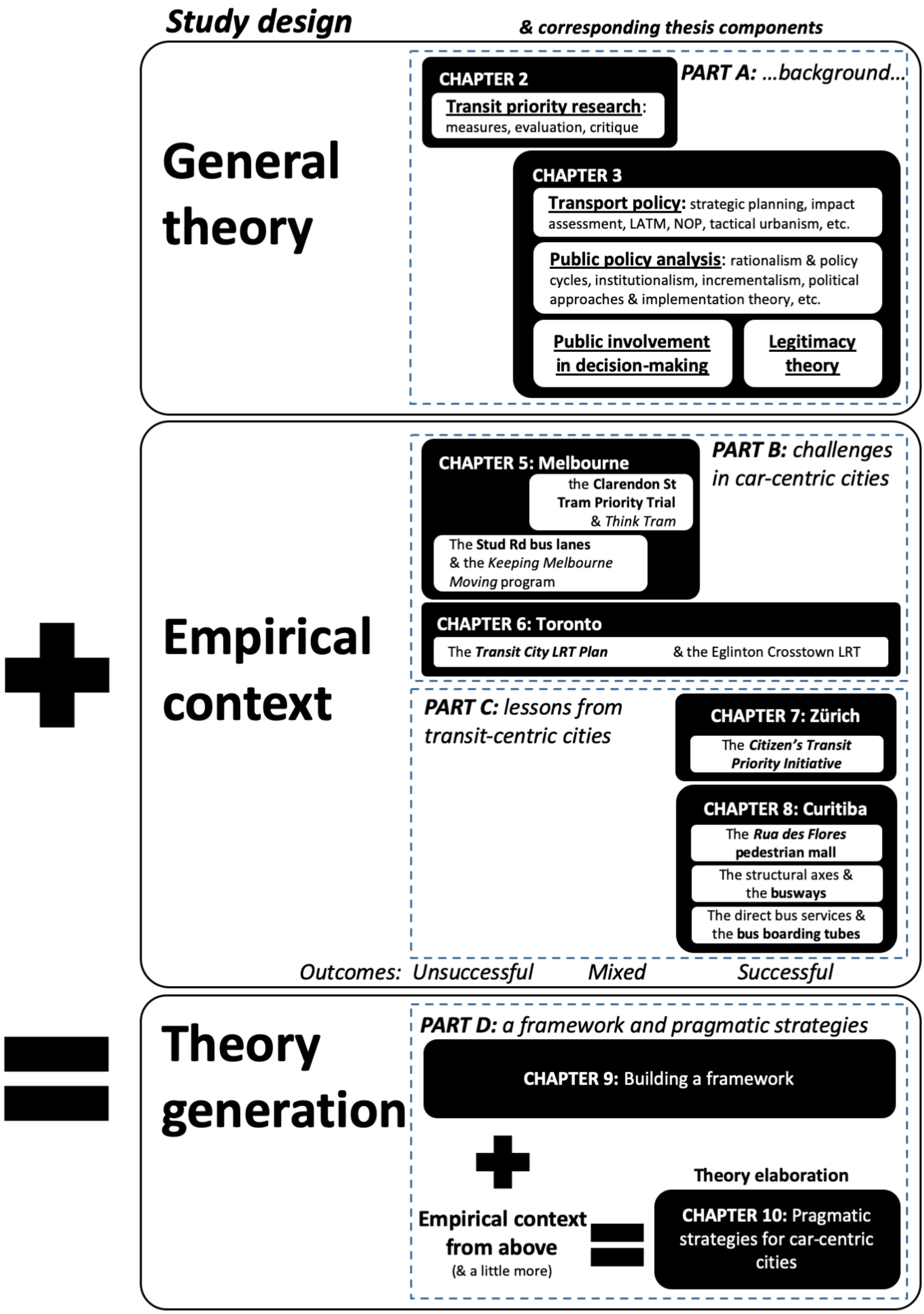

Figure 4.2 Study design and thesis structure

Source: Author's concept

The majority of the study is focused on theory generation, undertaken through the combination of:

- existing general theory from:
    - transit priority (reported in Chapter 2), and
    - transport policy, *public policy analysis*, public involvement in decision-making, and *legitimacy theory* (Chapter 3); with
- empirical context from case studies of Melbourne, Toronto, Zürich and Curitiba (Chapters 5 to 8).

The output of this is a new *framework for transit priority and legitimacy*, which is described in Chapter 9[144]. However, the study design **also** includes a small amount of theory elaboration in Chapter 10. This is shown below in Figure 4.3 (which is a reproduction of the lower part of Figure 4.2

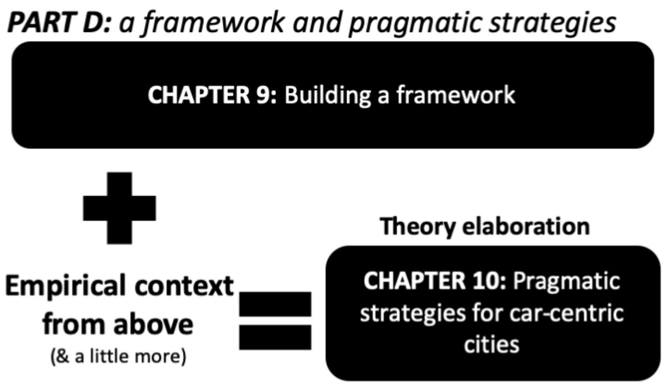

Figure 4.3 Study design: theory elaboration component (Chapter 10)
Source: excerpt from Figure 4.2, previous page

This theory elaboration involves the combination of:

- the new (theoretical) *framework for transit priority and legitimacy* developed earlier in the study (in Chapter 9); and
- empirical context from:
    - the case studies of Melbourne, Toronto, Zürich and Curitiba; and
    - (a little bit more through) additional examples from Melbourne, Toronto, Zürich, Curitiba and Boston, which provide further instances of real-world transit priority implementation that have informed this study[145].

The result of the theory elaborating component of the study are nine *pragmatic strategies for transit priority implementation in car-centric cities*. These are described in Chapter 10 of this thesis.

[144] This new framework is the major research outcome of this study. Therefore, the majority of the thesis is structured to concentrate and converge the case narratives included in Chapter 5 to 8 towards Chapter 9.

[145] These might have been included as additional sub-units (implementations) in some of the cases (Melbourne and Toronto) or as additional cases. However, to reduce the complexity of the study and the thesis these have not been included in detail in the main part of the case research (as reported in Chapters 5 to 8).

In summary, the study combines theoretical knowledge with empirical context of successful transit priority implementation (in *transit-centric cities*), and mixed outcomes and not-so-successful implementation efforts (in more *car-centric cities*). The first output is a new framework developed through theory generation in response to RQ1, 2 and 3. To respond to RQ4 the study also briefly includes theory elaboration in Chapter 10, which extends the new framework to develop *pragmatic strategies for transit priority implementation in car-centric cities*.

4.4.5 Case study questions

Case study questions have been used in this study to guide the study of each city. Yin (2009, 2014, 2018) defines five levels of questions that can occur in a case study: those asked during an interview (Level 1); questions about an individual case (Level 2); comparisons between difference cases (Level 3); research questions for an entire study (Level 4); and questions about how policy approaches should change based on the findings of a study (Level 5). The case study questions developed for this study are shown in Table 4.5.

Table 4.5 Case study questions relevant to this study

Code	Question	Level	Question directed at?
Study research questions			
RQ1	Why is transit priority implementation effective and *legitimate* in *transit-centric cities*?	4	Entire study
RQ2	Why is the implementation of transit priority effective and *legitimate* in *transit-centric cities*?	4	
RQ3	How can *public policy analysis*, *legitimacy theory* and related research knowledge be used to better understand transit priority implementation?	4	
RQ4	How can transit priority be successfully implemented in car-centric cities (where prioritising bus, streetcar or tram services generally lacks legitimacy)?	4	
Context questions			
1	What is the governance structure in the city?	2	Main unit of analysis (city)
2	What is the population of the city?	2	
3	What is the size of the city?	2	
4	What is the population density of the city?	2	
5	What is the transit usage / ridership in the city?	2	
6	What is the transit mode split?	2	
7	What is the private automobile mode split?	2	
8	What is the car ownership rate?	2	
9	What is the road network like in the city?	2	
10	What is the transit network like in the city?	2	
11	How does this city compare to the other cities in this study in terms of general context?	3	
12	What was the transit priority implementation?	2	Sub-units of analysis (instance of priority implementation)
13	What were the events?	2	
14	How did the transit ROW or level of priority change?	2	
15	Was the implementation process successful?	2	
16	Did the implementation have successful outcomes?	2	
17	How did the process and outcomes of this implementation compare to other transit implementations in the city?	2	
18	How did the process and outcomes of this implementation compare to transit priority implementations in other cities?	3	
Legitimacy questions			
19	How was *normative legitimacy* relevant to the implementation?	2	Sub-units of analysis (instance of priority implementation)
20	How was *sociological legitimacy* relevant to the implementation?	2	
21	How was public *consent* relevant to the transit priority implementation?	2	
22	How was *reasonableness* relevant to the implementation?	2	
23	How was *legitimacy as unconditional duty* relevant to the implementation?	2	
24	How was *conditional normative legitimacy* relevant to the implementation?	2	
25	How was *legitimacy through trust* relevant to the implementation?	2	
26	How did legitimacy related to this implementation compare to other transit priority implementations in this city?	2	
Summary questions			
27	In general, how is transit priority implemented in this city?	2	Main unit of analysis (city)
28	In general, how does transit priority implementation in this city compare to the other cities in this study?	3	

Notes
Source: Author's synthesis
1. Table rows grouped and shaded to according to what each question is directed at (column 4)

RQ1, RQ2, RQ3 and RQ4 are all Level 4 questions, and are directed at the entire study. There are 18 context questions, 11 of which are directed at each city and 7 at each instance of implementation. Most of these are Level 2 questions, but Question 11 and Question 18 are both Level 3 questions involving cross-case comparison. Questions 19 to 26 are focused around the legitimacy of each implementation. All of these involve Level 2 questions directed at each sub-unit of analysis. The final two questions are directed at the main unit of analysis, and involve a summary (Question 27, Level 2) and cross-comparison (Question 28, Level 3). There are no Level 1 questions as this study does not use interviews, as discussed in the next section.

Responses to the case study questions for each of the cities and implementations are summarised in Appendices C and D. In general, the process for this study involved the preparation of reports for the individual case studies, then summary reports making cross-comparisons between the two *car-centric cities* and between the two *transit-centric cities*. Each of these reports focused on answering the case study questions through review of literature about each city and implementation[146].

4.4.6 Data sources

All of the cities included in this study have already been extensively studied in previous research[147]. Therefore, this study does not seek to collect fresh primary data, but instead reinterprets what knowledge already exists in academic and other sources, such as reports, project websites, and the records of decision-making bodies[148]. In general, this data was obtained using a 'snowball' search strategy, starting with mentions of the cases in the literature reviewed in Chapters 2 and 3 and then following citations and references to locate other material. Informal searches of databases,

[146] The individual case study reports form the basis for Chapters 5 to 8, but have been reduced in length. The cross-case comparison reports form the basis for Appendices C and D. This process of case study reporting and cross-case comparison was undertaken as per the guidance of the case study methodology literature, in particular Yin (2009, 2014, 2018). The reports also made use of data tables, as per Miles and Huberman (1994) to facilitate the collection, interpretation and cross-comparison of data about each of the cases and implementations. A selection of these are included in Appendices C and D. Following the initial cross-case comparison, the structure described in Chapter 9 was developed to facilitate cross-case comparison between all four cases, which led to the development of the framework and then the pragmatic strategies described in Chapter 10.

[147] Cervero (1998) includes detailed case studies of Curitiba (pp. 265-296), Zürich (pp. 299-318) and Melbourne (pp. 319-339), as well as general discussion of Toronto (pp. 83-90). Likewise, Mees (2000, 2010) provides in-depth studies of Melbourne, Toronto and Zürich amongst other cities. Curitiba has also been extensively studied in the BRT and urban planning research literature Including by Rabinovitch (1992); Worcam (1993); Rabinovitch and Hoehn (1995); Rabinovitch and Leitman (1996); Major (1997); Rabinovitch (1997); Smith and Hensher (1998); Kroll (1999); Wright (2001); Goodman et al. (2005); Fox (2008); Lara (2010); Lindau et al. (2010b, 2010a); Cervero and Dai (2014); Charner (2014); Martinez et al. (2016) and Rosário (2016).

[148] For example, the Clarendon Street tram priority pilot project is discussed in published research (Currie & Shalaby 2007), but there is a large amount of other material about this project that is readily available including:

- communication kits (VicRoads Media and Events Unit 2004);
- promotional information (Yarra Trams et al. 2004);
- technical reports (Smith 2005; Yarra Trams 2005a);
- protest group websites (Quin 2005b);
- media releases (Batchelor 2005b; Quin 2005a);
- newspaper reports (Silkstone 2005); and
- records of decisions made by councils and other bodies (City of Port Phillip 2005; City of Port Phillip & South Melbourne Business Association 2005).

newspaper records, internet sites and archives were also used to locate material relevant to each case[149].

Where necessary, people involved in the various transit priority implementation projects have been contacted to gain access to materials that are not readily available. However, interviews have **not** been used as a source of data in this study. An extensive programme of interviews would have been needed, and the complexity of such an international undertaking was considered to outweigh the benefits of direct access. Researchers have already used interviews and contact with people involved in implementation to explore transit in the selected case study cities[150]. Participants have also published research about transit priority implementation efforts[151]. This study therefore seeks to increase understanding by using and reinterpreting this previous work, rather than interviewing participants again, but with a different set of questions.

Multiple approaches and data sources can be used in case research (Denscombe 2007, pp. 56, 63-4). This study makes use of this by leveraging the extensive literature that already exists about the four case study cities. However, new primary data collection has been avoided, and this study instead uses the lenses of *public policy analysis*, *legitimacy theory* and other related knowledge to the re-examine the existing research and practice literature[152].

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[149] More systematic literature reviews might be considered for future research about these cases, but in general the amount of information that is readily available on most of the cases appeared sufficient for the purposes of this study. This is predominately a theory generating case study, with a small amount of theory elaboration in Chapter 10. For the purposes of this study there does not appear to be a need to obtain every single record about each of the cases and implementations included in this study, as this appears likely to only add further details rather than significantly add to the generalised findings. A systematic literature review (using a pre-defined search strategy) to locate every record about each case or implementation might be more suited to a theory testing approach where even a very small detail might be sufficient to find an inconsistency between an existing theory and actual real-world experience.

[150] Participant interviews are present in previous publications about Zürich, such as Nash (2001, 2003) and Nash et al. (2020) and about Curitiba, such as Fox (2008), Lindau et al. (2010a) and Ardila-Gomez (2004). Additionally, various other researchers have acknowledged assistance from practitioners in Melbourne and Toronto, such as: Currie and Shalaby (2007, 2008), Currie and Lai (2008), Woo (2009) and Mees (2000, 2010). It is acknowledged that these previous studies do not appear to have focused on applying legitimacy theory to transit priority, and so their participants are unlikely to have been asked questions about 'legitimacy' directly. However, issues that are relevant to politics, power and legitimacy are evident in findings, quotations and other materials reported in this previous literature, which has been included in this study and is cited where relevant in the various chapters.

[151] For example Joos (1989, 1990, 1994), Lerner (1996, 2007, 2014) and Currie and Smith (2006).

[152] That is not to say that there are not potential benefits and research insights that might be gained by undertaking extensive interviews of transit priority implementers or other forms of primary data collection with a focus on transit priority implementation. Rather, just that primary data collection was not used in this particular study for a range of reasons including: the challenge of recalling events that have occurred a long time ago (e.g. Zürich's Citizens' Transport Priority Initiative was developed in the 1970s), access to participants, etc.. Sections 11.3.1 and 11.5.3 discuss the issue of using only secondary data in this study and the potential for future research, including interviews with participants, to further explore, test and elaborate on issues of legitimacy and transit priority implementation.

4.5 Limitations of the research methodology

Section 4.3.1 above describes some of the common criticisms and misunderstandings, challenges and limitations associated with case research methodology. These are identified and directly responded to in Appendix A (see Table B.3 to Table B.7). This section, however, discusses further limitations of the research methodology and study design, beyond the criticisms, challenges and limitations that are common to case research.

One notable absence in this study is any exploration of failure or mixed success in a *transit-centric city*. This is a deliberate omission for two reasons: Firstly, transit priority implementation failure that is due poor engineering, construction or management is not of particular interest in this study. There is already a wealth of technical research knowledge about the technical aspects of transit priority, as discussed in Chapter 2, and so examining technical failure is unlikely to fill a research gap. Nor would this respond to the research questions. Secondly, challenges to the legitimacy of transit priority implementation appear to have also occurred in *transit-centric cities* (not just in the *car-centric cities*). The narratives that follow in Chapters 7 and 8 suggest that despite the strong technical justification that can be present in *transit-centric cities* there can still be significant opposition and challenges to priority implementation, at least early on. While, this opposition sometimes led to inaction, limited action or delayed action, part of the reason for focusing on these cities in this study is that these challenges were eventually overcome.

Another limitation is a lack of clear definitions: the terms *car-centric*, *transit-centric*, *success*, *mixed success* and *unsuccessful* have all been used in the study design, but none of these have been precisely defined. However, this is intentional and also somewhat inevitable given the qualitative nature of this research. While the *failure* and *removal* of a transit priority scheme might be relatively easy to define, the differences between a complete *success*, *mixed success*, and an *unsuccessful* implementation are not as clear. As such, these terms are used qualitatively and in a general sense. Likewise, *car-* and *transit-centric cities* are intentionally not clearly defined[153]. Instead, the terms *car-centric* and *transit-centric cities* are used in a broad, generic sense to provide structure to this thesis, rather than in a precise quantitative manner where an arbitrary threshold makes a city *transit-centric* or *car-centric*.

[153] In discussing the conceptual model of three different city transport polices: *car-dominant*, *transit for peak-period traffic relief*, *transit-dominant* (Chapter 2, Section 2.3.3) Currie (2016a, p. 492) states that "[i]n practice all cities probably exhibit aspects of policy of each of the types…in separate parts of the city". This would be similarly a problem for any precise definition of *car-centric* and *transit-centric cities*.

4.6 Discussion and conclusions

This chapter has outlined this study's research objectives, aims and questions. The study adopts a multiple embedded case study design. It explores transit priority implementation (sub-units of analysis) in both *car-* and *transit-centric cities* (the main unit of analysis). Cities have primarily been selected for theoretical sampling reasons, although forced, opportunistic and convenience sampling reasons have also had some influence on the selection of the cases. Importantly, this research does not attempt to exhaustively describe transit priority implementation in each of the case study cities. Rather, implementations are included where these can add value by being an example of a particular aspect of transit priority implementation.

Case study methodology is often misunderstood or criticised for lacking scientific rigor due to a lack of statistical significance. Eisenhardt (1989); Meredith (1998); Stuart et al. (2002); Voss et al. (2002); Denscombe (2007); Siggelkow (2007); Yin (2009); Ketokivi and Choi (2014, p. 239); Yin (2014, 2018) have all provided counter-arguments and a defence of the scientific validity of case study methodology. That is not to say that case study methodology is not without its challenges and limitations (which have also been discussed in this chapter). However, case study methodology's duality of being grounded in context, yet seeking generalisation, and its use of both empirical context and existing theory make it a suitable methodology for this study of transit priority implementation.

Common criticisms, misconceptions and other issues related to case study methodology are discussed further and responded to at length in Appendix B with respect to their applicability to this study. However, this may not be sufficient to build confidence in this specific study design. Fortunately, Denscombe (2007, p. 65) provides a list of questions to help researchers **confirm** whether a selection and design of case study methodology is justified. As shown in Table 4.6 the study methodology described in this chapter allows positive responses to the Denscombe (2007, p. 65) questions. Overall, this suggests that the selection and design of the case research methodology for this study will appropriately address the research questions.

The next chapter of the thesis, therefore, moves on to discuss transit priority implementation in Melbourne relating to the *Think Tram* and *Keeping Melbourne Moving* programs.

Table 4.6 Questions to confirm that a case study method is appropriate, and responses relevant to this study

No.	Question	Response relevant to this study	
		Yes /No	Comment
1	Is the research based on a 'naturally occurring' situation?	Yes	Although parts of the process of transit priority implementation are 'designed', the overall systems and processes that lead to, support or otherwise impact transit priority implementation is a naturally occurring outcome of governance structures, context and the interactions of humans.
2	Have the criteria for selection of the case (or cases) been described and justified?	Yes	Case study selection and rationale is described in Section 4.4.3.
3	Has the case been identified as a particular instance of a type of social phenomenon (e.g. kind of event, type of organization)?	Yes	The case has been identified as a city (a type of social organisation) while sub-units have been identified as an instance of transit priority implementation (a type of event).
4	Have the significant features of the case been described and have they been compared with those to be found elsewhere among the type of thing being studied?	Yes	Case study selection and rationale is described in Section 4.4.3.
5	Is the case a fairly self-contained entity?	Yes	Cities are fairly self-contained entities generally defined by statistical boundaries.
6	Have the boundaries to the case been described and their implications considered?	Yes	The boundaries of each case are, as above, generally defined by statistical boundaries. Boundaries of sub-units of analysis (the implementation) are defined on an implementation by implementation basis, given the difficulty of defining the boundaries of 'an implementation' more generally.
7	Has careful consideration been given to the issue of generalizations stemming from research?	Yes	The research makes use of existing general theory to leverage the existing generalisations made through research from public policy analysis and related areas. It also includes two transit- and two *car-centric cities* to provide replication, which helps to build confidence in generalisation made in this research.
8	Does the research make suitable use of multiple methods and multiple sources of data?	Yes	The research makes use of research literature, government reports, newspaper articles and many other documents, as well as visits some of the case cities and informal discussion with participants and other interested and knowledgeable parties able to assist with gaining access to research material and understand about each case.
9	Does the research give due attention to relationships and processes, and provide a 'holistic' perspective?"	Yes	The research is grounded in public policy analysis and pays particular attention to institutional relationships, power and structures,

Source: Denscombe (2007, p. 65) (column 2)
Author's assessment (columns 3 & 4)

Part B: Challenges in *car-centric cities*

Chapter 5: Think Tram and Keeping Melbourne Moving

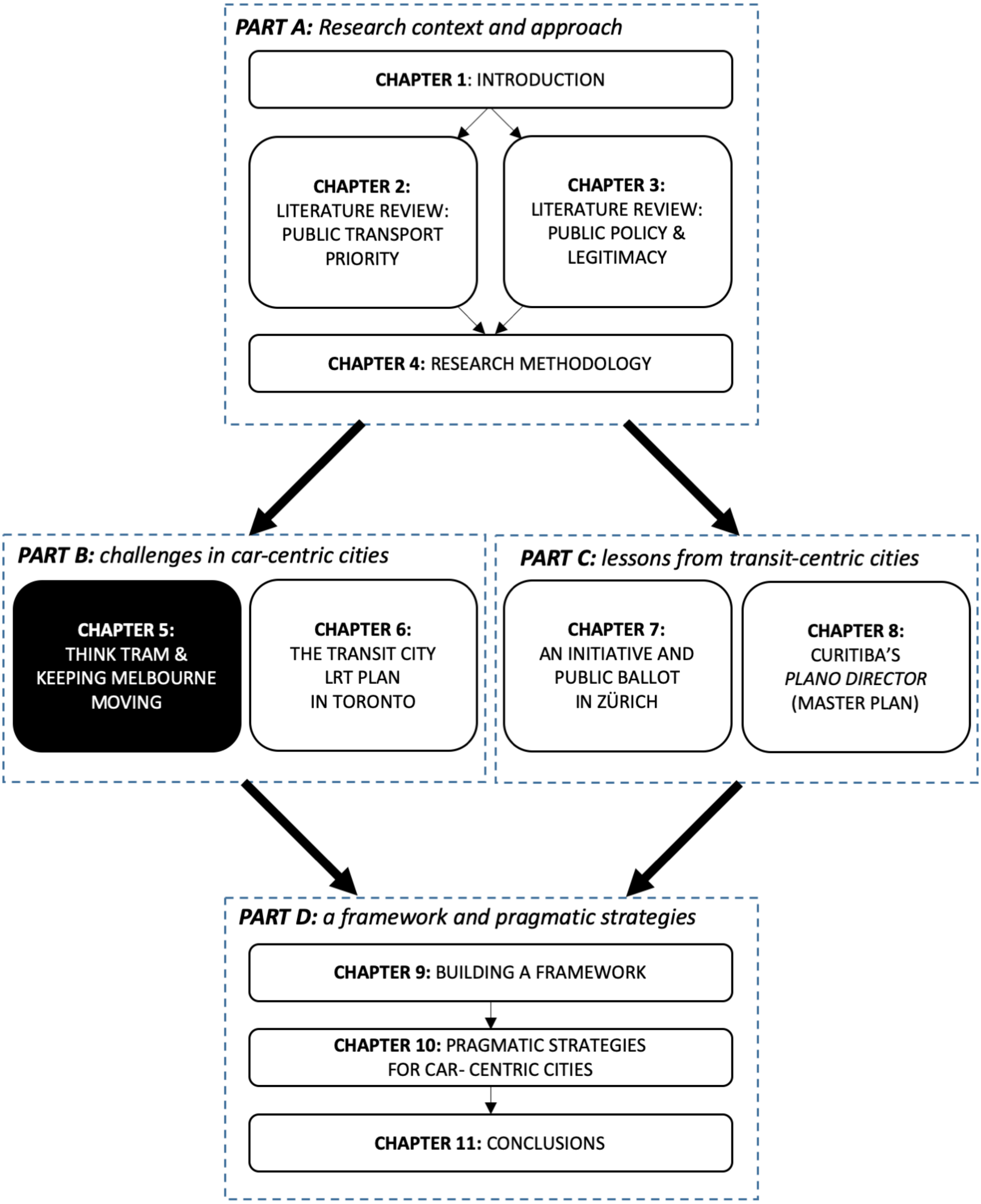

Figure 5.1 Position of Chapter 5 in thesis structure

5.1 Introduction

This is the first chapter in Part B of the thesis. The objective of this Part of the thesis is to understand the challenges that have been faced by strategic planning-led efforts to implement transit priority in *car-centric cities*. Part B consists of two chapters: this chapter about the *Think Tram* and *Keeping Melbourne Moving* programs in Melbourne, Victoria, Australia; and Chapter 6, which discusses the *Transit City LRT Plan* and the *Eglinton Crosstown LRT* in Toronto, Ontario, Canada.

Melbourne provides an interesting case for exploring why transit priority implementation might face legitimacy challenges in a *car-centric city*. This chapter explores two implementation efforts where top-down state government policies calling for transit prioritisation were defeated by more local interests relating to opposition from motorists and other stakeholders. The ***Clarendon Street Tram Priority Pilot*** was the first project in the *Think Tram* program, which was initiated through the *Melbourne 2030* land use and transport plan. However, the Clarendon Street measures were partially removed to reinstate **20** on-street parking spaces (VicDoI 2002; Smith 2005; Currie & Shalaby 2007; VicRoads various). Further to the east, the ***Stud Road bus lanes*** were implemented along a *SmartBus* route as part of the *Keeping Melbourne Moving* strategy. However, the lanes were partially removed following sustained opposition from motorists and a change of state government (VicRoads 2010; The Scarlett Syndrome 2011).

This chapter first discusses the overall city context of Melbourne in Section 5.2. The *Clarendon Street Tram Priority Pilot* and the *Think Tram* program are then discussed in Section 5.3. Section 5.4 examines the *Stud Road Bus Lanes* prior to a brief conclusion in Section 5.5.

5.2 City context

Melbourne is the capital of the State of Victoria. Victoria has a bi-cameral parliament that uses the Westminster system, with government formed in the lower house (Victoria State Government 2020a). Melbourne is centred on a Central Business District (CBD) in the inner local government area of the City of Melbourne. The CBD has a grid road system, a partially underground inner rail loop with five stations, and many tram and bus routes providing access from the surrounding suburbs. However, the term ‘Melbourne’ is typically used to refer to a much larger metropolitan region than just the City of Melbourne itself. Greater Melbourne is about 100km in diameter. It is Australia’s second largest city, with a population of over 4.5 million (Australian Bureau of Statistics 2017) and 32 local government areas.

Governance in Australia and Melbourne tends to be more centralised than is typical in many other countries. Most taxation powers are reserved to the Australian Federal Government. State Governments are funded through Commonwealth grants and revenue sharing arrangements, while local government services are funded through property rates (The Tax Institute undated)[154]. In Melbourne (and across the state) the Victorian State Government, rather than local councils, has responsibility for most functions. This includes policing and transport, with transit services, major arterial roads and freeways all under the control of the state government. Similarly, traffic lights, speed limits and most other major parts of the road traffic system are controlled by the state road authority. Local government is mostly responsible for the maintenance of local roads, garbage collection, libraries and recreational facilities, although some state government powers are delegated to local councils and their staff[155].

Much of the recent challenge for land use and transport planners has been to maintain Melbourne's high standard of living in the face of rapid population growth. Population growth in Melbourne is now faster than in any other Australia city Melbourne has consistently placed at the top of world rankings of 'liveable cities', but growth rates of over 2 percent per year are already placing pressure on transportation networks and infrastructure provision (Goodman 2018; Miller 2018). Population statistics are shown in Figure 5.2.

[154] In Australia there are some state taxes, such as stamp duty on property transfers. However, unlike in many other jurisdictions, local and state governments do not appear to have the power to add a sales or other local taxes to fund infrastructure investment. These authorities are instead reliant on federal grants or finding funding from within their existing budgets.

[155] For example, local government has control of on-street parking and footpaths, even on major arterial roads that are otherwise controlled by the state road authority. Local councils have an important role in assessing most planning applications and granting planning approvals. However, the state government Minister for Planning ultimately has the power to take over the review of a planning application, while the state-wide Victorian Civil and Administrative Tribunal provides a venue for planning appeals and dispute resolution (Victoria State Government 2017).

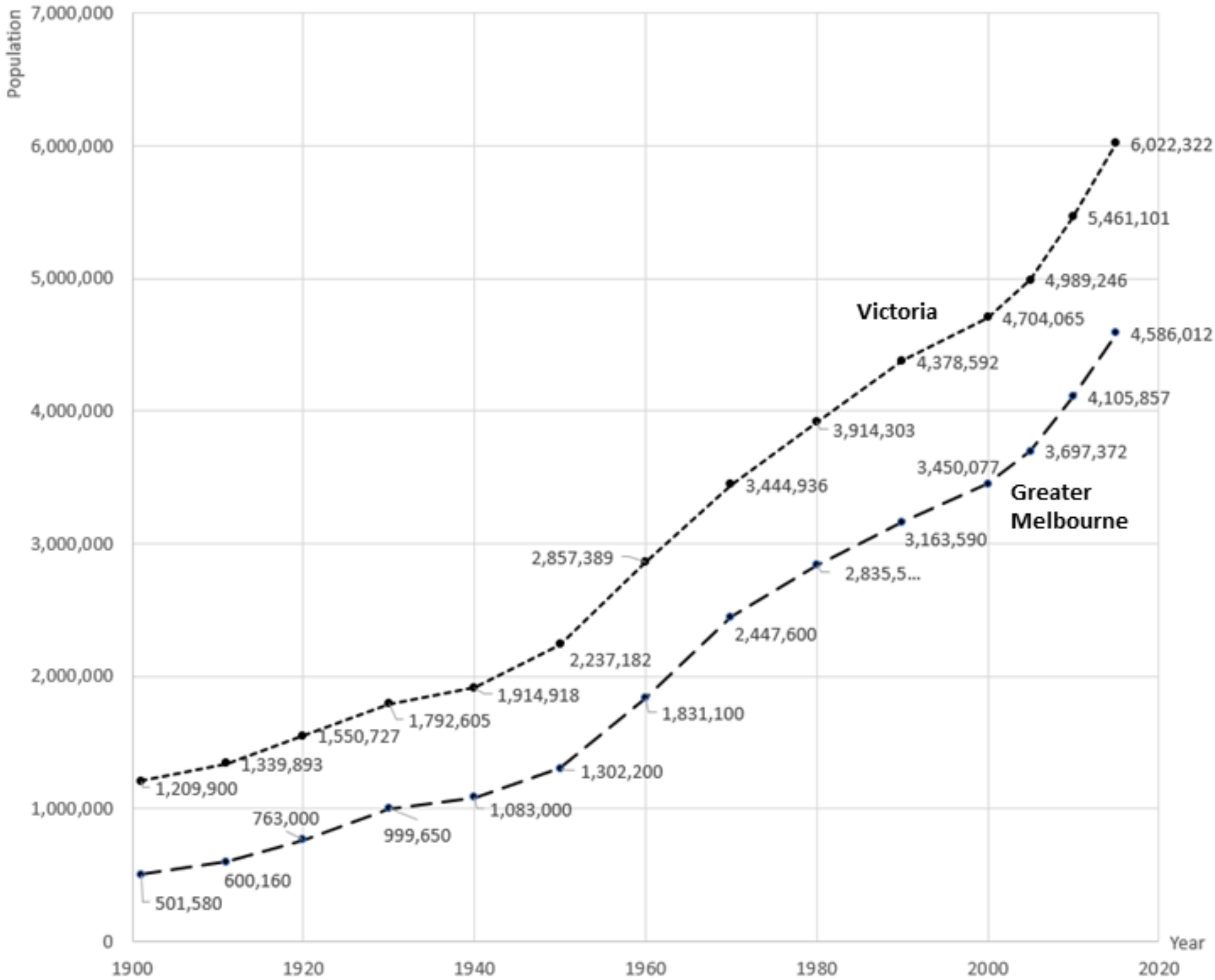

Figure 5.2 State of Victoria and Greater Melbourne population trends

Source: Australian Bureau of Statistics (2019)

Part of the challenge are the low densities, as Melbourne is one of the least densely populated major cities in the world and the city has tended to spread further outwards rather than densify. Melbourne has a similar populated spatial area to London and Paris, but less than half of their population (Loader 2015b). This is not immediately apparent when visiting the central and inner suburbs of Melbourne where urban densities are in the range of 40-60 people per hectare (Cervero 1998, p. 322; Mees 2000, p. 164). However, "Melbourne has traditionally accommodated new housing by spreading outwards" (Goodman 2018, p. 10) mostly along the radial train network. Various planning efforts have sought to protect the 'green wedges' between railway lines from low-density infill development, and to create a "Network of Activity Centres" (VicDoI 2002) and a "city of 20-minute neighbourhoods" (VicDELWP 2017). This push for suburban district centres on railway lines dates back to the *1954 Metropolitan Planning Scheme* (Mees 2000, pp. 219-21). However, much of the activity in the city remains either focused on the CBD (increasing pressure on the radial rail network) or dispersed to regional shopping malls and across the outer suburbs (where it is difficult to travel without using a car).

Cervero (1998, pp. 321-2) suggests that "Melbourne is in many ways a region of two faces". There is a central core and inner neighbourhoods with densities similar to those found in European cities.

However, this is surrounded by middle and outer suburbs with densities as low as those often found in North American cities, where "except when heading to the core region, the car becomes the only practical way of travelling" (ibid, p.322). However, Mees (2000, p. 192) suggests that the "'two Melbournes' model is a myth, at least as far as density is concerned", and is simply an artefact of the measurement of urban density using municipal boundaries. Instead, there is little change in density between the inner 1920s-built suburbs and the rest of the city, with the post-World War 2 urban sprawl being a consequence of path dependency effects from the earlier development of railway lines reaching out into the surrounding country. Sub-division and housing development has tended to follow behind the rail services, while later efforts to preserve the 'green wedges' between the rail lines (together with the freedom and mobility provided by private vehicles for cross-town travel) led to the current sprawling and low-density land use patterns (Mees 2000, pp. 171-3).

There have been a succession of major transport and land use plans for Melbourne[156]. Planning efforts in the 1980s revitalised the centre of the city, converted the core into a more pedestrian friendly environment, and encouraged people to move into inner city developments (Cervero 1998, pp. 330-5). However, there continues to be tension between further development of the freeway network to improve mobility for auto-based suburbanites, versus improving the public transport network to provide alternatives to the car.

Some 81% of journeys-to-work were reported in the 2011 census as being by private vehicle, 12% by transit and 5% by walking or cycling (Australian Bureau of Statistics 2017). Melbourne was not always like this, with transit being used for almost 75% of motorized journeys-to-work up until the 1950s (Mees 2000, p. 180; 2010, p. 147). The general trend since then has been that of a long decline in transit use and increases in private car use and ownership, and transit is now used for only around 10% of all journeys (Mees 2000, p. 181; Currie 2016b; Loader 2019). This decline was interrupted somewhat when rail ridership doubled in the 15 years between 1993 and 2008, leading to significant crowding problems during the morning peak period (Currie 2010b). However, these transit capacity problems may have had more to do with the rapid population growth and a lack of available capacity on the rail network, rather than a major shift towards European-style levels of transit usage. Instead, the rate of private car ownership has been growing and there is now in the order of 57 passenger cars per 100 residents (Loader 2019).

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[156] These include:

- The 1929 Metropolitan Town Planning Commission plan, which focused on major road construction along the model of Paris' boulevards (Mees 2000, p. 46).
- The 1969 *Melbourne Transportation Study*, which called for 'balanced transportation', but then allocated 86.4 percent of the budget to building a large road and freeway network. However, this proved unpopular and was cancelled in Melbourne's version "of the freeway revolts that swept the western world in the early 1970"(Mees 2010) (Gleeson & Low 2000, pp. 164-5; Mees 2000, pp. 73-5, 274).
- *Transporting Melbourne: a strategic framework for an integrated transport system in Melbourne* (VicDoI 1996)
- *Melbourne 2030: planning for sustainable growth* (VicDoI 2002)
- *Melbourne 2030: a planning update*; *Melbourne at 5 million* (VicPCD 2008).
- *The Victorian Transport Plan* (VicDoT 2008)
- *Investing in transport, east-west link needs assessment* (Eddington 2008).
- *Plan Melbourne: metropolitan planning strategy* (VicDTPLI 2014).
- *Plan Melbourne 2017-2050* (VicDELWP 2017).

Melbourne has an extensive freeway network that provides connections to the outer suburbs and to regional highways that link to other parts of the state. However, the freeway network is incomplete. There are numerous missing links and places where major freeways transition directly onto arterial roads, notably the Eastern Freeway which stops a few kilometres to the north-east of the CBD. In the last two decades state governments have turned to the private sector to help fund new freeway links, with the CityLink tollway now connecting some freeways through the inner city and EastLink providing a connection across the outer eastern and south-eastern suburbs.

There is a wide range of road types and conditions across Melbourne. The CBD is built on a grid, and is gradually being transitioned to have more road space allocated to pedestrians, cyclists and public transport services. In the inner suburbs there is a mix of wide tree-lined boulevards and narrow two-to-four lane arterials accommodating strip shopping centres, trams and on-street parking. The middle and outer area tend to have wider arterial roads, with larger shopping malls on private land tending to draw customers from across suburban regions.

The road authority has had a long history of supporting *TSP*, but *bus lanes* mostly tend to operate during peak periods only (VicRBPTAC 2005; Currie & Shalaby 2007, 2008; Currie & Delbosc 2010, 2014). More recently there has been a shift in focus to a new Network Operating Planning (NOP) approach, called *SmartRoads*, that emphasises road management for all users, not just private vehicles (VicRoads 2016; Delbosc et al. 2018).

Melbourne has an extensive radial train network. There are 16 lines that converge on the CBD, where there is an inner loop with five stations. Some of these lines will be connected via a new line through the city that is currently under construction. There is also an extensive program of level crossing removals underway across the suburban network (Rail Projects Victoria & Victorian State Government 2018; Level Crossing Removal Authority 2020).

Melbourne's tram network is a legacy of the original horse drawn and cable streetcars. It is the largest streetcar network in the world, with 75% of the 250-kilometre double-track network operating in *mixed traffic* conditions[157] (Cervero 1998, pp. 324-5; Currie & Shalaby 2007; Currie &

[157] Notably, recent additions to the tram network have provided quite high levels of separation from other traffic. However, this appears to have been because of circumstances, for example, the connections to St Kilda Beach (Route 96) and Port Melbourne (Route 109) were made through the conversion of former heavy rail corridors to be used by trams in 1987 (Hoadley 1995). As a result, for parts of each of these routes trams operate in ROW A environments, before transitioning back to on-street running in other areas, including through the CBD. More recent extensions include connecting Route 109 to Box Hill (Bracks 2003), Route 75 to Vermont South (Batchelor 2005a), and of Routes 30 and 48 further into the Dockland precinct (Yarra Trams 2005b). Some of these have provided relatively high levels of separation and priority, for example with Route 75 operating within the central median of the Burwood Highway and being provided with far side stops.

However, this appears to have mostly been the case when there was space available for such a facility. For example the Route 109 Box Hill extension was delivered with sections of mixed traffic conditions through Whitehorse Road, but then within a median where the road reserve widens as Whitehorse Road transitions to become the Maroondah Highway. Currie and Shalaby (2007, p. 36) provide some further details about the Box Hill extension, which was delivered as part of the "Route 109 Project" to improve performance along the entire route through a "premium route strategy". This project preceded the *Think Tram* program, which is discussed in Section 5.3, but Currie and Shalaby (2007, p. 36) note that "it is difficult to comment on the performance of the Route 109 project, given the lack of publicly available performance impact data". While this project was "highly consultative, including a comprehensive program of public meetings and surveys…(and) a consensus approach that is used to select measures for implementation", unfortunately this appears to have been a slow process due to the amount of time required to undertake such engagement with the community (ibid p. 36). Further investigations of the Route 109 project might be an area for future

Reynolds 2010; Currie 2016b; Public Transport Victoria 2017, 2018; Reynolds et al. 2018). For most Melbournians, however, the only transit services close to where they live are infrequent buses. In middle and outer suburbs there is heavy demand for parking at railway stations, and 2.16 million people live in areas where bus is the only means of transit directly accessible and within walking distance. Bus frequencies tend to be low. Headways average 40-minutes during the peak periods. Services on the bus network also tend to end by the early evening and many do not run at all on weekends (Mees 2000; Currie 2016b).

Mees (2000, pp. 238-40) provides an extensive commentary on the Melbourne public transit network, suggesting that the train, tram and bus systems tend to compete against each other rather than provide an integrated and simple network. In part this is due to historical reasons, but also due to an emphasis on avoiding transfers and serving commuters. contrasts this with Toronto, where a simpler route structure following the grid-like road system and higher frequencies provides a transfer-based network that makes more of the city accessible by transit (Mees 2000, pp. 238-40).

In general, the experience of using transit in Melbourne is similarly two faced. For people living near a train station or in the inner suburbs that are served by the tram network Melbourne's transit system can be used for many trips. It might provide for journey-to-work travel into or out of the city, and also give some options for cross-town trips. However, for everywhere else, transit is mostly only for those who cannot otherwise drive.

research, particularly with respect to comparing its consultative approach to the process used during *Think Tram*. However, given that the Route 109 project started earlier and information and materials about it appear to be less readily accessible, the focus in this research has been on the more recent *Think Tram* program instead.

5.3 Clarendon Street and the *Think Tram* program

Transport planning in Melbourne in 2005 was based on the *Melbourne 2030* plan. This plan had a goal of increasing the transit mode share of motorized trips in Melbourne from 9 to 20% by 2020. As part of achieving this a "cooperative program between VicRoads, the Department of Infrastructure and private transport providers" (VicDoI 2002) was to be launched to decrease delay to on-road public transport. It is this which provided the impetus for the *Think Tram* program.

Think Tram was a $30 million joint program launched in February 2004 by Peter Batchelor, then the Victorian State Government Minister for Transport (Yarra Trams et al. 2004; Smith 2005, p. 2). Originally named the *Tram Priority Program*, it initially focused on eight priority routes with a target of reducing tram journey times by 25%. *Think Tram* was later extended to 2010 with a further $47.3 million in funding ($77.3 million in total).

The *Clarendon Street Tram Priority Pilot* scheme was the initial project for the *Think Tram* program. Clarendon Street is located in South Melbourne, approximately two kilometres south of the Melbourne CBD and within the City of Port Phillip Local Government Area. Because of its inner location and the density of services, transit is more widely used in the City of Port Phillip than is typical across most of the rest of Melbourne. The 2011 census reports a transit mode share of 27% for journeys-to-work trips starting in the City of Port Phillip. However, even in such an inner suburban area the private car is still the dominant transport mode. 57% of journey-to-work trips originating in the City of Port Phillip are by private automobile (Australian Bureau of Statistics 2017).

Clarendon Street is a strip shopping centre with four traffic lanes in an approximately 30-metre wide road reserve. On-street parallel parking is provided, except close to intersections where kerbside space is used to accommodate tram stops and turning traffic movements. There are footpaths on both sides of the road, which accommodate both pedestrians and on-street seating for cafés and dining. There are no facilities for cyclists, who instead have to share the general traffic lanes. Trams operate in the centre lanes, also directly sharing lanes with other traffic. The tram stops along Clarendon Street are kerbside and on the approach side of intersection. Traffic laws in Melbourne forbid traffic from driving past a stationary tram that has its doors open, during which time passengers are able to cross the traffic lane to board and alight trams[158].

This type of operating environment is fairly typical in inner suburban areas of Melbourne and there are many similar strip shopping centres along parts of the tram network. Unfortunately, these types of streets can be a challenging environment for both tram and traffic operations. Vehicles moving into and out of on-street parking spaces can interfere with through traffic movement, and sometimes with trams in the centre lanes. Cyclists are often squeezed between parking and passing

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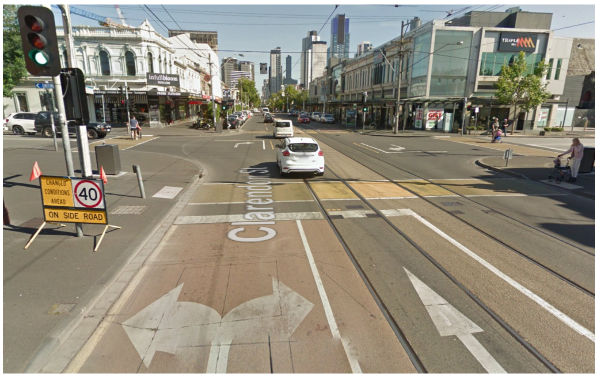
[158] This arrangement is typical across much of Melbourne's tram network, but poses many safety problems as passengers are exposed to vehicles that fail to halt behind a tram (Currie & Reynolds 2010). It also creates challenges for road capacity at intersections, with trams often delayed behind right turning vehicles on the approach to the stop, and then all traffic having to halt while passengers board and alight.

vehicles, and at risk of being 'car doored'[159]. However, there is typically strong resistance to removing on-street parking as local traders tend to see it as vital for the survival of their businesses[160]. The *Clarendon Street Tram Priority Pilot* may have represented an opportunity to try to address some of the problems of strip shopping centres along tram lines, and might have been replicated at other similar sites across the network if it had proved successful.

The *Clarendon Street Tram Priority Pilot* scheme was first announced in the local press in July 2004. VicRoads and City of Port Phillip staff "presented a concept to the South Melbourne Business Association seeking in principle support" (Smith 2005, p. 2) in August 2004. A formal announcement by the Minister for Transport occurred in September and a concept drawing and brochure explaining the proposed work was distributed to the local area throughout September and October. The proposed works required planning permission and the application was made in October. The planning permit was subsequently approved after a 14-day public advertising period, and the construction was completed by January 2015 (VicRoads et al. 2004; Smith 2005). Figure 5.3 shows images of the tram priority measures installed as part of the pilot scheme, which included *mountable separation kerb*, *hook turns,* and *far side stops* with *kerb extensions*.

a. North end separation kerb (current conditions)



b. *Hook turn* at Dorcas Street (current conditions*)*

c. *Hook turn* and tram stop at Park Street (during trial)

d. *Far side kerb extension tram stop* (during trial)

Figure 5.3 Tram priority measures in Clarendon Street.

Source: Google (2017)[161] and Kulesza (undated)[162].

[159] Car dooring is a crash type that involves a vehicle door being opened into the path of a cyclist (Johnson, Newstead, et al. 2013).
[160] See for example the recent efforts to address challenges along the Sydney Road strip shopping centre in Brunswick, which relate to cyclist safety and a need to provide level boarding access at tram strops to meet DDA compliance requirements (Jacks 2018b; Bicycle Network 2019; Jacks 2019b; VicRoads 2019b; Revitalise Sydney Road undated-b, undated-a).
[161] Google Street View images reproduced as per guidelines at https://www.google.com/permissions/geoguidelines/.
[162] Images reproduced with permission of Les Kulesza.

After the implementation there was significant opposition to the pilot, centred around a campaign by local traders for the measures to be removed. A website opposing the scheme was launched (Quin 2005b). In response the *Think Tram* project team held meetings with various stakeholders throughout the first half of 2005. However, on May 3 the Clarendon Street Charter was launched as an agreement between the City of Port Phillip and local traders focused around three concepts: “More trade not less trade”, “Safe and reliable travel”, and a “Better streetscape” (City of Port Phillip & South Melbourne Business Association 2005). Reviews of the pilot scheme were subsequently undertaken by the City of Port Phillip (Smith 2005), Yarra Trams (2005a), and VicRoads (Coyle 2005) in the lead up to the end of the pilot period. Table 5.1 summarizes the findings of these reviews.

Table 5.1 *Clarendon Street Tram Priority Pilot* post-implementation evaluation findings.

<table>
<tr><th>Aspect</th><th>Finding</th></tr>
<tr><td>Tram speed and reliability</td><td>The priority measures had reduced variability in tram speeds.
The priority measures had produced:
an average of 15-45 seconds travel time reduction for citybound trams,
a significant delay reduction in the am peak of 25-180 seconds.
varied results in the outbound (pm-peak) direction with improvements in the central area of the pilot scheme offset by increases in delay at either end.
The hook turns:
at Dorcas Street and Park Street had improved journey time in the order of 15-45 seconds and decreased variability in both directions for most of the day, but
at York and Coventry Street had increased outbound journey times and variability.
The reduction in travel time variability “enables the (tram) driver to more easily adhere to the scheduled travel time and will lead to a reduction in early and late running” (Yarra Trams, p. 3), and
The minor impacts on overall journey time were “not entirely unexpected as total travel times are unlikely to differ greatly…as trams continue to operate to a schedule requiring compliance with timetable to meet operational performance regime” (emphasis added) (Yarra Trams, p. 3).
Boarding and alighting was quicker at the far side kerb extension stops.</td></tr>
<tr><td>Vehicle travel time, volumes and operations</td><td>Traffic volumes on Clarendon Street reduced by about 11.5%.
Vehicle travel times on Clarendon Street had reduced (up to -25%).
There has been driver behaviour change including illegally blocking intersections, avoidance of the hook turns, and avoidance of Clarendon Street altogether.</td></tr>
<tr><td>Safety</td><td>Road safety had improved.
The far side kerb extension tram stops were considered to be safer for passengers.</td></tr>
<tr><td>Public feedback</td><td>A large number of negative email responses were submitted through the www.clarendonstcampaign.org website. This website provided a web form to send an email to the Deputy Premier, the Minister for Transport and Manager of Government Business, the Premier, the Federal Member of Parliament and the Mayor of the City of Port Phillip (Quin 2005b). “60% of e-mails generated from this website were from people generally opposed to the trial and requesting removal”(Smith 2005, p. 52).
Independent research was undertaken by Sweeney Research (2005) into attitudes towards the pilot scheme. It involved interviews with 105 traders, 100 shoppers, 200 residents, 102 tram users and 25 commercial drivers, 27 cyclists and 3 emergency service units and found:
overall 33% of respondents were positive and 50% were negative about the scheme,
44% of shoppers were positive about the measures,
60% of tram users were positive about the measures,
47% of traders reported a reduction in trade (Smith 2005, p. 12).</td></tr>
</table>

Source: Author’s summary of Smith (2005), Yarra Trams (2005a) and Coyle (2005).

The VicRoads review describes a practical problem with the trialled measures, namely that drivers were often halting within intersections behind stationary trams as passengers boarded and alighted at the *far side stops*. In Victoria it is illegal to enter an intersection if there is insufficient space available to clear to and beyond the other side, but the combination of *hook turns,* and *far side stops* trialled in Clarendon Street was a first for Melbourne. It appears that both a lack of driver understanding, and a lack of police enforcement may have contributed to these problems. The VicRoads review (Coyle 2005) recommended a two stage approach involving the removal of the *far side stops*, followed by the development of future options for the ultimate conditions in Clarendon Street, perhaps timed to coincide with renewal of tram tracks sometime after 2012. Options put forward include different *traffic signal phasing*, *mid-block stops* and *stop optimization*, but these do not appear to have progressed beyond initial concepts.

Yarra Trams (2005a, p. 3) notes that the pilot scheme "had only minor impact on the total end to end journey time across the area…(as) trams continue to operate to a schedule requiring compliance with timetable to meet operational performance regime" (emphasis added). This suggests that the tram schedule might not have been updated to account for the scheme. Coyle (2005, p. 8) notes that timetable changes were scheduled for April 2006, well after the end of the trial and review.

The City of Port Phillip evaluation report recommended that the City request the removal of the *far side stops* and reinstatement of the 20 on-street parking spaces. The pilot was found to have reduced tram travel time through the works area by an average of 15-45 seconds. However, this was "not considered to have delivered sufficient improvements in tram performance and reliability to justify permanent construction of the trial treatment as implemented"(Smith 2005, p. 5).

Overall, the steps of the *Clarendon Street pilot* scheme appear to have been to:

- install priority measures; then
- leave the timetable unchanged[163]; then
- run trams at a speed that adheres to the timetable, rather than at faster speeds permitted by conditions; and then
- remove some priority measures on the basis that they had not increased tram speeds sufficiently to justify the removal of on-street parking**.**

This series of events might be considered irrational. They also speak to wider issues of institutional responsibilities and contractual relationships. The transit priority measures were judged as having **failed to increase tram speeds** sufficiently, despite the **trams not being run as fast as might have been allowed** by the conditions. Instead, the trams continued to be run to the timetable and there was an improvement in reliability. In particular, the scheme was found to have reduced travel time variability, which "enables the (tram) driver to more easily adhere to the scheduled travel time and will lead to a reduction in early and late running" (Yarra Trams, p. 3).

There may have been a conflict for Yarra Trams between their involvement as a partner in Think Tram and their obligation to run tram services to meet on-time performance measures and avoid fines under the franchise contract. The level of involvement of transit schedulers from the Department of Infrastructure in the *Clarendon Street pilot* project is also unclear. However, given that VicRoads was the lead agency for *Think Tram* it may be that there were institutional barriers in

[163] Or, if there was a change to the timetable it did not increase speeds as much as was possible.

place to changing the timetable as part of the works[164], or that the impact of the timetable on tram speeds may have been overlooked due to a focus on road related issues.

It is unclear what standard of improvement would have justified the permanent retention of the *far side stops*. Smith (2005) and Yarra Trams (2005a) are silent on what the desired level of improvement were, although the overall 25 percent tram journey time reduction target initially adopted by the *Think Tram* program may have had relevance as a benchmark[165]. Regardless, the underlying subtext is perhaps that the level of improvements provided by the *far side stops* were not sufficient to justify their retention in the face of the public opposition to the loss of parking.

The recommendation of the Smith (2005) report to remove the *far side stops* and reinstate the on-street parking, but keep all the other measures was passed at the City of Port Phillip Strategy and Policy Review Committee meeting on June 6 (City of Port Phillip 2005). The stops were subsequently relocated back to the near side of intersections. Some further minor works involving the installation of red pavement marking at trams stops occurred in 2006 (Hagan 2006), but otherwise there have been no further changes in Clarendon Street to date.

The City of Port Phillip evaluation report highlights "lack of initial consultation" (Smith 2005, p. 11) as a problem with the pilot scheme, and local traders did not appear to believe that the scheme was really a pilot, but that changes to Clarendon Street was "a done deal" (Quin 2005a). Prior to construction, the opportunities for the public to have input into the pilot scheme appear to have been limited to an initial meeting with the business association, and the 14-day planning permit advertising period. This limited inclusion of the public in the initial decision-making surrounding the scheme may have led to a lack of trust and the strong opposition to the scheme, which may have been exacerbated by the speed at which the scheme was implemented.

Lessons learned from the pilot scheme "led to a more consultative approach being taken" (Currie & Shalaby 2007, p. 36) for the remainder of the program. As such, the effective abandonment of *Think Tram's* 25% target may have been more to do with a realisation, after the events of Clarendon Street, that such a target was infeasible. While the initial *Think Tram* target may have been a laudable top-down objective, the events suggest that the political reality in Clarendon Street (and

[164] Refer back to Chapter 3, Section 3.3.2 discussion of *institutionalism* and the institutional model of transit priority implementation from Reynolds et al. (2017) shown as Figure 3.5. Although not specifically based on the Melbourne institutional structure at the time of the Clarendon Street pilot, that model shows how there might be some distance between transit planners and schedulers (within or reporting to a transit authority) and the road and civil designers (within or reporting to a road authority) or transit designers implementing priority measures.

[165] Tram travel times through the entire section of works are shown as being in the order of 6 minutes during the day and 4 minutes late in the evening in the current timetables (Public Transport Victoria 2020a). Assuming that this is similar to travel time during the pilot allows the impact of the scheme to be estimated as follows:

- the delay reduction in the morning peak period of 25 to 180 seconds may have been in the order of a 7 to 50 percent improvement,
- the average delay reduction of 15 to 45 seconds might be in the order of a
    - 4 to 12 percent improvement during the day, or
    - a 6 to 19 percent improvement during the evenings.

As such, it appears that the actual performance of the trialled measures was good, being not far short of the 25 percent journey time reduction target for *Think Tram*, even with some trams being driven slowly so as not to get ahead of schedule.

perhaps Melbourne more generally, given South Melbourne's inner city location) is that the **car is dominant** and prioritising transit requires negotiation and compromise.

Previous research has suggested that *far side* stops can reduce reliability problems caused by variable passenger boarding times and fixed length traffic signal cycles, or improve the effectiveness of *TSP*, and be "an effective, low-cost way to avoid delays caused by … turning traffic" (Ryus et al. 2016, pp. 43-51, 81-7). However, the *Clarendon Street Tram Priority Pilot* scheme perhaps demonstrates that *far side* stops are not necessarily an **easy** way to prioritise transit given the potential for opposition about the impacts, or perceived impacts, on local businesses. Practitioners in *car-centric cities* might be better served by focusing their efforts on implementing measures that do not impact on-street parking, although the extent to which this might hold for all cities is likely to be dependent on local circumstances, parking conditions and other contextual factors.

It appears that *Think Tram* took a technical approach in Clarendon Street, focused on improving tram operations in accordance with central policy directions. Local political factors and defining what 'success' looked like in terms of tram travel time and variability reductions appear to have been somewhat neglected. In general, the pilot period appears to have been dominated by the visuals of vehicles blocking intersections, and opposition to on-street parking removals and road user impacts[166], rather than being informed by data on tram operational improvements in a format that was accessible to the general public. This suggests that practitioners seeking to implement transit priority measures might be well served to have a clear post-implementation review process in place that provides information in a format that can be used directly in public decision-making and debate. In Clarendon Street, however, it appears that the performance reviews were reactive, undertaken in response to public opposition, and generally silent on how the pilot had performed against the strategic objectives set in *Think Tram* and *Melbourne 2030*.

5.3.1 Legitimacy

Think Tram and the *Clarendon Street Tram Priority Pilot* gained *normative legitimacy* through the *Melbourne 2030* plan and the support of the State Government. However, there does not appear to have been much *sociological legitimacy*, *public consent* or other forms of legitimacy to support the implementation of tram priority measures unless these measures did not have a significant impact on other road users. In *Who killed Melbourne 2030?* Mees (2011) is critical of the process through which the underlying plan that supported *Think Tram* and the *Clarendon Street Tram Priority Pilot* scheme was developed. Mees (2011) "point(s) to flaws in the strategy itself and the process by which it was prepared" and suggestions by other authors that densifying 'activity centres' would fail due to a lack of infrastructure planning. However, it is argued the lack of proper public consultation is what led to *Melbourne 2030* having "no legitimacy in the eyes of the public" (Mees 2011, p. 2).

[166] See for example the images of traffic blocking the intersections while queuing behind trams at stops shown in Figure 5.3, which appear to reflect typical conditions despite it being illegal for drivers to enter an intersection if there is insufficient space to exit on the other side. Similarly, Quin (2005b); Silkstone (2005) published photographs focused on the negative impacts of the priority measures for other road users.

This lack of legitimacy amongst the public appears to have also been a problem for *Think Tram* and the *Clarendon Street Tram Priority Pilot*. It does not appear that there was sufficient *public consent* to support the sort of impacts on other traffic that might have been required to deliver a 25 percent reduction in tram journey times, while the removal of on-street parking in Clarendon Street does not appear to have gained the consent of the local businesses[167]. Smith (2005, p. 11) highlights a “lack of initial consultation” during the development of the Clarendon Street scheme, which appears to have led to a lack of trust that the scheme was a test or trial, but instead was “a done deal” (Quin 2005a). The 25 percent target appears to have had legitimacy only within the *Think Tram* program team itself, not the broader *public and political policy arenas*. This target does not appear in the *Melbourne 2030* planning documents and does not appear to be something for which there had been an expression of *public consent* (i.e. the 25% target does not appear to have been voted on in parliament, or otherwise publicly debated).

The *Clarendon Street Tram Priority Pilot* perhaps also shows the *unconditional legitimacy* that on-street parking along strip shopping centres has in Melbourne. Only the priority measures that had reduced on-street parking were removed, which suggests that *legitimacy* for priority implementation was *conditional* on avoiding impacts on cars and parking[168]. This *conditionality* appears to have continued through the remainder of the *Think Tram* program in which *TSP* and some *part-time tram lanes* were successfully implemented, but trams mostly continuing to operate in *mixed traffic* environments.

This might be the key message from the *Clarendon Street Tram Priority Pilot* and the *Think Tram* program. In a *car-centric city* legitimacy might be gained to provide *subservient priority* (and perhaps some *peak-only priority*). However, prioritising transit at the expense of private vehicles, even by just removing a small number of on-street parking spaces along a tram-served strip shopping centre, may be politically unpopular and so considered *illegitimate*.

[167] Note that the initial Clarendon Street concepts where initially mentioned in the local press in July 2004, and there had been a meeting in August 2004 “with the South Melbourne Business Association (SMBA) to present concept & seek in principle support” (Smith 2005). It is unclear how much ‘in principle support’ was obtained. Given that the South Melbourne Business Association and the political leadership at the local council later signed the Clarendon Street Charter together, it appears that whatever support there had been might have been from such initial consultation was no longer relevant once the scheme itself was implemented. This, again, touches on issues of whether the outcomes of this case occurred because of the *car-centric context* and the legitimacy of transit prioritisation, or through the adequacy of consultation / public involvement during implementation (see also Section 11.3.3). However, in general it appears that the removal of the on-street parking spaces was not something that business owners were in favour of once it had happened, suggesting that there was a lack of *public consent* for the scheme despite the initial consultation. It is unclear whether additional consultation might have helped to legitimise the parking removal, or led to the development of an alternative that was more acceptable to local business owners prior to its implementation. The larger issue, perhaps is that the overall policy direction of *Melbourne 2030* appeared to have been developed with little public consultation (Mees 2011, p. 2), yet to obtain the level of improvement to tram speeds and mode share it appears to have almost necessitated significant changes to the sort of strip shopping centres along tram routes like Clarendon Street that would have impacted on-street parking.

[168] This point is supported by the way the March 2005 press release opposing the scheme (Quin 2005a) included multiple quotations from local shopkeepers about how the scheme “will put people out of business…”, “may well turn Clarendon Street into a ghost strip”, or how “customers can’t get here…”. The later Clarendon Street Charter agreement between the local council and the local business association (May, 2005) is silent on on-street parking specifically, but emphasises “More trade not less trade” (City of Port Phillip & South Melbourne Business Association 2005). The underlying subtext, therefore, appears to be that the permanent removal of on-street parking in Clarendon Street would be counter to the agreement. The idea that less on-street parking on Clarendon Street itself would equal ‘less trade’ appears to be an *accepted* understanding amongst local business owners. Hence, the interpretation here is that by the time of the Smith (2005) report to Council (June, 2005) it appears that any recommendation that did not involve reinstating the on-street parking spaces on Clarendon Street (perhaps even regardless of how well the scheme had performed technically) was not likely to be politically feasible.

5.4 The Stud Road Bus Lanes and Keeping Melbourne Moving

The previous section discussed an implementation in the inner suburban areas of Melbourne, which suggests how even quite close to the CBD the acceptability of transit prioritisation is *conditional* on-street parking impacts. If Melbourne has faces, as suggested by Cervero (1998, pp. 321-2), Clarendon Street might be representative of the café-rich, central part of the city that is closest to being similar to a European city (or at least where transit might be used in preference to the car for some trips). This section, therefore, turns to an example of transit priority implementation in the second 'face' of Melbourne, where conditions might be more akin to North American cities (or at least where transit is mostly for trips when a car cannot be used). The focus here is the implementation of *bus lanes* along a cross-town major arterial road in the middle-to-outer suburbs, approximately 20 kilometres east of the CBD[169].

The *Stud Road bus lanes* were implemented in 2009 as part of the Victorian State Government's *Keeping Melbourne Moving* strategy, which included funding for the *Targeted Tram and Bus Priority* program. Stud Road is used by bus route 901, which is part of Melbourne's *SmartBus* network. The *SmartBus* network provides a range of 10 to 15-minute frequency routes that have more priority, better passenger amenities and other improvements, but which continue to operate in *mixed traffic* conditions (Currie & Delbosc 2010; Public Transport Victoria 2010; Parker 2011; Currie & Delbosc 2014). There are a number of other, more local services, that also use Stud Road[170].

The *Keeping Melbourne Moving* strategy and the *Stud Road bus lanes* themselves were not the only changes in the eastern suburbs of Melbourne around that period. The *EastLink* tollway had opened in July 2008, the year before the *Stud Road bus lanes* were implemented. This new tollway provided a 39km crosstown link[171]. It has relevance to the *Stud Road bus lanes* because *Eastlink* is only approximately two kilometres west of Stud Road and provides the same north-south connectivity. The opening of *EastLink* resulted in large traffic reductions on many arterial roads in the area[172]. However, the legislation and contractual arrangements that allowed the privately-operated tollway to charge motorists expressly forbade the narrowing of any nearby roads in an attempt to redirect traffic onto the new facility (Southern and Eastern Integrated Transport Authority 2007; Milesi

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169 Note that the Greater Melbourne Statistical boundary extends to approximately 50 kilometres east of the CBD, and approximately 75 kilometres to the south-east. However, the Dandenong Ranges to the east of the city limit the extend of suburban development, and the Stud Road bus lanes are only 10 kilometres west of the end of the Belgrave railway line (and the start of the Puffing Billy historic narrow-gauge steam railway line).

170 It is difficult to judge the combined frequency of buses that were using the *Stud Road bus lanes*, as maps and timetables from the time of the implementation are not readily available. Review of the current maps shows that there are many overlapping routes that turn on and off Stud Road (664, 681, 682, 691, 697, 737, 745, 754, 862, 900, 969). This suggests that there were many different services that would have used parts of the *bus lanes* at the time of the implementation. However, the 901 Smart Bus is the only route that travels the entire length from Dandenong to Knox (PTV 2016, 2018). At the time of the *bus lane* implementation the 901 was operating at 15 minute headways, and there was a call from the Public Transport Users Association to improve this to 10 minute headways (Bernecich 2010).

171 *EastLink* connects the Eastern Freeway (which had previously terminated at Ringwood) all the way south to the Frankston Freeway. It also provides connections to other freeways and major arterial roads across the eastern and south-eastern suburbs of Melbourne.

172 Initial estimates suggested traffic volumes on nearby roads were down by 30 to 40% when *EastLink* opened, but the opening coincided with the commencement of school holidays (Milesi 2008) so this should be treated with some caution. Later studies by the local municipality provided more detailed analysis of the impacts of *EastLink*, but these have not been reviewed for this study given that objections to the *Stud Road bus lanes* appear to have been generally about the changes to the (post-*EastLink*) traffic conditions caused by the bus lanes on Stud Road itself.

2008). While *EastLink* had had a major impact on the transport system in the immediate vicinity of Stud Road, as well as across the eastern suburbs more generally, it appears that events surrounding the bus lanes' implementation and later removal were not especially influenced by the presence of the new tollway or its opening the year before.

Although the original plan had been to build new *bus lanes* along the entire length of Stud Road as new road capacity, through road widening, this was not the option adopted for implementation. Instead, parts of Stud Road where there were already three traffic lanes in each direction were converted so that one lane became an *exclusive bus lane* and only two lanes remained for general traffic[173]. In other sections, where there were only two existing lanes in each direction, the road was widened to provide an *exclusive bus lane* and also maintain two general traffic lanes. However, the lanes tended to stop short of intersections and restart again on the far side. Hence, the existing capacity for traffic at intersections, and turning lanes, remained generally unchanged.

The *bus lanes* were unpopular with motorists due to the reduction from three to two general traffic lanes in some sections of Stud Road. There were many letters of complaint sent to elected representatives and published in the local newspapers, citing traffic congestion and safety concerns. However, there was debate amongst local councillors and other elected representatives.

Various claims of a 70 percent increase in patronage and counterclaims that the buses were infrequent and half-empty were made during this debate. However, there does not appear to have been much authoritative evaluation or public comment by engineers, transport planners or others involved in the project. Instead, the *bus lanes* became an issue, at least locally, in the State Government election campaign. The then-opposition promised to remove the lanes if elected to government, which they subsequently were in November 2010.

Despite a call from the Public Transport Users Association to compromise and convert the *bus lanes* to HOV operation (Bernecich 2011b), the *bus lanes* were removed from the one-kilometre section of Stud Road between Ferntree Gully Road and Kelletts Road. "Roads Minister Terry Mulder said the bus lanes…had caused "nothing but frustration and delay for many Knox residents""(Bernecich 2011a) in this section, which is where Stud Road crosses over the Corhanwarrabul Creek. It appears that the bridges over the creek for each carriageway are only three lanes wide, and to avoid the cost of bridge widening the *bus lanes* had been installed in this section by removing a general traffic, rather than by adding a new lane.

[173] It is unclear how this reduction in traffic capacity was reconciled with the legislative and contractual arrangements that forbid any removal of traffic capacity to force traffic onto *EastLink* (see Southern and Eastern Integrated Transport Authority (2007, p. 21)). One possibility is that the original plan to provide the bus lanes as new capacity through road widening along all of Stud Road may have been made to avoid potential problems with the *EastLink* legislation. In general, it appears that the conversion of existing traffic lanes to become bus lanes occurred over relatively short distances where to do otherwise would have resulted in major additional costs, such as to add lanes to bridges across the Corhanwarrabul Creek. Hence, the reason for a reduction in traffic capacity might have been justified on the grounds of reducing project costs, and so not immediately related to the *EastLink* legislation. Regardless, there does not appear to have been much of a link made between the *Stud Road bus lanes* and *EastLink* in the materials reviewed for the case study, which in general appeared to have focused mostly on local traffic impacts along Stud Road itself rather than across the broader corridor.

However, this was the only section where the *bus lanes* were removed. The section between the Burwood Highway and Boronia Road had also been installed by converting a general traffic lane, rather than through road widening, but the *bus lanes* in this section were ultimately retained. This appears to have been because this section was in another electoral district, and negotiations over which sections of the *bus lane* to remove involved the local members of the state parliament directly (Bernecich 2011c). The *bus lanes* were also retained where they had been installed through road widening, rather than through removal of an existing traffic lane (Bernecich 2011a).

Previous research has shown that short *bus lanes* do not work, as the benefits of prioritisation are lost due to bus and traffic delays at merging locations (Currie et al. 2007; Mulley 2010; Currie 2016a). This, unfortunately, appears to have been the result along Stud Road. A need to avoid impacts at intersections and to return capacity to general traffic in some sections has resulted in "a "disjointed" decision….meaning buses will now have to weave in and out of busy lanes" (Bernecich 2011c).

5.4.1 Legitimacy

Normative legitimacy for the *Stud Road Bus Lanes* implementation was provided through the *Keeping Melbourne Moving* strategy and the state government's direct control over the arterial road network. Techno-rational legitimacy for the implementation of the *bus lanes* was therefore based on the *bus lanes* being in accordance with the *strategic objectives* of these transport plans. However, the *bus lanes* do not appear to have developed *sociological legitimacy* within the broader *public and political policy arenas*, primarily due to a lack of *public consent* for taking away existing road capacity from private motorists.

There were some questions raised about the *reasonableness* of the *bus lanes*, notably to do with the bus frequency and usage being too low to justify the lanes. The federal member of parliament noted "…Australian and international research which suggests that at least 17 full buses per hour are required to justify a dedicated bus lane (but) the Stud Road bus lane has 6-7 half full buses an hour" (Tudge 2010). However, there does not appear to have been a formal engineering assessment undertaken and released to the public to provide clear data as to how much usage the lanes were getting or to respond to claims that the lanes were unsafe. Additionally, the techno-rational legitimacy that had led to the initial implementation of the *bus lanes* does not appear to have been based on these sorts of *traffic* or *mobility perspectives*, but on a *strategic objectives* perspective based on the transportation plans. The implementation may have been more to do with claiming road reserve space to protect for anticipated future increases in passenger demand and bus frequencies, rather than necessarily having sufficient justification for the *Stud Road Bus Lanes* based current demands and bus frequencies at the time of implementation alone[174].

The issue at hand, however, appears to have been that the *legitimacy* of the *bus lanes* was *conditional* on having not made traffic conditions significantly worse for private motorists. In most

[174] This is in part based on discussions with an industry practitioner familiar with the project.

sections the *bus lanes* had been installed through road widening between intersections (stopping short of traffic lights and then restarting downstream). This had been the original plan for the entire project. Under this plan the *condition* of retaining traffic capacity, therefore, appears to have been already designed in.

However, as constructed, the section between Ferntree Gully Road and Kellets Road, over the Corhanwarrabul Creek bridges, had involved the removal of an existing traffic lane in each direction. Regardless of the *strategic objectives* and transportation plans supporting the lanes, had clearly failed the test of having no impacts on traffic. Bridge widening is certainly expensive and something that engineers focused on benefit cost ratios and economic efficiency may wish to avoid. This might appear to be the reason behind the decision to convert traffic lanes to exclusive bus use between Ferntree Gully Road and Kellets Road. However, it is unclear whether there was analysis or consideration of the **political costs** of reducing road capacity over this bridge instead. This construction cost saving appears to have ultimately led to a large amount of public and political opposition, partial removal of the scheme, and possibly reduced the legitimacy of implementing transit priority more generally on future projects in Melbourne.

5.5 Conclusions

When visiting the centre of Melbourne, it is easy to see why it has a reputation as one of the world's most liveable cities. "Marvellous Melbourne" (Museums Victoria 2020) is a place of tree-lined boulevards, an extensive tram network, a CBD filled with pedestrian-friendly alleyways, places of cultural and historic importance, a thriving street art movement, a café culture, and many "places for people" (Dovey et al. 2012; Eidelson 2014; Wilson & Budd 2014; City of Melbourne 2016a, 2016b; Fogarty & Fairbank 2016; Rychter 2016; Wright 2016; Butt 2017; Freeman & Pukk 2018). However, the type of urban environment found in the inner suburbs and in the CBD, such as at the 'Paris end' of Collins Street (City of Melbourne 2019), is quite different from the car-centric, low-density environment that makes up most of the rest of the city.

Continued population growth, low-density sprawl, and car-dependence is a significant challenge for Melbourne, but one that appears to have been difficult to address through land-use and transportation planning efforts (Mees 2003a; Low, Gleeson & Rush 2005; Mees 2011; Goodman 2018). Across Greater Melbourne over 75% of trips are made by private car (Mees 2010, pp. 60-1; Currie 2016b; Australian Bureau of Statistics 2017; Loader 2018) and for most people the choice is between low frequency buses or the private car (Currie 2016b).

The examples of transit priority implementation that have been examined in this chapter have been prompted and supported by transportation plans that have been seeking to address these challenges. However, the experience of implementation suggests that the techno-rational legitimacy of prioritisation of transit in accordance with the *strategic objectives* of these top-down plans has not been enough in the face of the almost *unconditional legitimacy* of maintaining the status quo for motorists. Transportation plans have been met by political challenges and there has been opposition to transit priority implementation that reduces road capacity or the amount of on-street parking in both the inner and outer parts of the city.

In the *Clarendon Street Tram Priority Pilot* strong public opposition developed over the removal of 20 on-street car parking spaces to accommodate *far side stops* for trams. This opposition continued despite the subsequent provision of 29 new parking spaces on surrounding streets, and did not subside until the spaces on Clarendon Street itself were returned. While the initial *Think Tram* target of reducing tram journey times by 25% may have led, if delivered, to major improvements to the tram network, this sort of top-down, transport planning-led-approach clearly lacked sufficient legitimacy to support making conditions worse for private motorists.

The *Stud Road Bus Lanes* perhaps more clearly demonstrate the *conditional normative legitimacy* of transit priority implementation. Narratives surrounding the introduction of these *bus lanes* focused on impacts to motorists and how the bus frequencies did not justify the loss of traffic lanes despite the *strategic objectives* of transport plans, patronage increases following the implementation, and the government having the power to increase bus frequency levels. Instead, where the *bus lanes* had made the *status quo* worse for other drivers they were removed. It is only implementation was through road widening (with the status quo for drivers remaining generally the same) that the *bus lanes* could be politically supported.

A lack of *legitimacy through reasonableness* within the *public and political policy arenas* appear to have been a problem for both the *Clarendon Street Tram Priority Pilot* and the *Stud Road bus lanes* implementations. The *Clarendon Street Tram Priority Pilot* had resulted in tram speed and reliability improvements, but these were not sufficient to overcome the (perceived) *unreasonableness* of taking away on-street parking. The *Stud Road Bus Lanes* similarly appear to have improved conditions for transit and perhaps increased patronage. However, the bus frequencies were not high enough for the impacts on motorists to be considered *reasonable* in the broader policy arenas. Despite government having the power to increase bus frequencies, this does not appear to have been the focus of complaints. Rather, the desired solution was a return to the status quo for motorists. In both examples transit priority implementation was found to be *unreasonable* at the local political level, regardless of the *reasonableness* of prioritising transit as part of city-wide plans and programs that seek to help to improve transportation more generally.

Of course, these are just two examples of transit priority implementation in Melbourne. Some other efforts have been more successful. However, what success there has been has not necessarily been without opposition or protest, and in general the level of prioritisation for transit services remains low[175]. While Melbourne's transportation plans, governmental legislation and other *top-down* sources of *legitimacy* have provided some support for implementing transit priority, in the *public and political policy arenas* and at the local level this *legitimacy* has been shown to be *conditional* on maintaining the car-centric status quo. This lack of legitimacy for impacting motorists appears to be a factor that has contributed to the mixed results, compromises and removal of transit priority measures that has occurred in Melbourne.

[175] For example, the introduction of the *SmartBus* network provided an opportunity to prioritise buses. However, this was predominately delivered through the building of new capacity and low-impact TSP implementations. In general the *SmartBus* routes continue to operate in *mixed traffic* conditions and are well short of the BRT standard facilities that have been implemented in other cities (Loader & Stanley 2009; Currie & Delbosc 2010; Public Transport Victoria 2010; Currie & Delbosc 2011; Parker 2011; Currie & Delbosc 2014).

Chapter 6: The Transit City LRT Plan in Toronto

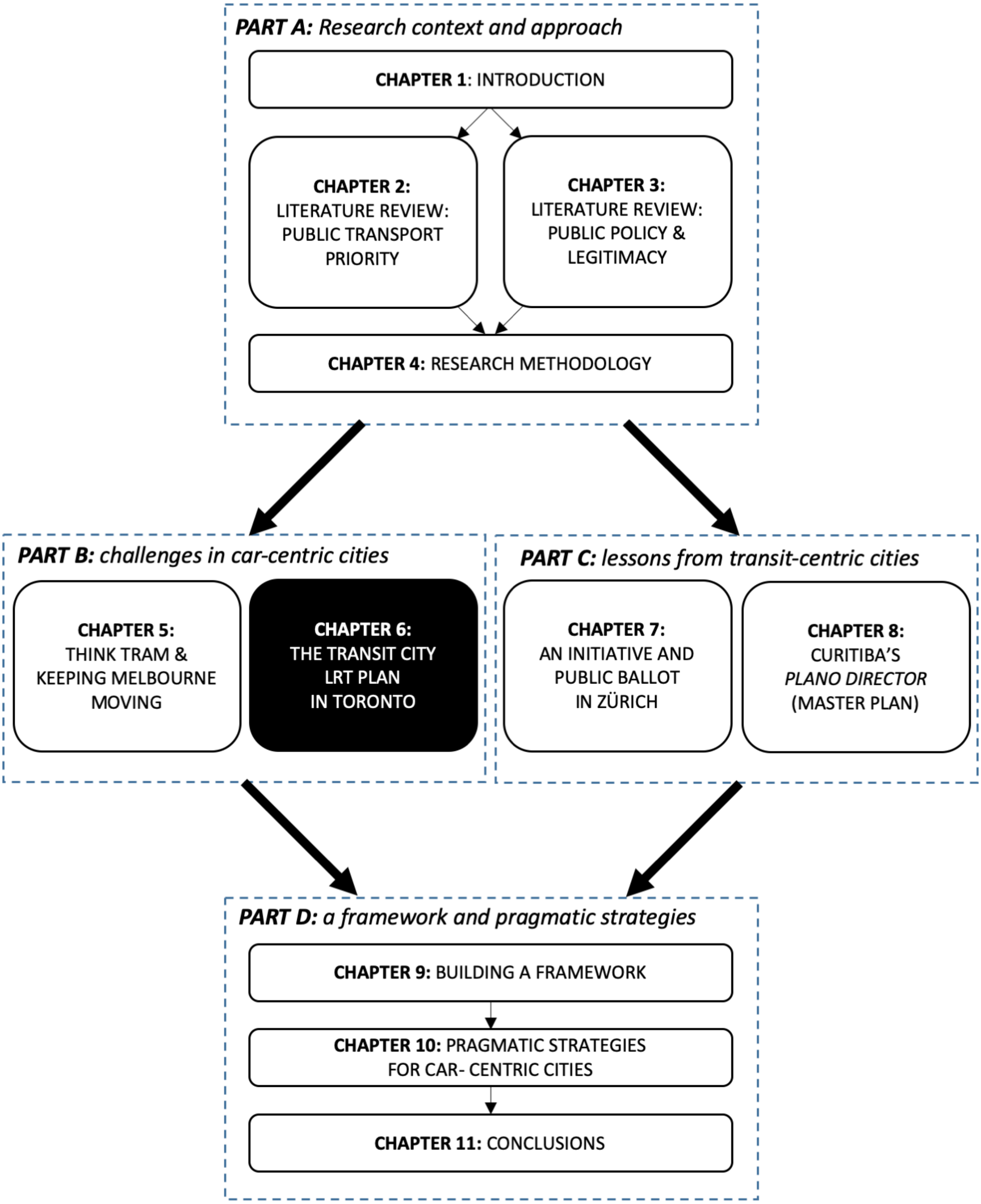

Figure 6.1 Position of Chapter 6 in thesis structure

6.1 Introduction

This is the second chapter in Part B of the thesis. It addresses the first research objective of the thesis by reviewing efforts to implement the *Transit City LRT plan* in the City of Toronto. This was a strategic plan calling for the construction of seven new LRT lines to replace existing bus services operating mostly in *mixed traffic*. The new lines were proposed to be generally at-grade and *longitudinally separated* from traffic, but the plan was largely abandoned after the election of Mayor Rob Ford in 2010.

Toronto is the capital of the Province of Ontario, in Central Canada. It has been called "New York run by the Swiss"[176] and "Vienna surrounded by Phoenix"[177] and was named the world's fourth-most liveable city in 2016 (Wright 2016). Mees (2000, p. 155) notes that Toronto "is a spread-out city with high car ownership which appears to be providing European-style public transport". However, there appears to have been challenges implementing transit priority due to protests and legal action (Bow 2016) and restrictions or limitations placed on *TSP* systems (Currie & Shalaby 2007), as well as more general difficulties for transit improvement during "a century of plans, projects, politics, and paralysis" (Levy 2015).

The *Transit City* plan included a scheme to implement seven new LRT lines across the outer suburbs of the City of Toronto. Mayor Rob Ford cancelled the plan on his first day in office, declaring that the "war on the car is over" (Kalinowski & Rider 2010)[178]. However, the *Eglinton Crosstown LRT*, which was part of *Transit City*, had already been funded and had received approval to start construction. Further negotiation and politics led to the dramatic rejection of Mayor Ford's preferred all-underground plan for the *Eglinton Crosstown LRT* in a "Council Rebellion" (Bow 2018). The *Eglinton Crosstown LRT* is currently under construction as per the original *Transit City* plan and is to open in 2022 (CBC News 2020).

Transit City is of interest for this thesis because it provides an example of a conflict between two competing coalitions, both of whom appear to have given <u>*conditional*</u> *normative support* for transit upgrades. All parties appear to have been in favour of improving transit services in the City of Toronto. Supporters of LRTs were opposed to the high costs of underground construction. In contrast, Mayor Ford's pro-subway platform appears to have been focused towards making improvements to transit, but only on the <u>condition that where no impacts on private motorists</u>.

This chapter is structured as follows: first the overall city context of Toronto is discussed in Section 6.2. *Transit City* and the *Eglinton Crosstown LRT* are then reviewed in Section 6.3. Section 6.4 provides a conclusion to the chapter.

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[176] Actor Peter Ustinov quoted by Popik (2006).
[177] A Toronto transit planner quoted by Cervero (1998).
[178] This cancellation was announced despite the plan having previously been approved by the entire city council. It appears that the mayoral office may <u>**not** actually have had the authority or *normative legitimacy* to directly cancel the plan</u>, and that this (technically) should have been put to another vote in council (Kalinowski & Rider 2010).

6.2 City Context

This chapter focuses on implementation within the City of Toronto itself. Various geographic areas are often to describe areas surrounding and including the City of Toronto. The City is part of the Greater Toronto Area (GTA), which also includes the Regions of Halton, Peel, York and Durham. Together the City of Hamilton and the GTA form the Greater Toronto and Hamilton Area (GTHA). The GTHA itself is only part of the 'Golden Horseshoe' that wraps around the shores of Lake Ontario. This is then (again) part of the still larger 'Greater Golden Horseshoe', which has approximately two-thirds of Ontario's population and one-third of the population of all of Canada (Neptis Foundation 2014).

Somewhat complicating the geographic description of this case is that the current City of Toronto is an amalgamation of the (former) local municipalities of (Old) Toronto, Etobicoke, York, East York, North York and Scarborough, and the former Metro Toronto regional level government. In many areas of Canada there are four levels of government (Federal, Provincial, Regional and Local). However, since the 1998 amalgamation the City of Toronto has been a single authority that fulfils both Regional and Local government roles. The Mayor of Toronto is elected by the entire City. There are 25 electoral wards, each of which are represented by one councillor.

Figure 6.2 shows population trends in the City of Toronto, the Toronto Census Metropolitan Area (CMA)[179], the Greater Toronto Area (GTA) and the GTHA. There are almost 3 million residents in the City of Toronto, 5.9 million in the Toronto CMA, 6.4 million in the GTA, 7 million in the GTHA, and 9.2 million residents in the Greater Golden Horseshoe. Population growth has mostly occurred beyond the City of Toronto boundaries and the projections for 2046 are 4.27 million for the City of Toronto and 10.2 million for the GTA (OntarioMoF 2019).

The pattern of development is generally similar to the pattern across Greater Melbourne, with a relatively dense inner area surrounded by lower density suburbs. However, across the Toronto and the Greater Golden Horseshoe there are perhaps more district centres than across Greater Melbourne, and this may be because local and regional municipalities have their own planning schemes and transport networks focused towards its own city centre. In general, governance in Ontario often tends to more local than in Australia, with Cities and Regions often having their own police force and transit agencies.

[179] The CMA is a statistical boundary for the metropolitan population.

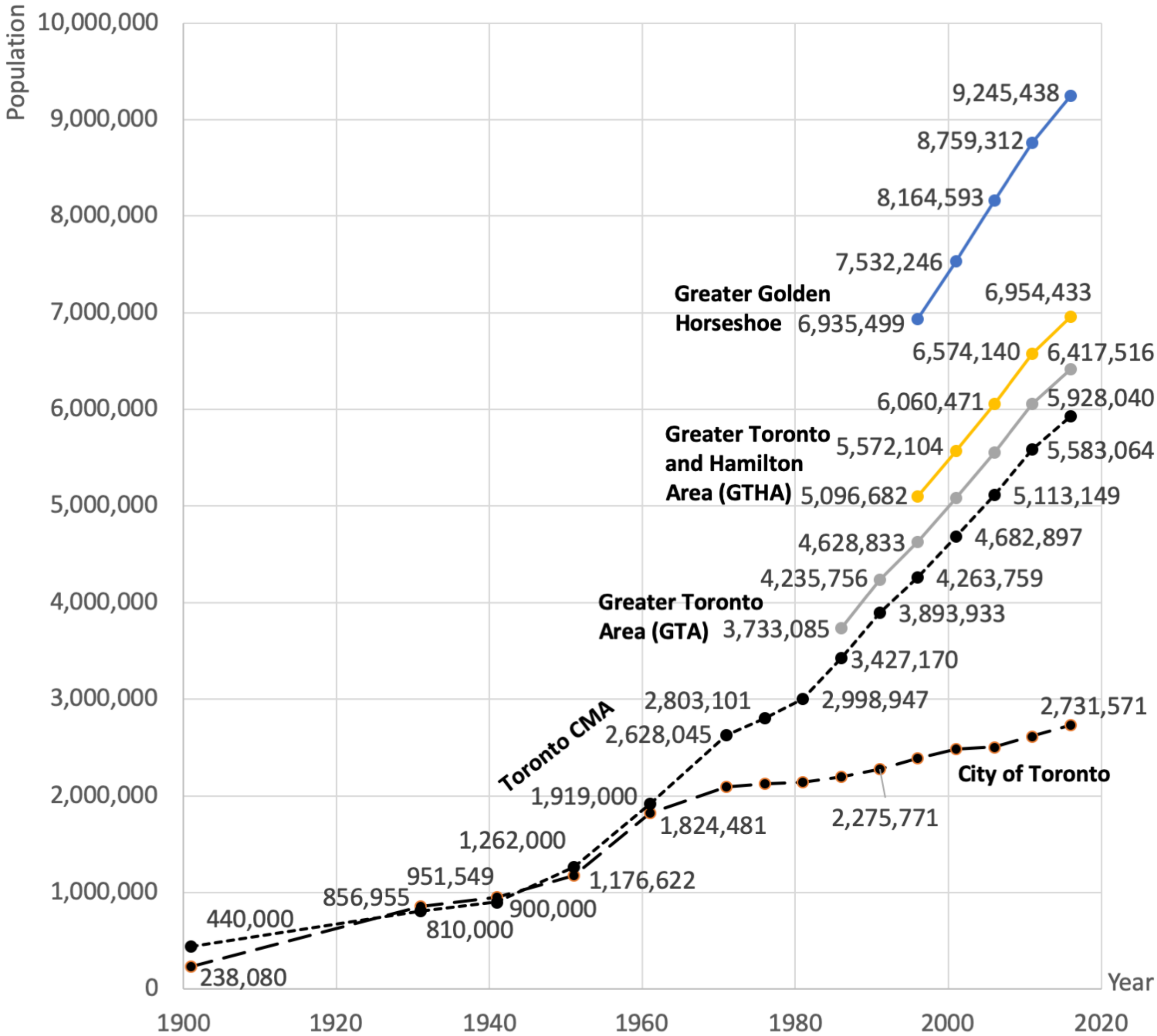

Figure 6.2 Population trends in Toronto

Source: Author based on Wikipedia (undated-a) summary of Statistics Canada Census data

Mees (2010, p. 102) notes that "the largest change in urban density in the Toronto region comes when one moves from the inner city, the old City of Toronto, to the 'middle' suburbs that comprise the remainder of the new city; (where) overall urban density…drops from 70 per hectare to 34". This boundary also roughly divides parts of the city that are served by both buses and streetcars (Old Toronto), from parts of the city where there are only buses (the rest of the City of Toronto). As will be discussed further below, it also divides the parts of the City that mostly voted Rob Ford and his pro-car, pro-subway platform (the rest of the City) from parts of the city that did not (Old Toronto)(Taylor 2013)[180].

[180] *Populism in the City: the Case of Ford Nation* (Silver et al. 2020) provides an detailed description and analysis of Rob Ford's campaign and period as mayor. Readers seeking to better understand that larger context of politics in Toronto might start with a review of that paper, as this chapter generally focuses on issues related to transit and the *Transit City LRT Plan*. There are further papers that have also discussed the rise of Rob Ford in Toronto, and the implications of "…neoliberalism, Fordism, and the politics of automobility…" (Walks 2015); "Toronto's Tea Party…" (Filion 2011); and "right-wing populism in a metropolis…" (Kiss et al. 2020) for urban and transportation planning and related topics.

Urban planning research has discussed and compared the urban densities of Melbourne and Toronto at length. Mees (2000, pp. 155-225) critiques previous research that suggested that high density development in Toronto has been well integrated with transit networks, and that it is this that has led to European-style transit service levels and performance.

> *"Toronto has many more apartments than Melbourne, (but) these are scattered across the metropolitan area…Overall, Toronto's population density is only modestly higher than Melbourne's, while activities are less centralised and less rail-oriented" Mees (2000, pp. 206, 44).*

Instead, Mees (2000) argues it is the transit network form that has led to higher transit ridership in Toronto than in Melbourne, with the Toronto system "clearly and deliberately structured as an interconnecting, non-duplicating network" (Mees 2000, p. 240). Currently it is a provincial agency, *Metrolinx*, that is responsible for GO Transit network across the Greater Golden Horseshoe. GO Transit operates regional train and bus services. The regional train services on many lines currently operate only during peak periods for commuters travelling into the City of Toronto, with buses providing off-peak services. However all-day, two-way services are already provided along some lines, and the *GO Expansion* project is currently underway to extend this across the network (Metrolinx 2020c). New LRT and BRT services are also proposed, under-construction, or opening in many parts of the Greater Golden Horseshoe. Many of these are part of *The Big Move* and *Next Wave* plans for new rapid transit projects (Metrolinx 2008, 2018b, 2020e, 2020c).

The Toronto Transit Commission (TTC) currently operates three subway lines and 'the RT'[181] within the City of Toronto. There are 10 streetcar routes and 159 bus routes, which operate mostly in *mixed*

In general, however, Mayor Ford's popular support and political appear appears to have been strongly related to a divide between downtown city dwellers and more suburban areas (see Figure 6.4). Silver et al. (2020) mention "Rob Ford's obsession with transit policy and his support from immigrant communities…". As a candidate he was "the authentic embodiment of the popular will against a self-interested elite" (p.17), having "rallied (an) economically and ethnically diverse coalition around a message of "respect for taxpayers" and criticism of a "downtown elite"…" (p.5). In this way, Rob Ford's campaign and period as mayor was not based solely on a pro-car, pro-subway platform, but across wider political issues and around his right-wing views. An analysis two of the city's newspapers' reporting by Filion (2018, p. 10) show that Ford's campaign themes included: social issues (anti-gay and anti-immigration); finances (spending cuts and reduction in taxation, "ending the 'gravy train'" and waste in City governance); law and order; transportation; and opposition to "downtown elites". Most of the themes reported in the local newspapers related to Ford's focus on financial matters, but his transportation related themes ("Build subways", "Anti LRT and streetcar" and "End 'war on cars'") were the second-most reported category in the Filion (2018, p. 10) analysis, suggesting that being pro-car and pro-subway was an major part of Ford's platform and appeal to voters (particularly those in the suburbs).

Some of Ford's approach centred around attacking 'elites' and emphasising his persona as an everyman, "which exuded anti-elitism by virtue of his simple vocabulary, absence of university credentials and folksy demeanour" (Filion 2011, p. 466). However, there was some contradictions, such as Ford taking pride in paying for his own office expenses so as to save taxpayers funds, yet perhaps being able to do this because he was a wealthy business owner (ibid).

There is insufficient space for a full exploration of the literature about Fordism, or similar populist movements and their implications for urban planning, transportation engineering and related areas. The title of *Populists and planners: "We are the people. Who are you?"* (Sager 2020), however, perhaps indicates a potential link between the efforts in urban planning and related research to respond right-wing populism and the topic of legitimacy addressed in this thesis. *Public consent* through populism appears to be at the heart of building of legitimacy for movements such as Fordism, which at the same time appear to attack the *legitimacy through trust* in transport planning and engineering experts, and the 'downtown elites' involved in city governance. Further research might seek to make additional connections between this emerging research in planning and the topic of this thesis, but this is outside the scope of this study.

[181] Line 1 – the Yonge-University-Spadina line, which has a U shape centred on Union Station and with legs running north along Yonge Street and north-west along University, Spadina and the Allen Expressway; Line 2 – the Bloor-Danforth line, which runs east-west across the City; and Line 4 – the Sheppard line, which runs east-west along Sheppard Avenue in the north of the city. Confusingly, Line 3 is typically included as part of the TTC's subway network on maps etc. but uses a different technology. It is known as the 'Scarborough RT' (for Rapid Transit), and operates in a fully

traffic conditions. However, *active TSP* has been installed at many intersections and there have been efforts to increase the physical separation of streetcars from other traffic[182]. In general, transit services in Toronto are much more frequent than in those in Melbourne, with even buses tending to operate at headways of 10 minutes or better (Mees 2000, pp. 226-56; Currie & Shalaby 2007; Toronto Transit Commission 2019b). Transit trips account for in the order of 30 percent of trips within or to the City of Toronto. However, for trips across the wider GTHA the mode share for transit tends to be less than 20 percent (Transportation Information Steering Committee (TISC) et al. 2018).

Mees (2000) highlights that non-work travel on transit is more prevalent in Toronto than in Melbourne. However, Toronto appears to still be generally car-centric. Automobiles are used for approximately 50 to 60 percent for trips within or to the City of Toronto, and for approximately 70 percent of trips across the wider GTHA. Car ownership is just over 40 cars per 100 residents in the City of Toronto and 50 cars per 100 residents in the GTHA (Transportation Information Steering Committee (TISC) et al. 2018), which is only slightly lower than Melbourne's 57 cars per 100 residents (Loader 2019). The road network is grid-like and tends to follow direction of the shore of Lake Ontario (east-west within the City of Toronto, which is on the northern shore of the lake). There is a network of provincial highways and expressways across the GTHA, including some that are up to 18 lanes wide. However, plans for more expressways in the City were abandoned in the 1970s following protests and the cancelation of the Spadina Expressway (Levy 2015; Laurence 2016).

Overall, the city context of Toronto involves:

- a population of almost 3 million in the central City of Toronto, within a population of almost 6 million people in the surrounding metropolitan area;
- a locally autonomous governance structure, with the City of Toronto having control over roads, local transit, policing and other services;
- most of the metropolitan area consisting of generally lower-density and car-oriented suburbs, on a grid-shaped road network and major expressways;
- a regional rail transit network that is in transition to all-day service, but is still generally focused towards peak-period commuter travel;
- a local transit network within the City of Toronto consisting of three subways and the Scarborough RT line, and streetcars and buses that mostly operate in *mixed traffic*.

grade-separated ROW but with smaller vehicles than the subway system. It connects to Line 2 at Kennedy Station in the east of the City of Toronto, but this requires passengers to change vehicles and move between the below-grade subway and the above-grade RT platforms. The Scarborough RT also uses standard gauge, while the rest of the TTC's subway and streetcar networks operate on a unique gauge that is only used in Toronto (Levy 2015; Transit Toronto 2020).

[182] These include:

- the 1993 implementation of peak-period streetcars lanes (ROW C.7) along King Street, which largely failed due to a lack of enforcement, parked cars and traffic driving within the lanes (Currie & Shalaby 2007; Bow 2019b);
- the 1997 implementation of a *longitudinally-separated transit alignment with non-mountable kerbs* (ROW B.3) along Spadina Avenue, with streetcars replacing the existing bus services that had been operating in *mixed traffic* (Currie & Shalaby 2007, p. 37); and
- the implementation of *longitudinally-separated transit alignment with non-mountable kerbs* (ROW B.3) along St Clair Avenue West in the early 2000s, which resulted in the "Battle of St Clair" (Bow 2016) where the construction was opposed in court and suffered major delays, primarily because of opposition to its impact on traffic and parking.

6.3 Transit City and the Eglinton Crosstown LRT

Transit City was a plan to prioritise on-road transit across the City of Toronto. It consisted of the *Transit City Light Rail Plan* (Toronto Transit Commission 2007a), which is shown in Figure 6.3, and the *Transit City Bus Plan* (Toronto Transit Commission 2009)[183].

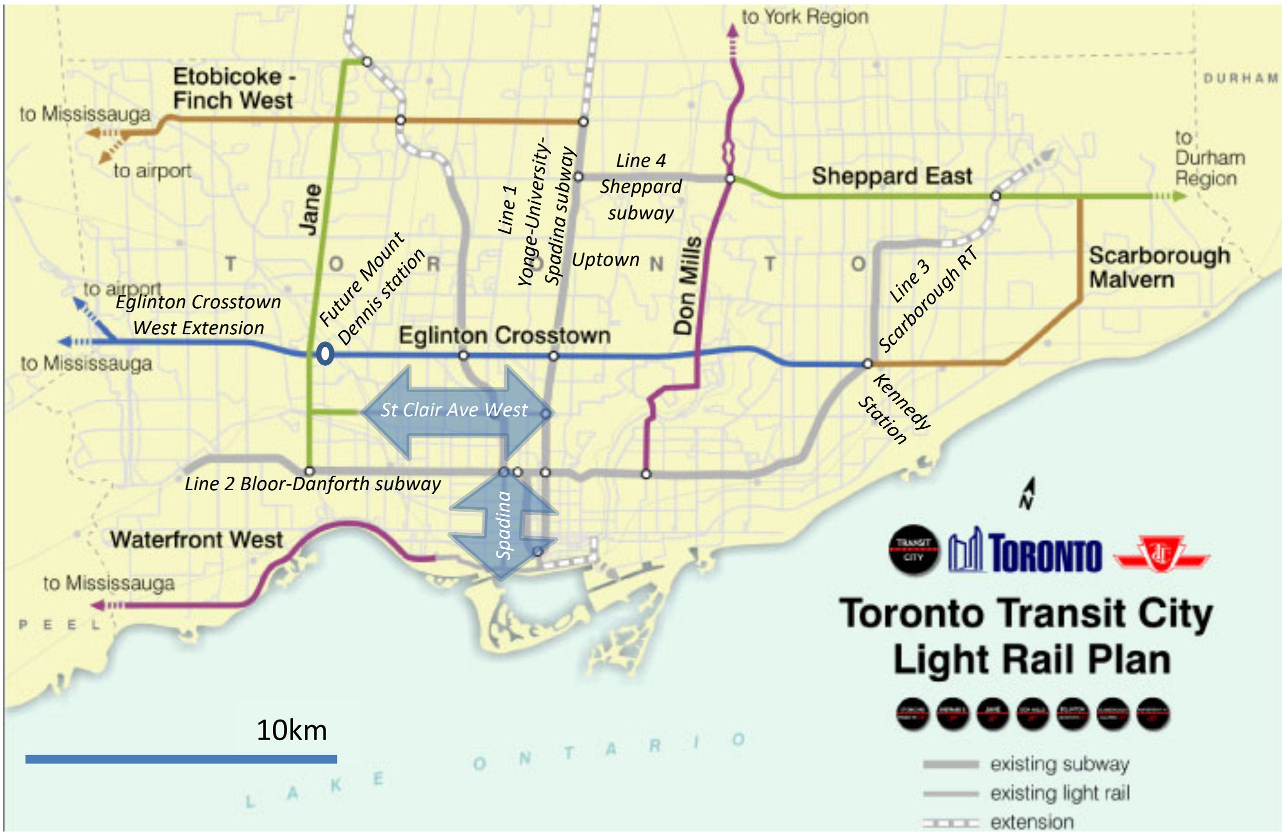

Figure 6.3 ***Transit City Light Rail Plan*** **in the context of Toronto's transit system**

Source: Author, based on Bow (2017a)

Transit City originated as a continuation of the *Ridership Growth Strategy (Toronto Transit Commission 2003)* and the *Building a Transit City* report (City of Toronto & Toronto Transit Commission 2005), rather than as an independent strategic plan based on stand-alone technical analysis (Levy 2015). The *Transit City Light Rail Plan* was proposed by the TTC in 2007, while the *Bus Plan* followed later in 2009 (Toronto Transit Commission 2007a, 2009; Bow 2017a). These were later incorporated into the Province's *MoveOntario 2020* policy and *The Big Move*[184](Kalinowski 2007; Metrolinx 2008; Levy 2015; Bow 2017a).

The *Transit City Light Rail Plan* envisaged seven new LRT lines, most of which would be *longitudinally separated*. Toronto had previously implemented kerb-separated longitudinally-separation (ROW B.3) on the existing streetcar network along Spadina and along St Clair, but there had been considerable opposition to the St Clair project (Currie & Shalaby 2007; Bow 2016). *Transit City*, in contrast, proposed entirely new LRTs beyond the extents of the existing streetcar network to

[183] The bus plan was generally less controversial and is sometimes not mentioned in the literature that discusses *Transit City*. This appears to be because it was added later than the LRT components of the plan, was perhaps more modest in scope, and likely because bus-based transit priority often tends to be less visible than LRT construction.

[184] *The Big Move* is the transportation plan for the GTHA launched in 2008 by *Metrolinx,* the Province's then-new regional transit authority.

replace existing buses operating in *mixed traffic*. These LRTs would have been in more suburban parts of the city, beyond the boundaries of Old Toronto and where urban densities are generally much lower.

Most of the new LRTs were proposed to be at-grade and *longitudinally-separated with non-mountable kerbs* (ROW B.3) in a similar manner to the priority implemented for the Spadina and St Clair streetcars. However, most existing roads across the City lack medians and cannot be easily widened. Hence, the plan would have required reductions in existing road capacity along many of the corridors. However, not all of the proposed LRTs were to be entirely at-grade. Much of the *Eglinton Crosstown LRT* was to be underground because an *at-grade LRT* was not feasible within the existing 27 metre wide road right-of-way along Eglinton Avenue (City of Toronto 2010; Levy 2015; Metrolinx 2020a)[185].

Transit City was cancelled after the 2010 City of Toronto election by the new mayor, Rob Ford. On his first day in office Ford announced that "the war on the car stops today…Transit City is over…(and) we will not build any more rail tracks down the middle of our streets" (Kalinowski & Rider 2010). Subsequently Mayor Ford negotiated an agreement with *Metrolinx* to move all of the proposed *Eglinton Crosstown LRT* underground and for remaining funding to be shifted towards subway construction. However, this was not the end of the politics.

There was a later "Council Rebellion" (Bow 2018) against Ford's agreement with *Metrolinx*. During this City of Toronto councillors rejected the all-underground option for the *Eglinton Crosstown LRT* due to concerns that the costs were not justified given the projected passenger demands (Bow 2017a, 2018). As a result, *Metrolinx*, who had by then taken over the project from the TTC, returned to the original plan with only 10 kilometres of the *Eglinton Crosstown LRT* being underground. This scheme had already gone through the environmental assessment and approvals processes, and Provincial Minister of the Environment had already issued a notice to proceed (Gerretsen 2010) prior to Rob Ford becoming mayor. The *Eglinton Crosstown LRT* is currently under construction, but delays have pushed the anticipated completion date back to mid-2022 (CBC News 2020).

Some other parts of *Transit City* are now being delivered in the implementation of *The Big Move* (Metrolinx 2008; White 2012; Metrolinx 2020d). However, the cancellation of *Transit City* by Mayor Ford represented a sharp change in policy, with Ford instead proposing a plan for more subway construction instead of LRT (Flack 2011). Transport experts instead continued to favour LRT (Rider 2012). Following the "Council Rebellion" (Bow 2018) the TTC Chair Karen Stintz proposed the *OneCity Transit Plan* (Dotan 2012a; Stinz 2012; Warzecha 2012). This new plan, however, did not

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[185] The central and eastern sections of the line are currently under construction, and are due for completion in mid-2022 (CBC News 2020). The western section is now a separate project, the *Eglinton Crosstown West Extension*, which is planned to be completed by 2030-1 (Metrolinx 2020b).

The *Eglinton Crosstown LRT* as currently under construction is approximately 19km long. Approximately 11km of the line will be underground, including the entire western section of the line from Mount Dennis to east of Laird, and a shorter section in the vicinity of the Ontario Science Centre. This is generally in line with the original *Transit City* proposal. It will connect to the Yonge-University-Spadina subway (Line 1) at Cedarvale Station (currently Eglinton West) and again at Eglinton station. East of Laird station the *Eglinton Crosstown LRT* will be at-grade. It will terminate at Kennedy station where there will be connections to the Bloor-Danforth subway (Line 2) and the Scarborough RT (Line 3)(Thompson 2016b; Bow 2017a, 2018; Metrolinx 2018a, 2020a).

last long as "two weeks later, city councillors of all political stripes proclaimed that plan dead" (Dotan 2012b). Other plans have since been put forward and rejected, but these are not explored here in this chapter. Rather, the focus of the next section is on the *legitimacy* of the *Transit City Light Rail Plan* and the *Eglinton Crosstown LRT*, and the factors behind the sudden changes in policy.

6.3.1 Legitimacy

Normative legitimacy for the *Transit City* plan was built through various planning studies and reports, and the decisions of the TTC board and the City of Toronto Council. *Transit City* became Provincial policy when it was included in the *MoveOntario 2020* policy, in *The Big Move* plan and in funding agreements between the TTC and *Metrolinx* (Kalinowski 2007; Metrolinx 2008; Levy 2015; Bow 2017a). The plan to build the *Eglinton Crosstown LRT* itself was initially *normatively legitimate* because it was part of the *Transit City* plan. This was then confirmed through the preparation of the *Eglinton Crosstown LRT Transit Project Assessment; Environmental Project Report* (City of Toronto 2009) and the Provincial Minister for the Environment then issuing an official notice to proceed with the project (Gerretsen 2010), which allowed construction to commence.

These processes appear have been generally in accordance with the normal systems of planning, approvals and implementation that apply under the Toronto and Ontario governance systems. However, Mayor Rob Ford's declaration that *Transit City* was cancelled on his first day in office appears to have been outside these normal processes. While the Mayor of Toronto has some executive powers, *normative legitimacy* for most decision-making rests with the City Council as a whole, of which the Mayor is just one member. Kalinowski and Rider (2010) highlight that "it will take a council vote – not a decision from the mayor alone – to change course", and the process of unwinding *Transit City* involved negotiation with the Province and compromises regarding the redirecting of funding towards Ford's preferred subway plans (Bow 2017a).

Regardless, it does not appear that cancelling *Transit City* was ever actually put to a vote in council. However, the *normative legitimacy* of the City Council was firmly established in the "Council Rebellion" (Bow 2018) when Ford's all-underground plan for the *Eglinton Crosstown LRT* was rejected. This led to TTC commissioners loyal to Mayor Ford sacking the TTC General Manager in apparent political revenge (Bow 2018). It appears to have been a time of chaos and uncertainty, which may have damaged the legitimacy of the planning process itself as:

> *"…the prevailing disarray threatens to debase the planning process and mandate that, historically, have been founded upon well-documented studies and technically supportable conclusions for review by (mostly) responsible politicians throughout the 20th century"(Levy 2015).*

Despite this disarray, the general idea of improving transit services across the City of Toronto appears to have had *legitimacy*. However, this *legitimacy* appears to have been *conditional*, with two competing and apparently mutually exclusive views on how to proceed. Proponents of *Transit*

City appeared to be in favour of *at-grade LRT* because it met the *condition* of providing good value for expenditure, and so would allow more lines to be built with the limited funding that was available. Mayor Ford and his supporters appear to have instead seen *at-grade LRT* as an attack on the car. Improving transit would therefore have to go underground as *grade-separated LRT* or through the construction of subways to meet the *condition* of not making conditions worse for private motorists[186].

The previous implementations of kerb-separated LRT along Spadina Avenue and St Clair Avenue West appeared to have provided examples and hence some *sociological legitimacy* to support the *Transit City* plan. However, the St Clair Avenue project appears to have become a political football in the *Transit City* versus subway debates. A 2011 study showed that ridership, frequency and transit speed had all increased and "suggested that the final outcome of the St. Clair project should be hailed as a success" (Bow 2016). However, Mayor Ford and his supporters dubbed it the "St Clair Disaster" (Bow 2016) due to cost overruns, impacts on businesses and traffic, and other problems, only some of which had been due to the court action that had delayed construction. In part, the challenges experienced in implementing light rail, together with issues relating to taxation and a five-week garbage collection strike in 2009, may have led to a lack of confidence in government (Silver et al. 2020, p. 5)[187] and hence may have diminished *trust* in plans generated by the technical experts within city institutions.

Within these institutions, however, "LRT was clearly the 'flavour of the week'"(Levy 2015) in the lead up to the release of *Transit City*. LRT appears to have been presented as *reasonable* lower-cost option compared to other higher-capacity modes (i.e. subways). Where *Transit City* called for underground sections of LRT it appears to have been only to facilitate interchanges or where existing road right-of-ways were too narrow and could not be widened. In contrast, Mayor Ford's subway alternative to *Transit City* and desire to move all of the *Eglinton Crosstown LRT* appear to have lacked *reasonableness* as far as costs versus benefits. Despite this, subways appears to have had broad *public consent* across the suburban and more car-centric areas of the City of Toronto, who had overwhelmingly supported Ford in the 2010 election, as shown in Figure 6.4.

[186] "The only form of public transit that was acceptable to Rob Ford were tunnelled subways because they did not interfere with road traffic. He kept silent, however, on the fact that given public transit budget would deliver much more LRT than subway coverage and that most suburban areas do not post sufficient density to justify the presence of subways" (Filion 2018, p. 10).

This appears to be part of a contradiction in Rob Ford's political campaign. He had a large focus on financial matters, such as reducing taxes and spending, and cutting back on councillors' expenses and ending the "gravy train" at City Hall(ibid.). However, at the same time he espoused spending very large amounts of money on building subways through suburban areas, which could be more efficiently and much more cheaply served by prioritised on-road transit services.

Any political problems arising from the impossibility of delivering subways for most or all of the suburbs appears to have been avoided through timing. It appears that suburban voters may not have realised that that they would miss out on improved transit services (that *Transit City* might have delivered) until after they had helped to elect Ford. Ford then remained silent when complains and dissention later arose (Filion 2011).

[187] The strike "culminated in what was broadly seen as a capitulation to labor demand…(and) it was in this context of reduced confidence in the public sector that Rob Ford entered the (election) race…"(Silver et al. 2020, p. 5).

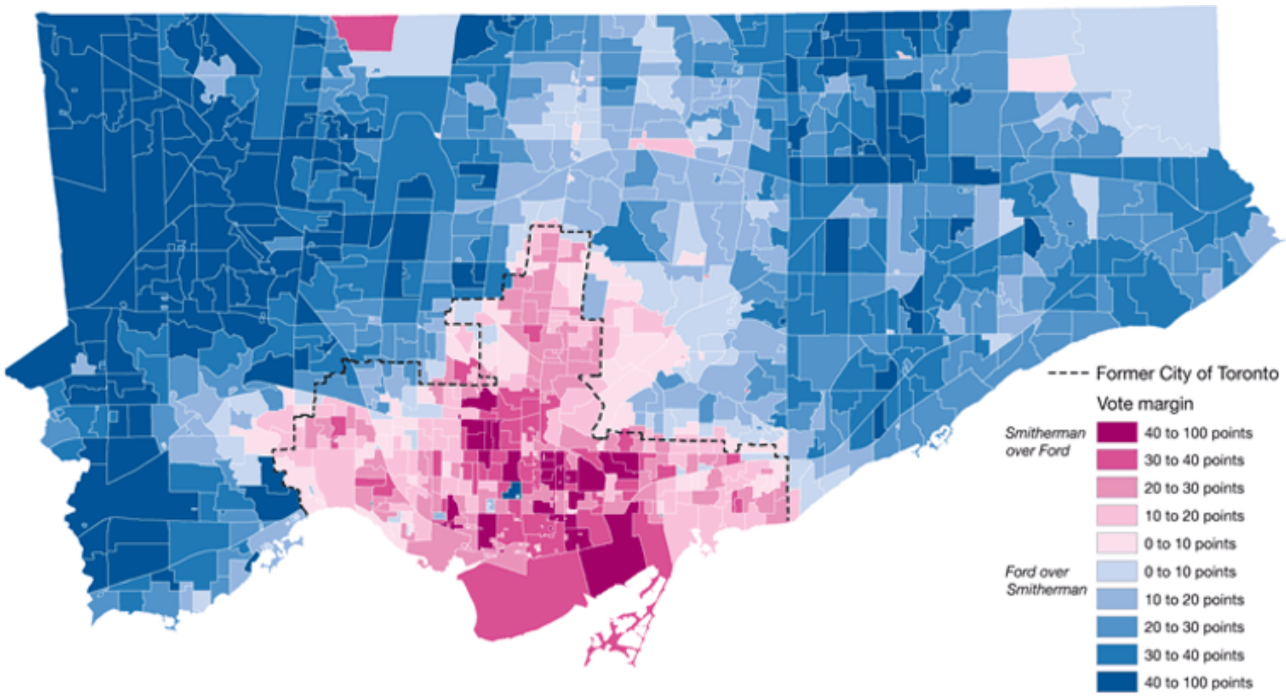

Figure 6.4 2010 City of Toronto mayor election results

Source: Taylor (2013), reproduced with permission of the author.

Figure 6.4 shows how Ford's election victory was driven by suburban voters from outside the former City of Toronto (Old Toronto). Inner-city voters from areas of the city served by the existing streetcar network and where the Spadina and St Clair projects had improved conditions for transit appear to have generally voted against Ford. However, those from the more suburban areas through which most of the *Transit City* was going to be implemented voted for Ford. This suggest that 'ending the war on cars' had significant appeal in the more car-centric suburbs, and that there was little *public consent* in these areas for *at-grade LRT* construction that might impact on private motorists.

However, the *Eglinton Crosstown LRT* had already been fully approved and funded prior to Mayor Ford's election, and so therefore had sufficient *normative legitimacy* to proceed. The Provincial Minister for the Environment had already issued a notice to proceed (Gerretsen 2010) and the project was funded and had been taken over by the province and *Metrolinx*. Hence, when Ford's proposal for an all-underground *Eglinton Crosstown LRT* failed in the City of Toronto Council *Metrolinx* was able to switch back to the original plan and get on with implementation regardless.

6.4 Conclusion

This chapter has focused on the debate about how to improve transit services in suburban areas of the City of Toronto. The *Transit City* plan called for implementing mostly *at-grade* and *longitudinally-separated LRT*, but because of the narrow road ROWs throughout much of the City of Toronto this appears to have been likely to have required significant amounts of road space to be reallocated from other traffic. In general, the debate about *Transit City* appears to have been almost entirely political, with those in favour of subways appearing to primarily be focused on maintaining the status-quo for motorists.

Grade-separated transit had already been tried in the suburbs of the City of Toronto. The Scarborough RT (Line 3) and the Sheppard subway (Line 4) appear to have been implemented instead of LRT alternatives for largely political reasons. However, ridership across these two lines is just a fraction of that of the rest of the subway system, and well short of what might justify the expense of their construction (Morrow 2012; Levy 2015; Adel & Bow 2017; Chan 2019; Bow 2020).

The *Transit City* plan called for *at-grade LRT* as a way to provide higher-order transit in the suburbs, but avoiding costly underground construction unless it was unavoidable, (as in central part of the *Eglinton Crosstown LRT*). However, the election of Mayor Ford on a wave of support from more car-centric suburbs suggests that there was little *public consent* for *at-grade longitudinally-separated* LRT. While *Transit City* would likely improve transit, it failed to meet the *conditional normative legitimacy* requirement of minimising impacts on private motorists. Narratives of the “St Clair Disaster” (Bow 2016) and ending the “war on cars” (Kalinowski & Rider 2010) suggest there was almost *unconditional legitimacy* for the idea that streets are for cars, and hence any technical evidence that subways were not *reasonable* or appropriate could be dismissed “without seeing the report”(Rider 2012).

Despite the shift in policy following the 2010 mayoral election, the *Eglinton Crosstown LRT* appears to have been far enough along in the approvals process to have sufficient *normative legitimacy* to proceed in one form or another. It may be that there was less resistance to its implementation, as part of this line would be underground anyway. Despite the efforts of Mayor Ford to shift to an all-underground option, this line is currently being delivered by the Province largely in accordance with the original *Transit City* plan.

Of course, *Transit City* is just one of the many transit prioritisation efforts that have occurred in recent years in Toronto[188]. One difference that appears to have supported some of these implementations is that they have been delivered in ways that have, where possible, minimised

[188] Parts of *Transit City* have been incorporated into other plans (Metrolinx 2020e), and there are other transit priority implementation efforts in the City of Toronto and across the Greater Golden Horseshoe that have been more successful. These include: the *York University Busway* (Bow 2017b); BRT implementation in York Region, north of the City of Toronto (Koole & Bow 2018; York Region Rapid Transit 2019); and the *Kitchener-Waterloo LRT* (Bow 2019a).

changes to the status quo for private motorists[189]. Another approach is suggested by the recent *King Street Transit Pilot* in the Downtown of the City of Toronto, where transit priority measures that negatively impact private motorists where permanently implemented after a formal trial[190]. In general, however, the potential for negative impacts on private motorists appears to have been a major factor impacting the legitimacy of transit priority in Toronto. This appears to have been the reason that *Transit City* lost *legitimacy*. However, this does not appear to be a problem unique to Toronto. As discussed in Chapter 5, opposition to transit priority implementation <u>because of its impacts on private motorists</u> appears to have been a significant factor in the removal of transit priority measures in Clarendon Street and Stud Road.

Toronto and Melbourne have been directly compared in previous research about public transport in by Cervero (1998); Mees (2000); Currie and Shalaby (2007, 2008); Woo (2009); Mees (2010); Currie et al. (2012) and in planning studies (e.g. Keesmaat (2016)). The cities have growing populations, low-density suburban development patterns, and are both generally car-centric. There are some notable differences, such as the more locally autonomous governance structure in Toronto and its higher frequency transfer-based local transit network. However, efforts to prioritise on-street transit services in Toronto and Melbourne through large-scale strategic-level planning approaches appear to have faced similar challenges in retaining legitimacy.

The <u>idea</u> of improving transit appears to have had *legitimacy* in both cities. However, <u>support appears to be *conditional*</u> on maintaining the status quo for private motorists. This is evident in Mayor Ford's efforts to move transit underground in Toronto to end the "war on cars" (Kalinowski & Rider 2010) and the political promises and compromises in Melbourne that have resulted in the removal transit priority measures that reduced on-street parking or replaced traffic lanes.

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[189] For example:

- the implementation of the *York University Busway* involved new road construction along an existing electricity corridor (Bow 2017b);
- *York Region's Rapidways* provide longitudinal-separation for buses from other traffic through *kerb-separated lanes* in the centre of the road (ROW B.3), and were delivered by widening Highway 7 (Koole & Bow 2018; York Region Rapid Transit 2019); and
- the *Kitchener-Waterloo LRT* runs along an existing freight railway lines for part of its route (Bow 2019a).

[190] This implementation was initially installed as a 12-month trial, and included restricting through traffic, *banning some turns* and *relocating streetcar stops to the far side of intersections* (City of Toronto 2017; City of Toronto et al. 2017). Some protests occurred (Harris 2018; O'Neil 2018), but the trial provided an opportunity to test the measures, collect data, and build *legitimacy*. Partway through "nobody (wa)s complaining about King Street anymore" (blogTO 2018a), and the City of Toronto adopted the measures permanently after the trial ended (BlogTO 2018b; City of Toronto & Toronto Transit Commission 2018; Mok 2018; Bow 2019b; CBC News 2019; City of Toronto 2019b; City of Toronto et al. 2019).

This concludes Chapter 6 and Part B of this thesis, which has described how there appears to be a *legitimacy* challenge in *car-centric cities* for transit priority implementation called for by strategic level plans and programs. In general, prioritising on-road transit appears to be acceptable only if the existing status quo for private motorists is maintained. In *car-centric cities* the existing status quo for motorists appears to have almost *unconditional legitimacy*, regardless of the *reasonableness* or technical appropriateness of reallocating limited road space to more efficient use by higher-capacity transit vehicles.

Part C and the following chapters, therefore, move on to examine what lessons can be learn from more *transit-centric cities* about legitimising transit priority implementation. Zürich and Curitiba have both successfully implemented high levels of priority for on-road transit services in accordance with strategic-level plans. However, it is unclear how these cities have addressed opposition from private motorists that might have reduced the *legitimacy* of transit prioritisation.

Part C: Lessons from *transit-centric cities*

Chapter 7: An initiative and public ballot in Zürich

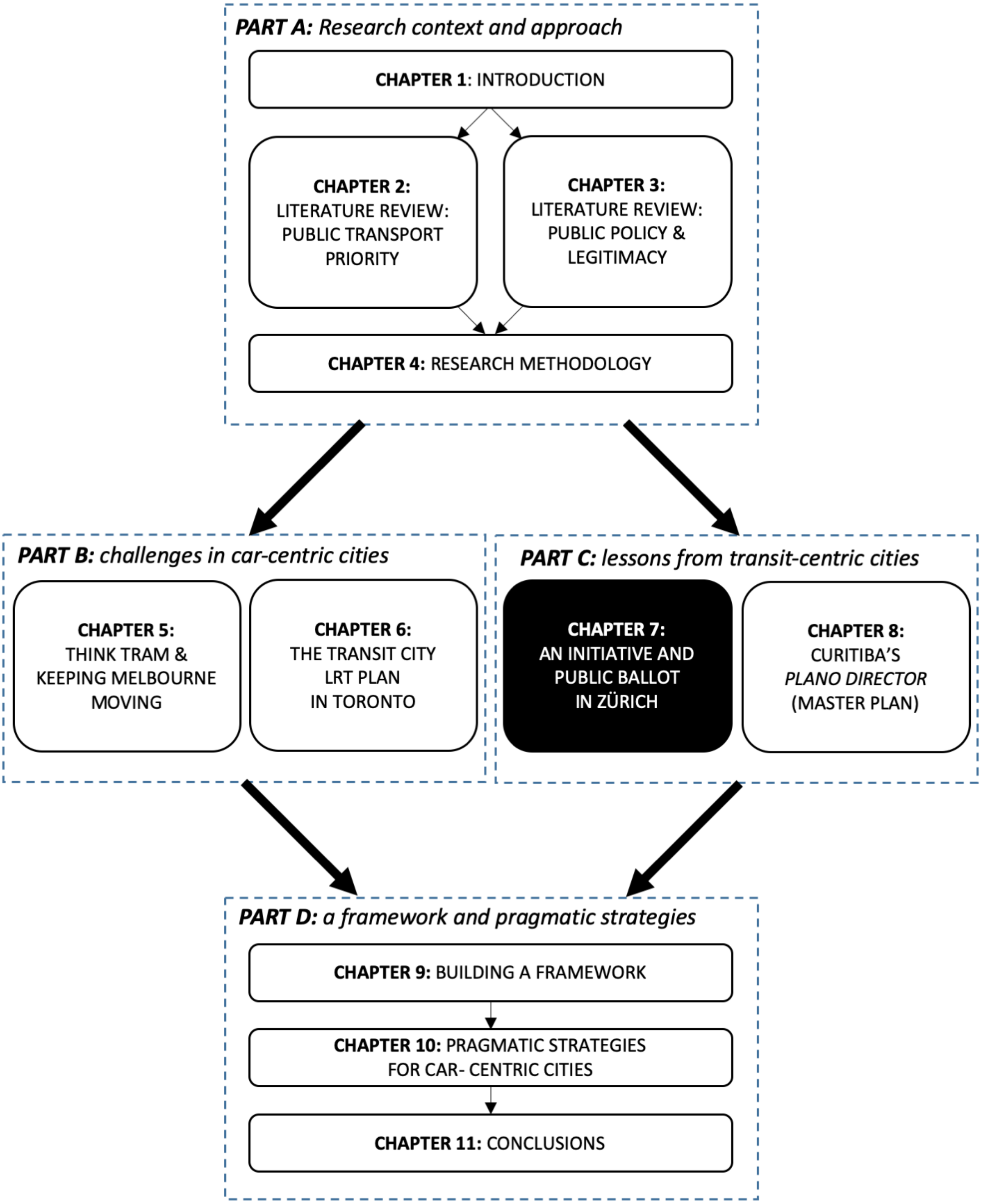

Figure 7.1 Position of Chapter 7 in thesis structure

7.1 Introduction

This is the first chapter in Part C of the thesis. It addresses the second research objective of the study by reviewing transit priority implementation in Zürich. Zürich has been included in this study because of its long-running and successful program of transit priority implementation. This program is largely the result of a public ballot that supported a *Citizens' Transit Priority Initiative*, which has been widely reported in the research literature[191].

Some of this literature suggests that directly transferring the successes in Zürich to other cities might be a relatively easy matter[192]. However, the experiences of implementing transit priority in Melbourne and Toronto that were discussed in the preceding chapters might suggest that priority implementation is about more than installing the measures. The aim of this chapter is therefore to understand transit priority implementation in Zürich, and why implementation has been more successful and *legitimate* there than in many other places.

This chapter is structured as follows: Section 7.2 first discusses the overall city context of Zürich. The context and *legitimacy* of Zürich's *Citizens' Transit Priority Initiative* and subsequent implementation of transit priority are then discussed in Section 7.3. Section 7.4 provides a brief conclusion. Additional supporting material is included in Appendix C.

7.2 City context

Zürich is the largest city in Switzerland and the capital of the Canton of Zürich[193]. The City of Zürich is the local government authority in central Zürich. However, like in Melbourne and Toronto, the metropolitan area extends into other surrounding municipalities.

In Switzerland there is considerable amounts of power and autonomy at the canton and local municipal levels. Direct democracy is a feature of the Swiss governance system, and major federal decisions require approval by a majority of the national populace and a majority of cantons. Large capital expenditure must also be approved at a referendum, while ballot initiatives can also be put

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191 Notably by Joos (1989, 1990, 1994); Nash (2001, 2003); Mees (2010) and Nash et al. (2018). In particular, Nash (2001) provides a detailed history of transit priority implementation in Zürich. This history is based on interviews with many of the participants, and provides much of the detail underlying this chapter.

192 For example, the first of the *three messages from Zürich concerning the new transport policy* messages was that "If you ask the inhabitants of a town which transport policy should be followed, the citizens will not choose the car…" (Joos 1994).

More generally, Mees (2010) discusses "the Zürich model" at length (pp.129-147) immediately prior to developing a "General Theory of Public Transport Network Planning". This provides *normative* guidance on "creating an effective public transport agency"(p.157), "who should be in charge" (p.160) and how "if all these elements are in place, the next challenge is to actually design a public transport network…"(p.162). All of this appears to suggests some very major and non-*incremental* changes to institutional structures and transit networks as a starting place.

Nash (2001, pp. 135-6) suggests that Zürich's successes in transit prioritisation are transferable to other cities because of Zürich having similar problems, characteristics and direct citizen voting on local taxes to fund capital expenditure (relevant in the USA, but not Australia). However, it is acknowledged that there are social and governance differences, and that "cities with less-developed transit systems might not achieve the same results as quickly as Zürich".

193 A canton is similar to a province or state in other political systems. Switzerland is a confederation of cantons.

forward by the general public if sufficient signatures are gathered (Joos 1994; Apel & Pharoah 1995, p. 131; Cervero 1998, p. 305; Nash 2001, pp. 46-9; Low, Gleeson, Green, et al. 2005, p. 144).

The City of Zürich currently has a population of approximately 410,000 (Nash et al. 2020), but lies within a larger 'agglomeration'[194] of approximately 1.3 million people. Figure 7.2 shows the population trends of the Canton of Zürich, Zürich Agglomeration and the City of Zürich.

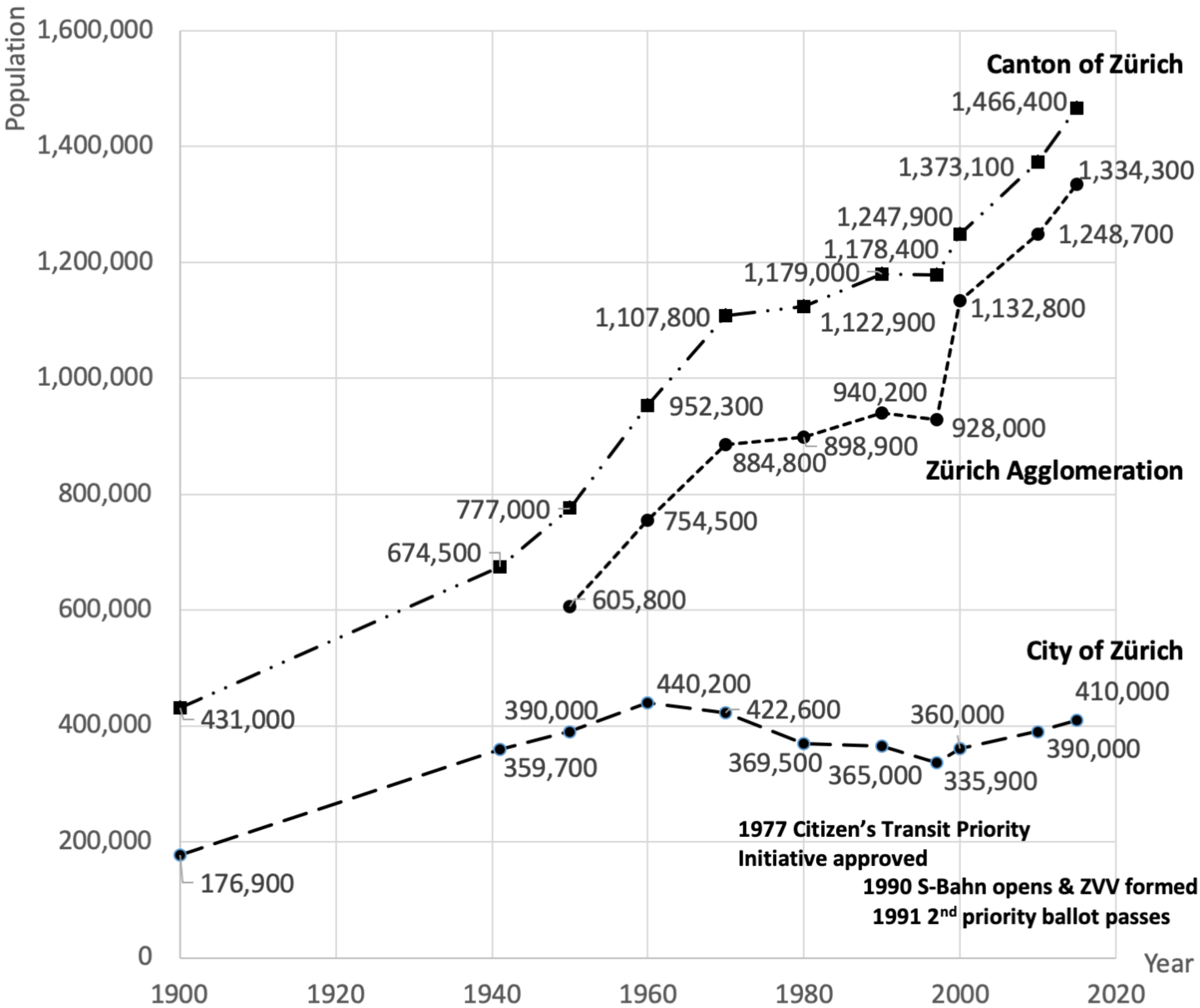

Figure 7.2 Canton of Zürich, Zürich Agglomeration and City of Zürich population trends

Source: Author based on Nash (2001, p. 40); Nash et al. (2018, p. 8)

Apel and Pharoah (1995, pp. 127-9); Mees (2010, p. 133) and Nash (2001, pp. 39-41) all note a general decline in population in the City of Zürich since a peak in the 1970s as people shifted to live in the suburbs and commute to employment in the city, although the City's population is now increasing again.

[194] Unfortunately the Zürich Agglomeration is not clearly defined, being the "the commute-shed area for the city" (Nash 2001, p. 39), rather than a statistical boundary. This likely explains the sudden increase in population in the Zürich Agglomeration between 1997 and 2000, as these figures are separately from Nash (2001, p. 40) and Nash et al. (2018, p. 8) respectively and it appears likely that a different boundary of the commuter-shed has been adopted.

The City of Zürich is 92km^2 in area[195]. Apel and Pharoah (1995, p. 131) describe the Zürich region as having a dense historic inner-city area with narrow streets, surrounded by dispersed and low-density suburban areas. However, a wide range of values are reported in the literature for population density because researchers have adopted different calculation methodologies[196]. Mees (2010, pp. 133-4) suggests that densities in the middle and outer suburbs of Zürich are lower than in similar parts of London, and only 20% higher than the middle and outer suburbs of Toronto and Los Angeles.

Figure 7.3 summarises transit usage, mode splits and the car ownership rate.

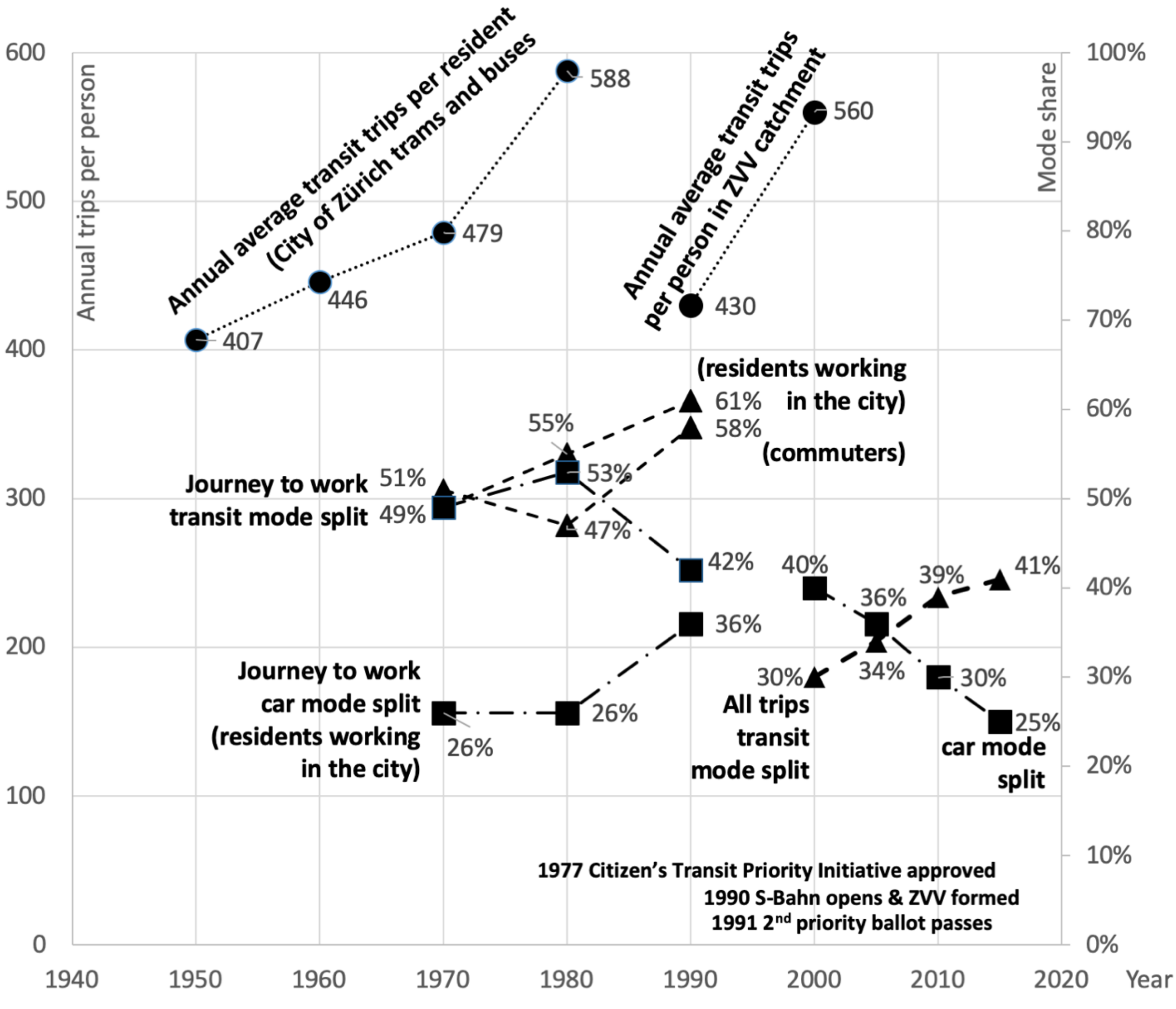

Figure 7.3 Transit ridership and mode split trends

Source: Author based on Joos (1989, p. 75); Cervero (1998, p. 299); Nash (2001, p. 40); Nash et al. (2018, p. 8)

Cervero (1998, p. 299) reports that Zürich residents average 560 transit trips per year, almost twice as many as made by residents of London, Paris or Berlin. Reported transit mode splits range from

[195] For comparison, the City of Melbourne is 37km^2, roughly 2.5 times smaller than the City of Zürich.

[196] Nash (2001, p. 39) and Low, Gleeson, Green, et al. (2005, p. 145) report densities using a simple gross density calculation of population within a statistical boundary. Mees (2010, pp. 53-66) discusses inaccuracies and challenges in measuring population density at length, and provides a density that is adjusted to include only areas with urban land uses. See values in Table C.1

40 to 70% for the journey to work and from 30 to 40% for all trips. Car ownership levels are low, in the order of 35-45%, and 53% of households do not own a car at all (Apel & Pharoah 1995, p. 149; Nash 2001, p. 45; Nash et al. 2018, p. 9).

The road network in the City of Zürich has limited capacity due to historical and geographical reasons. There are no wide ceremonial roads in the city (Mees 2000, p. 120), and the widespread use of traffic calming measures discourages car use (Cervero 1998, p. 312; Nash 2001, p. 13). Plans for extensive freeways were rejected by voters in the 1950s and 60s (Nash 2001, p. 51). However, the Canton government controls some of the roads in the City, and there is some tension between the Canton's desires for improved traffic mobility and the City's desires for traffic limitation (Apel & Pharoah 1995, pp. 127, 33-34).

Transit services date from horse-drawn trams in the late 1800s, with buses introduced in 1927 (Gunnarsson & Löfgren 2001, pp. 32-3). Transit in the Canton is now organised by the ZVV, which coordinates over 40 operators in a frequent and/or pulse coordinated network of services. This network effectively provides an 'anywhere to anywhere' service across the Canton, including into low-density areas and small villages. It has grown out of commuter rail services along the northern side of Lake Zürich, which started in 1968. The network form has also been influenced by the rejection of proposals to close lesser used lines. This has been possible because of the direct power of the people to defeat such plans through the system of referendums (Apel & Pharoah 1995, p. 144; Nash 2001, pp. 106-7; Mees 2010, pp. 134-7; Nash et al. 2018, p. 9). It perhaps contrasts to other countries where the response to financial losses because of increasing motorisation around the middle of the 20th century was to dramatically scale back rail networks (e.g. the Beeching Axe cuts in the UK). The net result, perhaps, is that the Canton of Zürich has retained and built upon its historic rail and other public transport services to a greater extent than has been common in other countries, meaning that public transport is a more viable option for travellers both inside and outside of major communities.

7.3 The Citizens' Transit Priority Initiative

The *Citizens' Transit Priority Initiative* has its origins in the failure of two preceding plans at the ballot box. Like many cities Zürich began to have problems related to traffic congestion in the mid-20th Century. A proposal to move the trams underground, the *Tiefbahn Plan*, was developed in the 1950s and 60s to address these issues, alongside plans for new freeways. It was put to a public referendum in 1962, but was unexpectedly defeated (39% in favour, 61% against).

Another plan, this time for a combined U-Bahn (metro) and S-Bahn (commuter rail) system, was similarly defeated in 1973 (43% in favour, 57% against). Opposition centred on the significant construction costs, impacts on the city form and environment, and concerns that a U-Bahn might lead to the tram system being abandoned. Opponents also argued that more could be done by improving the existing trams and buses (Nash 2001).

The City's planning department had already released a study in 1971 on how to improve the operation of tram route 10. This study and the opposition to the *U-Bahn / S-Bahn plan* led to the drafting of the *Citizens' Transit Priority Initiative* by a group of transportation professionals and students, supported by the Social Democrats party. The development of this alternative was important as the Social Democrats, a progressive party behind the opposition to the *U-Bahn / S-Bahn plan*, could not "seriously argue against a public transit proposal without having, or being willing to develop, its own proposal" (Nash 2001, p. 60). The Initiative sought a 10-year program and a budget of 200 million francs to improve buses and trams and "eliminate all interference by private traffic…so that the vehicles of (Verkersbetreibe Zürich) VBZ can travel along their lanes or tracks virtually as fast as is technically possible" (Nash 2001, pp. 61-4). It was submitted in 1973, almost immediately after the *U-Bahn / S-Bahn* referendum. However, it was not put to a public vote until 1977.

The *Citizens' Transit Priority Initiative* was opposed by the government as being unnecessary given that the City was already implementing transit priority measures. Some of the easier measures recommended in the 1971 tram route 10 study had already been implemented. A political-level committee and a multi-disciplinary staff working group had been formed in 1973, and in 1974 the City had revised the Zürich Transportation Plan to include transit priority implementation and measures to reduce automobile traffic. A 1975 city council resolution also directed departments of the city to prioritise transit.

Regardless of the City's opposition, the *Citizens' Transit Priority Initiative* was narrowly passed by the voters (51% in favour, 49% against)(Nash 2001, pp. 61-70). Cervero (1998, pp. 305-6) notes that the Initiative was supported by both pro-tram and anti-U-Bahn groups. More broadly, Nash (2001, p. 64) suggests that the Initiative appealed to voters due to growing environmental concerns about automobile use and car-dominated land-use patterns, the costs of alternatives, and the popularity of the "Small is Beautiful" idea at the time.

Subsequently, the Zürich City Council passed a directive in 1979 to build *bus lanes* and *separated tram tracks*, install *TSP,* and develop a transit control system (Apel & Pharoah 1995, p. 138; Cervero 1998, p. 307). Most of the initial program of transit priority measures had been implemented by 1985. A second initiative was put forward and passed by voters in 1991 to provide further funding for transit priority implementation (Nash 2001, p. 68).

Transit priority initiatives continue to be implemented to the current day. A project to move traffic on a major arterial street (*Rosengatenstrasse*) underground is to be completed by 2030 to allow trams to have uninterrupted operation at surface level. Tram and bus extensions are also planned (Nash et al. 2020).

Various listings and examples of the specific transit priority measures implemented in Zürich are provided in the research literature. The actual number of measures implemented is unclear, as different authors have studied the system at different times during its continuing evolution. However, the various transit priority measures installed include *TSP*, *parking prohibitions*, *turn restrictions*, *transit malls*, *transit lanes* and *traffic calming*.

In general, there has been a long policy of prioritising transit over other vehicles in the city in line with the wording of the 1977 Initiative. The policy is described as giving:

> *"free travel, unhindered by private traffic, between the junctions…[and] maximum preference for public transport at the junctions controlled by traffic lights", with "the aim of ensuring "Waiting Time Zero" for public transport" (Joos 1994).*

The successful outcomes of this policy are widely discussed in the research literature[197]. This literature also suggests that <u>the implementation **process** itself has been successful</u> in Zürich, <u>not just the outcomes</u>. Cervero (1998, p. 304) notes that the 1977 *Citizens' Transit Priority Initiative* provided a clear mandate. Similarly, Nash (2001, p. 65) suggests the Initiative:

> *"…was the single most important factor leading to the implementation of Zürich's transit priority program…that forced the government to act more boldly that it otherwise would have done."*

However, the passing of the Initiative itself was not the sole factor that supported prioritisation, as the City had already begun implementing transit priority measures prior to the 1977 ballot. The Initiative was also not sufficient on its own, as it took <u>further pressure from advocates to overcome initial reluctance</u> from officials and politicians to fully prioritise transit.

[197] See Joos (1989, 1990, 1994); Cervero (1998); Nash (2001, 2003); Mees (2010) and Nash et al. (2020).

Cervero (1998) and Joos (1994, p. 3) suggest that officials tend to be middle aged men[198] who drive more often and use transit less than the general public, and that this may help to explain the initial focus on freeway building and moving transit underground, and some of the reluctance towards transit priority implementation in Zürich. Of course, the demographics of the engineers and other city officials are probably not the only reason as traffic engineering and planning orthodoxy at the time was dominated by 'predict and provide' approaches[199]. These tend to focus on building road capacity to meet demand and so might under-emphasise the impact of induced traffic[200]. As such, the shift to the status quo and established, traffic-focused practices within the City's technical organisations[201] may have been initially resisted or limited. However, "as older employees have retired and younger staffs have taken leadership roles, the departments are more fully committed to the transit priority program" (Nash 2001, pp. 65-7), suggesting an incremental shift in attitude and policy-making within the city's institutions.

This suggests that the challenges for implementing transit priority in Zürich were about building *legitimacy* and overcoming path dependence and resistance to change **within institutions**, rather than the wider community. The six years between the submission of the Initiative and it being put on the ballot, the City's opposition, and the need for further advocacy after the 1977 ballot all suggest *bottom-up* efforts within the bureaucracies and government aimed at avoiding[202] the implementation of measures that would have significant negative impacts on traffic. It also shows

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[198] Joos (1994, p. 3) argues that "the instrument of the referendum is very clearly responsible for the fact that transport policy in Zürich differs from that in towns where elected representatives of the public determine what happens…the quarter of citizens who travel by car at above-average frequency also (are the source of the politicians who) make the decisions and, because they use their own needs as a measure of the needs of all citizens, they decide in favour of car traffic"

This appears similar to the issues raised in some research on gender and social equity in transportation relating to how the socio-demographics of transportation planners, traffic engineering and others working and making decisions in these fields are often not representative of the general public. See, for example, Rømer Christensen et al. (2007, pp. 108-25); Loukaitou-Sideris (2016, p. 558) and other related research on the need for broader perspectives and gender mainstreaming in transportation policy- and decision-making, design and implementation, and system management. Along similar lines there have been recent efforts to improve understanding of equity and accessibility issues through the "Travelling in the Shoes of Others" training program in Melbourne. This half-day course offers those who work in the transport industry an opportunity to experience (and so better understand) what it is like to use the transit system for people with restricted vision or mobility (Public Transport Victoria 2019, 2020b; van Holstein et al. 2020, p. 9).

There appear to be important issues with respect to the legitimacy of measures to improve accessibility, or other aspects, of transport systems for specific users groups. Many groups are often not well catered for because of systemic issues or lack of representation in decision-making and/or institutions. However, such topics or how socio-demographic issues may have influenced policy-making Zürich or other cities with respect to transit priority implementation are beyond the scope of this study.

[199] See discussion of *CATS*, the *four-stage model* and strategic transport planning approaches in Section 3.2.1.

[200] See discussion of induced traffic in Hills (1996); Sadik-Khan and Solomonow (2017, pp. 62-3); Litman (2019a) and many others.

[201] See discussion of traffic-focused perspectives on transport system evaluation in Section 2.3, and the problems associated with road authorities who may tend to be focused on vehicle delay minimisation, rather than the potential broader benefits of transit prioritisation for the transport system (Vuchic 2007, p. 243; Currie 2016a).

Detailed investigation of attitudes amongst transport officials in Zürich at the time of the *Citizens' Transit Priority Initiative* towards the legitimacy of transit prioritisation (versus continuing along a more orthodox and/or traffic focused path) is beyond the scope of this study. However, Nash (2001, pp. 65-7) provides a detailed account of the challenges of implementation and differing attitudes and levels of support within the various governmental organisations. In particular, Nash (2001, pp. 65-7) notes that "many of Zürich's professional transportation planners had supported the concept of transit priority for years…However, there was a reluctance to implement the program" initially, before it gradually became more supported by the City. This appears to be part of the general transition in Switzerland, with:

- a recognition of the need to prioritise transit in Zürich "since the 1950s and 1960s, but implementation of improvements (that) had been timid)";
- Basel and Bern having already approved transit prioritisation before Zürich in 1971 and 1973, respectively;
- but less support from the Cantonal government, which "is a problem because the canton controls many of the larger roads through Zürich and will not allow the city to reduce automobile capacity to provide a higher level of transit priority" (ibid).

[202] As per the use of the term *avoidance*, rather than *institutionalism*, by Lyles and Thomas (1988) to describe procedural approaches used by bureaucracies to try to avoid making decisions.

how there was a need for further *legitimacy*, beyond just the successful ballot outcome, for transit priority implementation to proceed in Zürich.

7.3.1 Legitimacy

Due to the direct public voting system in Zürich *citizen control* is the <u>*normatively legitimate*</u> mechanism for major decision-making (c.f. Arnstein (1969)). However, this *normative legitimacy* alone was not sufficient for the transit priority implementation in Zürich to go ahead as it did. Elected representatives and government officials also had powers over policy direction and implementation, and the ability to use bottom-up tactics to delay policy change.

In general, though, public involvement in decision-making in Zürich is at the top of Arnstein's ladder. In Zürich citizens can also directly enact policy change by gathering sufficient signatures for an initiative to be placed on the ballot. This means that "people are neither constrained by nor entirely secure with government decisions" (Apel & Pharoah 1995, p. 131), as a referendum can be held on any issue (and so the *sociological legitimacy* of any policy can be directly tested through *public consent*). The 1962 *Tiefbahn Plan* and the 1973 *U-Bahn / S-Bahn proposal* are examples of this insecurity as, despite the planning that went into these plans, rejection by the voters meant that they lacked *normative legitimacy*, *sociological legitimacy*, and *public consent* and so another way needed to be found.

<u>*Sociological legitimacy*</u> was relevant in Zürich with respect to competing ideas of whether roads should be used for moving people or for moving traffic, and the needs of local residents versus commuters from further away. The 1962 *Tiefbahn Plan* was put to the voters of the City of Zürich, rather than the voters of the entire Canton (Nash 2001, p. 52). Therefore, suburban drivers commuting into the city, arguably those causing the congestion that slowed transit services, were not participants in the ballot. While the use of city streets by private vehicles was *normatively legitimate* (i.e. suburban cars were legally allowed on the streets), the rejection of the *Tiefbahn Plan* was perhaps an expression by City residents that the fabric of the City <u>should **not** be fundamentally changed to accommodate traffic</u> (from the suburbs). Nash (2001, p. 52) also notes that there was a consensus around the idea of improving transit in the City, but moving trams underground was not supported by either the advocates of improving the existing surface transit or by those who wanted a U-Bahn system.

<u>*Legitimacy through reasonableness*</u> was also relevant given that voters in the City had rejected the undergrounding of streetcars in 1962, and then voters throughout both the Canton and the City rejected the 1973 *U-Bahn / S-Bahn proposition* (Nash 2001, p. 59). Given these election results it is perhaps not surprising that City staff were already making progress on transit priority implementation prior to the 1977 referendum. If there is no *public consent*, *normative* or *sociological legitimacy* then the <u>**only** *reasonable* alternative is to improve the surface transit network</u>:

> *"If, as decided by referendum in Zürich, the citizens as taxpayers do not find it reasonable to replace the trams with expensive underground railways … the first requirement in the management of the valuable traffic areas is the priority for public transport in the existing road network"*.
> The "Second message from Zürich" in Joos (1994, p. 3).

Another factor supporting the *reasonableness* of transit priority is the high transit mode split. In 1970 the transit mode split for residents of the city traveling to work in the city was already 49%, while the auto mode split was only 26%, and the remaining 25% were walking or cycling (Nash 2001, p. 44). While the auto mode split for commuters travelling into the city was much higher, at 49% (Nash 2001, p. 45) it is important to remember that surface transit priority was a matter for the City, not the Canton[203]. If around half of the City's residents were already using the surface transit network on their way to work, speeding up the surface transit network was *reasonable* from their point of view. In contrast, under the *U-Bahn / S-Bahn proposal* the existing tram and bus networks would have been realigned to connect with the new system. This would have reduced trip times for longer trips from the suburbs, but increased travel times for shorter trips within the city (Nash 2001, p. 57). For a city voter, the proposal to spend large amounts of money on a new underground system that would make their travel less convenient would not seem *reasonable*, particularly given that Zürich, already "had a well-used and highly respected transit system…[and so] simply needed to upgrade, by incrementally adding transit priority improvements" (Nash 2001, p. 8).

At least some of the initial reluctance towards fully prioritising transit (Nash 2001, pp. 65-7) may have been due to transit priority having only *conditional normative legitimacy* within government departments. The support for the *normative* principal of improving surface transit was *conditional* on it having few impacts on traffic:

> *"[t]he importance of transit priority had been recognized in Zürich since the 1950s and 1960s, but implementation of improvements had been timid" (Nash 2001); and*
>
> *when the* Citizens' Transit Priority Initiative *was submitted "[t]he city engineer responded negatively, and said that his department was already working on a less ambitious priority system that would not inconvenience motorists" (Mees 2010, p. 131).*

[203] There appear to be some important interactions between the governance structure and legitimacy in this case, which provide contrast to the case of Toronto discussed in the previous chapter. In Toronto many more suburban areas are within the City of Toronto and (as per Figure 6.4) were important to the election of Mayor Ford and his cancelation of the LRT plans (although it should be noted that there is much more of the suburbs in the GTHA and surrounds that are not included within the City of Toronto). Many of the public-decisions in Zürich, however, appear to have been made without the input of suburban residents because the City of Zürich is much smaller and does not include much of the area in which commuters who travel into the central city reside.
This also relates to the effect over governance and jurisdictional boundaries of the *reasonableness* for politicians to support transit prioritisation. In Toronto, councillors are elected by ward and so might be representing an entirely suburban part of the city. Hence, it might not be *reasonable* for some politicians to support transit priority if they wish to represent the views of their constituents (or be re-elected). In contrast, Zürich's decision-making on the *Citizens' Transit Priority Initiative* was made directly at the city level by a direct vote (Nash 2001, pp. 51-64). Representatives involved in subsequent decision-making already had a city-wide mandate for implementation.

The expression of *public consent* in the 1977 ballot and the various City policies and directives, however, appears to have shifted the situation so that there less regard for the impacts on private vehicles. Over 15 years later Joos (1994) described the ""Waiting Time Zero" policy for public transport", while Mees (2010, p. 131) suggests that after the 1977 referendum "the era of 'balanced transport' was over.

> *"Zürich has come to the inescapable conclusion that promoting ecological transport modes is not sufficient…it is essential to limit the attraction of private car travel" Ott (1993) quoted in Apel and Pharoah (1995, p. 150).*

This suggests that by the 1990s transit priority implementation was **no longer *conditional*** on traffic impacts, **but instead had *unconditional legitimacy***[204].

[204] Part of this shift may be the result of environmental regulations enacted at the federal level during the 1980s. Hass-Klau (1990); Apel and Pharoah (1995, p. 133) and Nash (2001) all point to the impact that legal requirements to reduce air pollution levels had on transport policy in Zürich, providing further support for transit priority and traffic restriction. This is evident at the local level in the resolution passed by the City Council in 1987 that public transport had to be promoted, private vehicles and parking supply had to be reduced, and that "environmentally friendly modes of transportation should be supported" (Nash 2001, p. 71).

However, such *unconditional legitimacy* is also (at least in part) related to the governance structure with respect to the small size of the inner City of Zürich, which excludes the surrounding suburban areas (see Section 7.2). If such suburban areas were included the city's jurisdiction, for example with the City of Zürich being like the City of Toronto and including both the downtown and some of the surrounding (middle) suburbs of the larger agglomeration, it might be that transit prioritisation could be less than *unconditional* and instead be *conditional* on minimising traffic impacts.

There may be opportunities for future research that might compare the impact of city size (land area), and the amount of surrounding suburban commuter areas that are included within a central city, on the legitimacy of transit priority. This appears likely to require the collection of primary data, and so is beyond the scope of what can be achieved in this study. However, future research might consider investigation and comparison of the extent to which transit prioritisation is considered legitimate by suburban voters in Zürich (outside the central city) with other cities (such as Toronto) where at least some suburban voters are within the central city boundaries.

7.4 Conclusion

It appears that the significant program of transit priority implementation in Zürich has been supported and legitimised through:

- the referendum process, which provided direct evidence of *public consent*, plus *normative* and *sociological legitimacy*;
- *reasonableness,* given that the surface transit system was already widely used by City residents and options for moving transit underground lacked the *consent* of the voters, and so prioritising on-road transit was the only remaining option; and
- a gradual shift from *conditional normative legitimacy* for speeding up and prioritising transit also long as traffic impacts were minimised, towards almost *unconditional legitimacy* for transit priority.

Having discussed Zürich, the next chapter turns to a case where there have been similarly successful transit priority outcomes, but within a completely different context and governance structure. Curitiba has implemented transit priority, including a renowned BRT network, across a similar period of time as the implementation in Zürich. However, this has been achieved during and a period of military rule across Brazil, and so the case of Curitiba provides a sharp contrast to the *citizen's controlled*, public-initiative-led implementation in Zürich.

Chapter 8: Curitiba's *Plano Diretor* (Master Plan)

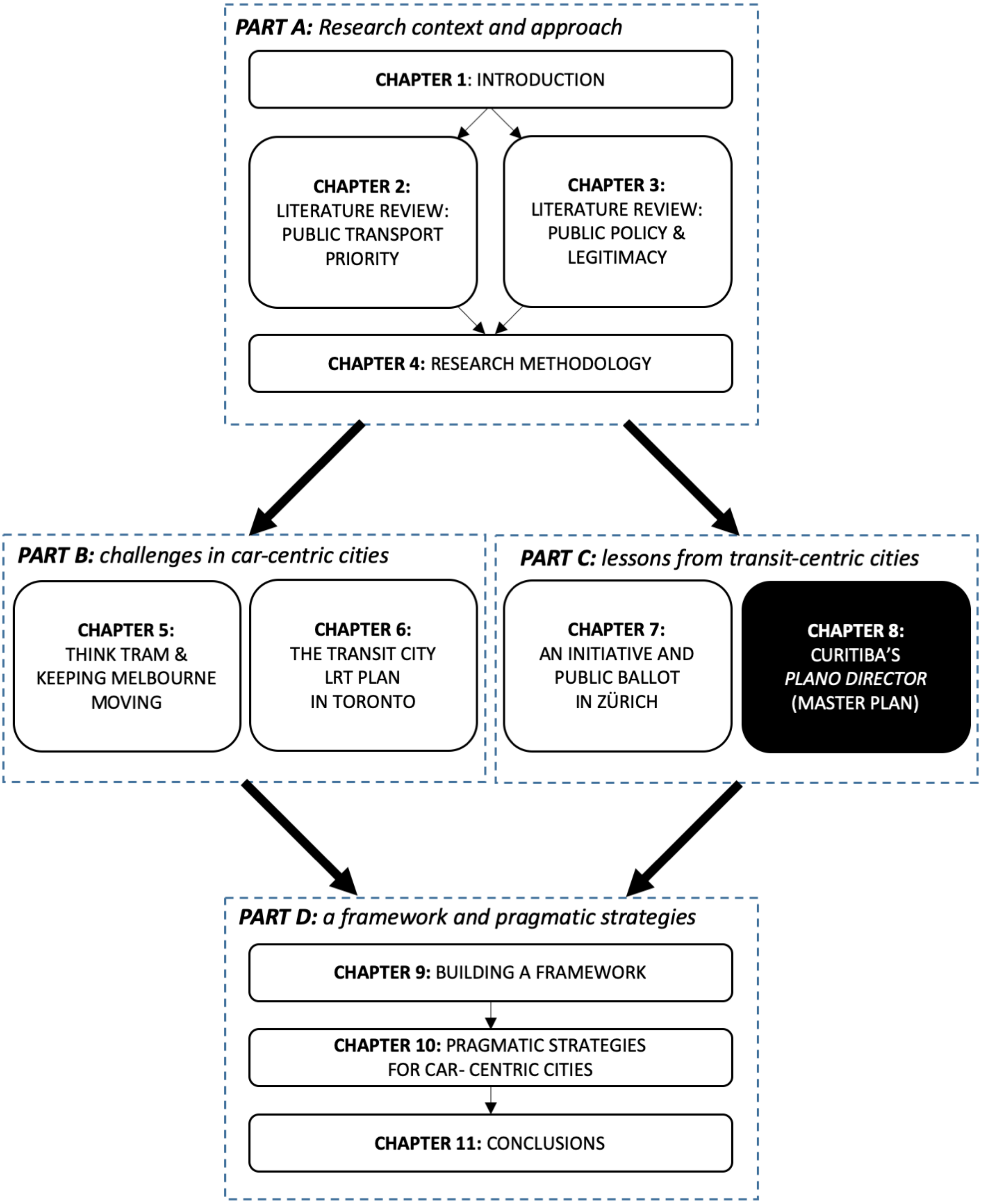

Figure 8.1 Position of Chapter 8 in thesis structure

8.1 Introduction

This is the second chapter in Part C of the thesis. It addresses the second research objective of the study by reviewing transit priority implementation in Curitiba. Curitiba has been called "the world's cradle for bus rapid transit (BRT)"(Lindau et al. 2010b), and so is included in this study as a *leading case* of transit priority implementation. However, its history of military dictatorships[205], appointed mayors, and planner-led development of the transit system suggests that Curitiba is entirely unlike Zürich and its *citizen controlled* prioritisation of transit that was discussed in the previous chapter. Hence, Curitiba provides an *opposite* and contrasting case of how to successfully implement high levels of transit priority.

While the BRT technology developed in Curitiba has inspired BRT systems throughout the world, attempts to directly transfer aspects of the Curitiba approach have not always succeeded[206]. This chapter aims to understand transit priority implementation in Curitiba, and why implementation has been more successful and *legitimate* there than in many other places.

This chapter is structured as follows: Section 8.2 discusses the overall city context. Three interlinked implementations are then examined:

- the *Rua das Flores* pedestrian mall is discussed in Section 8.3;
- the *structural axes and busways* that were implemented between 1974 and 1981 are discussed in Section 8.4; and
- the *direct bus services and boarding tubes*, which were implemented in the late 1980s and 1990s, are discussed in Section 8.5.

Notably, the *Rua das Flores* pedestrian mall is **not** an example of **transit priority** implementation. However, it is an integral part of the sequence of events in Curitiba that helped to legitimise Lerner, his group of technocrats and the implementation of transit priority. As such, the pedestrian mall implementation is included as a sub-unit in this case study because of its importance to the Curitiba BRT story. Further details about Curitiba and the implementations considered in this chapter are provided in Appendix D, together with detailed citations to reference material[207].

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[205] Throughout much of the 20th century Brazil was governed by dictatorships, including a military regime that held power from 1964 until the mid-1980s, during the formative years of the Curitiba BRT network.

[206] For example, footnote 41 discussed how New York had a six-week trial of bus boarding tubes that had been borrowed from Curitiba, but that "the system was not permanently implemented after… a successful test" and so "implementation of preferential treatment cannot be viewed from a purely technical perspective" (Pulichino & Coughlin 2005, pp. 80-1).

[207] Note that the volume of material that has been published about Curitiba is very large, and space constraints mean that not everything about that case can be fully described here or in the Appendices. As such, the narrative in this chapter generally stays close to the issues, events and parts of the literature that pertain to legitimacy and transit priority implementation, and which are relevant to the findings of this study. Appendix D provides more details in making comparisons between Zürich and Curitiba, but the detailed individual case study report for Curitiba prepared during this study is not included in this document. Readers wanting a broader understanding of the history of the Curitiba transit network and the planning process that led to its implementation might wish to start with the detailed Ardila-Gomez (2004) study as well as the many other papers, reports of similar about Curitiba noted in the references.

8.2 City context

8.2.1 Governance

Curitiba is the capital city of the state of Paraná, in the south-east of Brazil. At the national level the Vargas dictatorship held power through the 1930s and World War 2, but was ended by a military coup d'état in 1945. There was a period of democracy through the 1950s and 60s, although this included two presidents who were elected "on platforms that were explicitly technocratic and anti-political" (Moore 2007, p. 77). Another coup in 1964 resulted in a military dictatorship, which suspended mayoral elections in state capital cities such as Curitiba.

The military continued to hold power until a gradual transition in the 1980s. A new constitution was adopted in 1988 and an elected civilian president came to power in 1989. Despite the new constitution being similar to the USA constitution, the Brazilian judicial system is based on French law, resulting in a:

> *"hierarchical code that tends to provide different laws for different social ranks…[where] elites who hold public office are afforded a legal privilege unknown and unexpected by their North American counterparts" (Moore 2007, pp. 75-6).*

Mayor of Curitiba serve a four-year term, but cannot hold office for consecutive terms. From 1966 to 1985 the mayor was appointed by the military-appointed state governors of Paraná, who were looking to select non-politicians who would not compete for power (Hunt 1994, p. 74; Hawken et al. 1999; Ardila-Gomez 2004, pp. 33-4, 62, 91-2, 6; McKibben 2007, p. 76).

Virtually all of the research literature about land use planning and transportation in Curitiba discusses the key role of Jamie Lerner in the development of the city. Lerner is an architect and civil engineer who was directly appointed as mayor twice. He was later elected for his third term as mayor, being the second mayor elected after democracy was restored (Ardila-Gomez 2004, p. 93)[208].

While much of the literature focuses on Lerner individually[209], he is actually part of a wider group of technocrats who held various government positions in Curitiba and the state of Paraná throughout the second-half of the 20th century, and:

> *"Jamie Lerner's regime of sustainability must be understood as part of this Brazilian antipolitical, authoritarian, and technocratic tradition, rather than as the political anomaly that is typically claimed by outside observers and boosters of the Lerner regime" (Moore 2007, p. 77).*

[208] "[P]olitical careers are rather common for architects in Brazil, in part because lawyers are so discredited as corrupt (Skidmore 1967)" (Moore 2007, p. 77). Lerner was mayor for the 1971-75, 1979-83 and 1989-92 terms.

[209] For example see Hunt (1994)

This group included Ney Braga, who had been Curitiba mayor from 1954 to 1958 and was twice the Paraná state governor (Schwartz 2004). Between Lerner's first term as mayor and the start of the 21st century there were only two mayors of Curitiba not connected to the Braga / Lerner group:

> *"Braga, in effect, was the power broker during 30 years in Paraná's politics"(Ardila-Gomez 2004, p. 132).*

Braga was also involved in the formation of the *Instituto de Pesquisa e Planejamento Urbano de Curitiba*[210] (IPPUC), which is a "quasi-autonomous planning agency" that has been the "primary tool of planning implementation" (Moore 2007, pp. 77-8) in Curitiba. IPPUC is separate to the city's planning department and was formed following the adoption of the *Plano Diretor* (Master Plan) in 1965. Lerner was an architect and then president at IPPUC prior to being appointed mayor in 1971 (Rabinovitch 1992, p. 63; Hunt 1994; Ardila-Gomez 2004, pp. 78-96).

> *"The dictatorship provided the stability that allowed the IPPUC to grow and develop to the point where the city cannot function without it. During the stretches when Lerner was out of office, the IPPUC not only maintained the continuity of the urban projects but insinuated itself into the day-to-day administration of the city" (Hunt 1994, pp. 76-7).*

IPPUC has significant power and influence due to its long period of existence, technical expertise and proven planning capability. Despite the significant power of the mayor, it has been difficult for anyone to change direction due to IPPUC's longstanding mandate[211] (Dera 1995, pp. 50, 63-81).

> *"Curitiba's regime of sustainability was technocratic in nearly every sense of the term. Self-appointed elites managed to keep their clients happy by managing the municipal infrastructure efficiently" (Moore 2007, p. 217).*

With initial foundations resting upon the power granted by the military dictatorship, the Braga / Lerner group has had a long period of relatively uninterrupted political continuity to develop and implement their land use and transportation visions as:

> *"…in the frank words of senior IPPUC planner Celia Perez, 'Each new mayor is hand-picked by his predecessor' …elections in Curitiba were less about ideas than they were 'plebiscites on the question of continuing a certain group in power' (Andrade 1996). As an affiliate on the regime, Perez argues that such undemocratic continuity is 'good for us'" (Moore 2007, p. 102).*

[210] Known in English as the Urban Planning and Research Institute of Curitiba.
[211] For example, Mayor Fruet's efforts to revise the *Plano Diretor* guidelines went largely ignored (Schwartz 2004, p. 74).

It is only recently that opposition parties have become stronger and there has been a push for greater public inclusion in decision-making (Irazábal 2005, pp. 294-395). However:

> *"Many politicians had – and continue to have - continue to have … close links to the Planning Institute…Curitiba's image of a successful sustainable city is continuously supported and protected by an elitist political discourse coalition remaining in power precisely because of the discourse's past success and sustained discursive praise" (Martinez et al. 2016, p. 357).*

8.2.2 Population and demographics

Figure 8.2 summarises the population trends in Curitiba.

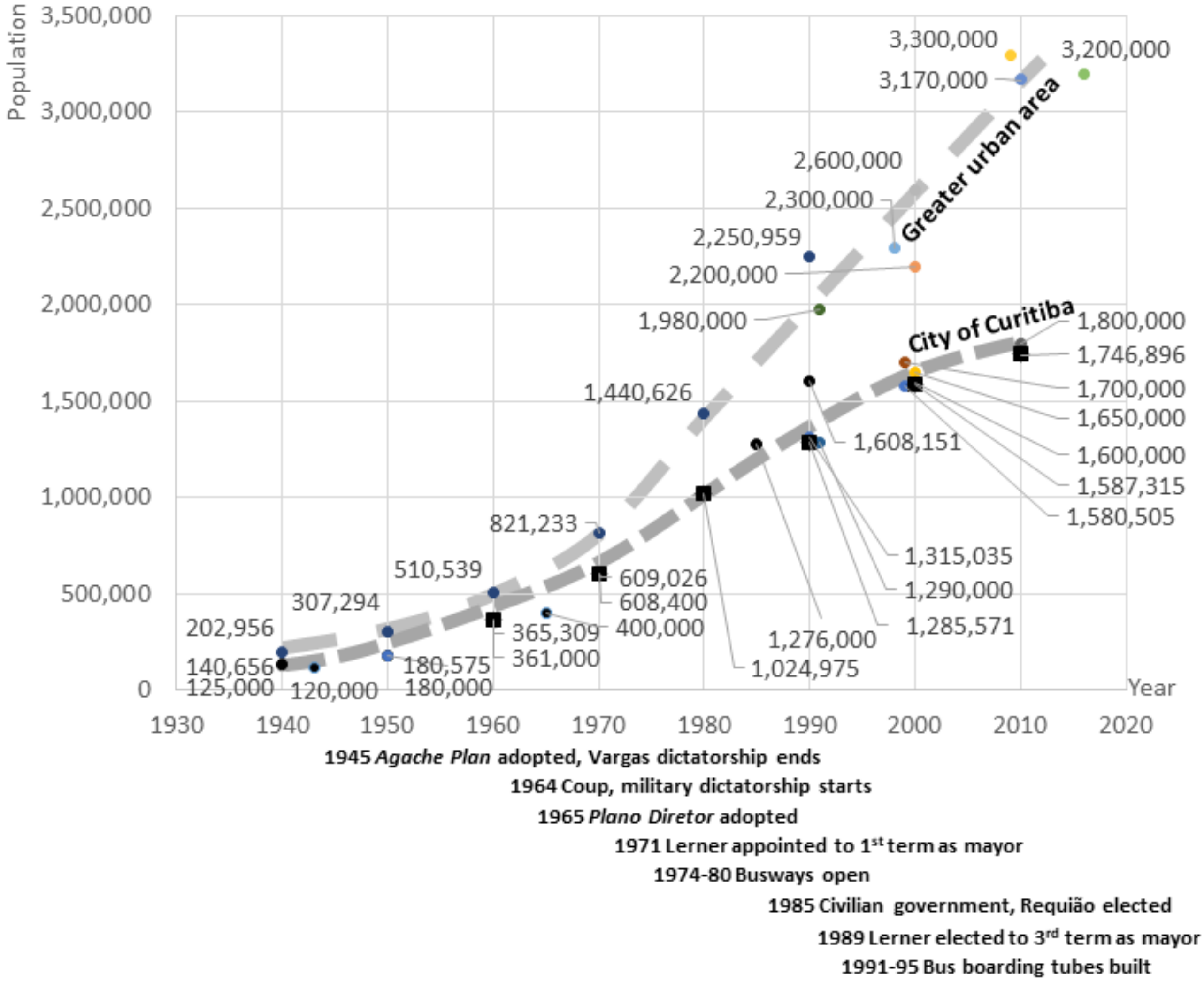

Figure 8.2 Population: City of Curitiba and greater urban area

Sources: see Appendix C

Different sources do not agree on the precise population numbers. However, the general trend in Curitiba has been one of significant growth[212] from a city of under 200,000 in the 1940s through to

[212] Moore (2007, p. 80) notes that Curitiba has had an annual growth rate of 5-7% for decades, while Lindau et al. (2010a) state a slightly more modest annual growth of 4.6% over the last 50 years and 3.8% over the last 20 years. Irazábal (2005, p. 91) points to a decrease in the rate of

over 1.8 million today. Over 3 million people now live in the greater urban area surrounding the city (Rabinovitch & Leitmann 1993; Hunt 1994; Ardila-Gomez 2004, p. 135; Lara 2010).

The City of Curitiba covers approximately 435km^2. It is surrounded by twenty-six other municipalities (Lindau et al. 2010a), which may be a reason for the inconsistencies in the research literature about the size of the greater urban area[213]. Various and conflicting figures are also reported for Curitiba's population density in the research literature[214]. For the purposes of this study exact population density figures are perhaps less relevant than the emphasis in the research literature on the concentration of high-density development along five 'structural axes'. Density drops off towards the 'housing zones' further away from the axes (Rabinovitch & Leitmann 1993, p. 17; Garcia & Yamamoto 1994, p. 693; Cervero 1998, pp. 272-3; Hawken et al. 1999, p. 291; Kroll 1999; Pulichino 2003, p. 60; Irazábal 2005, p. 89; Lindau et al. 2010a, p. 18).

8.2.3 Transport

Figure 8.3 shows the transit usage trends in Curitiba. Cervero (1998, p. 267) reports 15% transit ridership growth per year, and this being three to four times population growth. However, there are inconsistencies in the figures reported in the literature, so caution is required in making direct comparisons to other cities [215].

Various authors state that the transit mode shares are in the order of 70-75% for the journey-to-work and 45% for all trips. However, the source of these figures is unclear. There do not appear to have been any household origin-destination surveys in Curitiba, and the Brazilian census does not have a journey-to-work question (Lindau et al. 2010a, p. 17; Mees 2010, p. 118)

Automobile ownership is described by many authors as being very high by Brazilian standards. However, there are contradicting figures reported in the literature[216]. Many authors suggest that the rate of automobile use is very low, despite high ownership, but there is again a lack of reliable mode split data.

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growth in the central city in the 1980s, to only 2.3% annually, but growth of over 6% annually continuing in the outer areas. These figures are similar to the "more than 2% within the city limits and more than 5% in the outlying part of the metropolitan area" reported by Schwartz (2004, p. 13). Much of the growth is caused by movement from rural areas, and many people have moved into *favelas*, informal shanty towns that are common in Brazil. These pose difficulties in terms of providing sanitation and other services.

[213] Cervero (1998, p. 266) states that greater Curitiba is almost twice as large as the municipality (i.e. 870 km^2), but Smith and Hensher (1998, p. 133) instead state a much larger figure of 8,763km^2 for the area of greater metropolitan Curitiba, which would place it close to the Greater Melbourne Area's 9,990km^2 land area (Australian Bureau of Statistics 2017, 2018). The City of Curitiba is approximately 4.7 times larger than the City of Zürich (92km^2), but only a quarter of the size of the ZVV service area (1,700km^2). It is almost 12 times larger than the City of Melbourne (37km^2).

[214] These range from 5.67 people per hectare (567 people per km^2) for the metropolitan area as a whole (Smith & Hensher 1998, p. 133) through to as high as 294 people per hectare in high rise residential areas (Cervero 1998, p. 285).

[215] Some reported values appear to be broad estimates, do not clearly state whether it is average daily passengers or weekday trips, or double count transfers. Ardila-Gomez (2004, p. 193) provides a year-by-year accounting between 1974 and 1997. Mees (2010, p. 119), citing URBS data, states there was a decrease in ridership of 20 percent between 1997 and 2004, and then a partial recovery, but this does not appear in the figures reported in other literature.

Nieri (2000, p. 173) states averages of 350 unlinked and 202 linked annual transit trips per person in Curitiba, and suggests that these are similar to transit usage rates in New York City and Mexico City. Moore (2007, pp. 166-9) instead provides a figure of 456 annual transit trips per person.

[216] Martinez et al. (2016) suggest that the rate of car ownership has increased dramatically in the last 40 years to 1.33 cars per capita (1,330 cars per 1,000 inhabitants), but this appears difficult to reconcile with the rates of 267, 333, 385 and "almost 400" cars per 1,000 inhabitants reported by others (Worcam 1993; Cervero 1998; Hawken et al. 1999, p. 295; Nieri 2000; Ardila-Gomez 2004; Lindau et al. 2010a, p. 17).

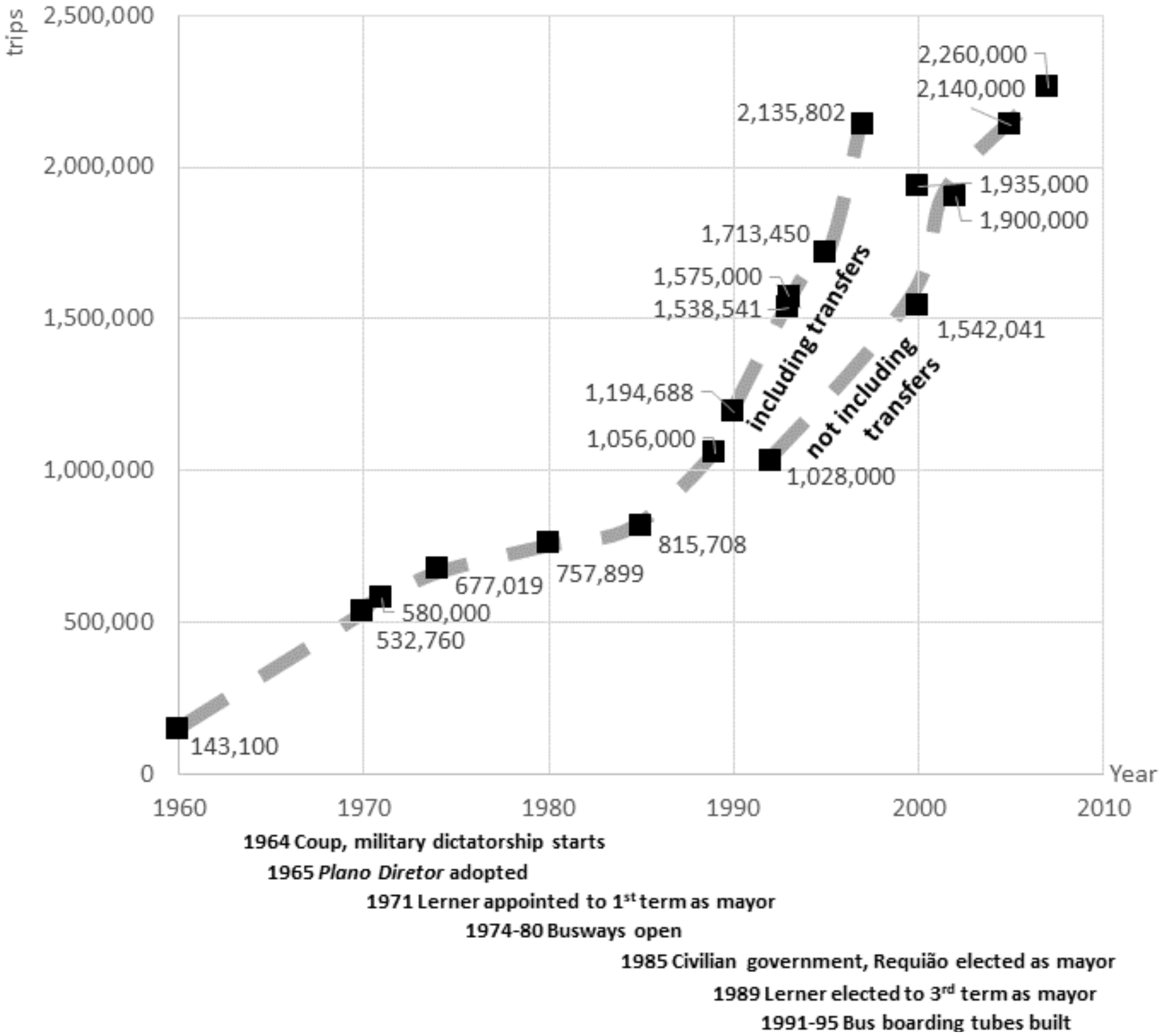

Figure 8.3 Transit ridership

Note: grey dashed lines indicative only.

Sources: see Appendix C

Curitiba’s road network has been strongly influenced by the guidelines set in the 1966 *Plano Diretor*, which are shown in Table 8.1.

Table 8.1 Initial *Plano Diretor* (Master Plan) Guidelines

Item	Guideline
1	Linear growth from downtown tangential rapid transit routes that would facilitate a continuous development progression.
2	A hierarchy of routes.
3	Preferential development of the city along a Northeast- Southwest axis, consistent with historical and recent spontaneous tendencies.
4	Multiple commercial centers.
5	Increased urban concentration.
6	Extension and improvement of green space.
7	Establishment of predominantly pedestrian areas.
8	Creation of a unique urban landscape.

Source: Schwartz (2004, p. 29)

The earlier 1945 *Agache Plan* had envisaged “grand boulevards radiating from the central core” (Cervero 1998), but this would have required the demolition of many buildings in the old historic city centre. The *Plano Diretor* instead, shifted Curitiba towards a linear city along a northeastsouthwest axis running through the city[217], which was later expanded to five *structural axes* radiating from the city, complimented by a pedestrianised downtown area (Dera 1995, pp. 9-10; Cervero 1998, p. 265; Kroll 1999; Schwartz 2004, p. 14; Irazábal 2005). Each *structural axis* is based around a *trinary road* concept, as shown in Figure 8.4.

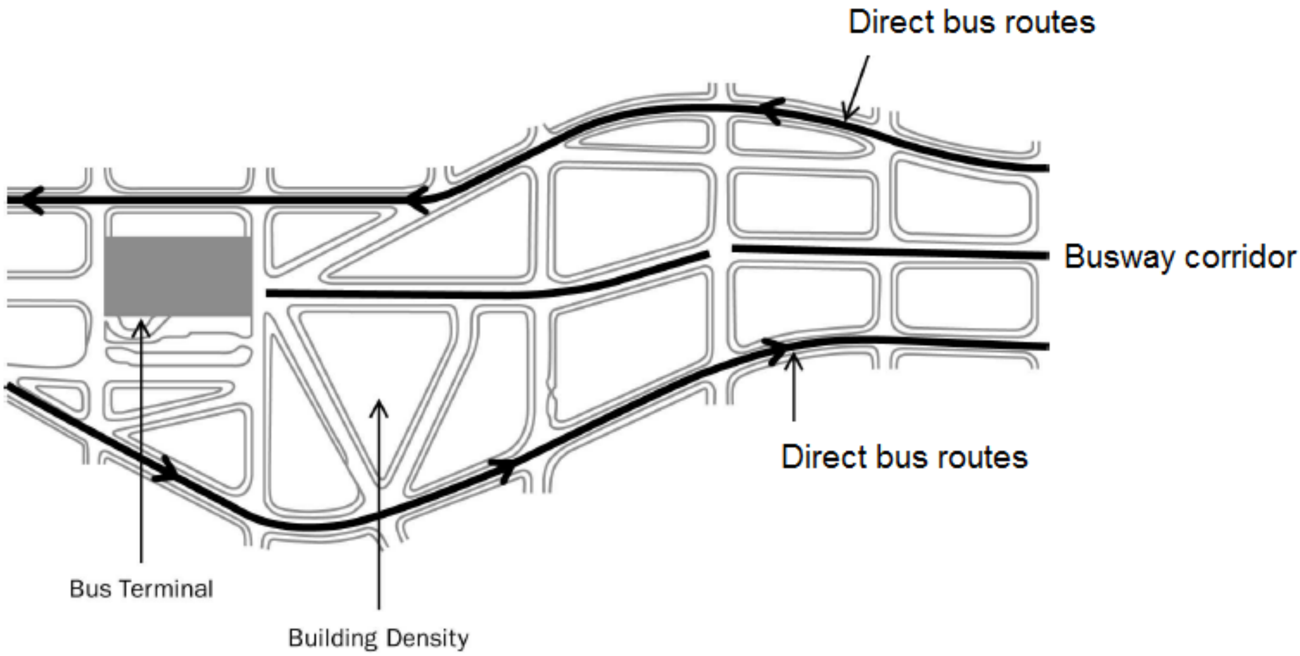

Figure 8.4 Structural axis and trinary road system: plan

Source: Levinson, Zimmerman, et al. (2003b, pp. 24-5)[218].

The *trinary road* system consists of a central corridor, which has a two-way *busway* and access roads servicing the adjacent properties. One block away from the central corridor are one-way streets, which provide for high capacity traffic connections and for direct (limited stops) bus routes (Dera 1995, pp. 32-3; Cervero 1998, pp. 273-4; Ceneviva 2000, pp. 173-7; Levinson, Zimmerman, et al. 2003b, pp. 24-5; 2003a; Irazábal 2005, p. 89).

The transit network is known as the *Rede Integrada de Transporte* (RIT)[219]. There are 10 private bus operators who are now paid based on the number of service kilometres travelled[220]. The Urban Development Agency of Curitiba (URBS) is responsible for collecting fare revenue, and the planning and management of the system. The network itself consists of: express lines along the *busways*; direct routes; cross-town routes; feeder lines; and other specialised routes. Routes connect at

[217] The original north-south axis later came to be referred to as the north and south axes, once the plan was expanded to have five axes extending from the city centre.

[218] Image reproduced with permission from the National Academy of Sciences, courtesy of the National Academies Press, Washington, D.C.. Minor additions made to match direct bus and busway terminology used in this thesis.

[219] Known in English as the Integrated Transit Network.

[220] The private bus operators were consolidated into 13 companies / cooperatives in 1955, when the city was divided into *selective areas* in which each had a monopoly on service provision (Ardila-Gomez 2004, pp. 40-7).

interchanges, known as terminal stations, where passengers are allowed free transfers[221]. Figure 8.5 and Figure 8.6 show the network of express and direct routes, respectively.

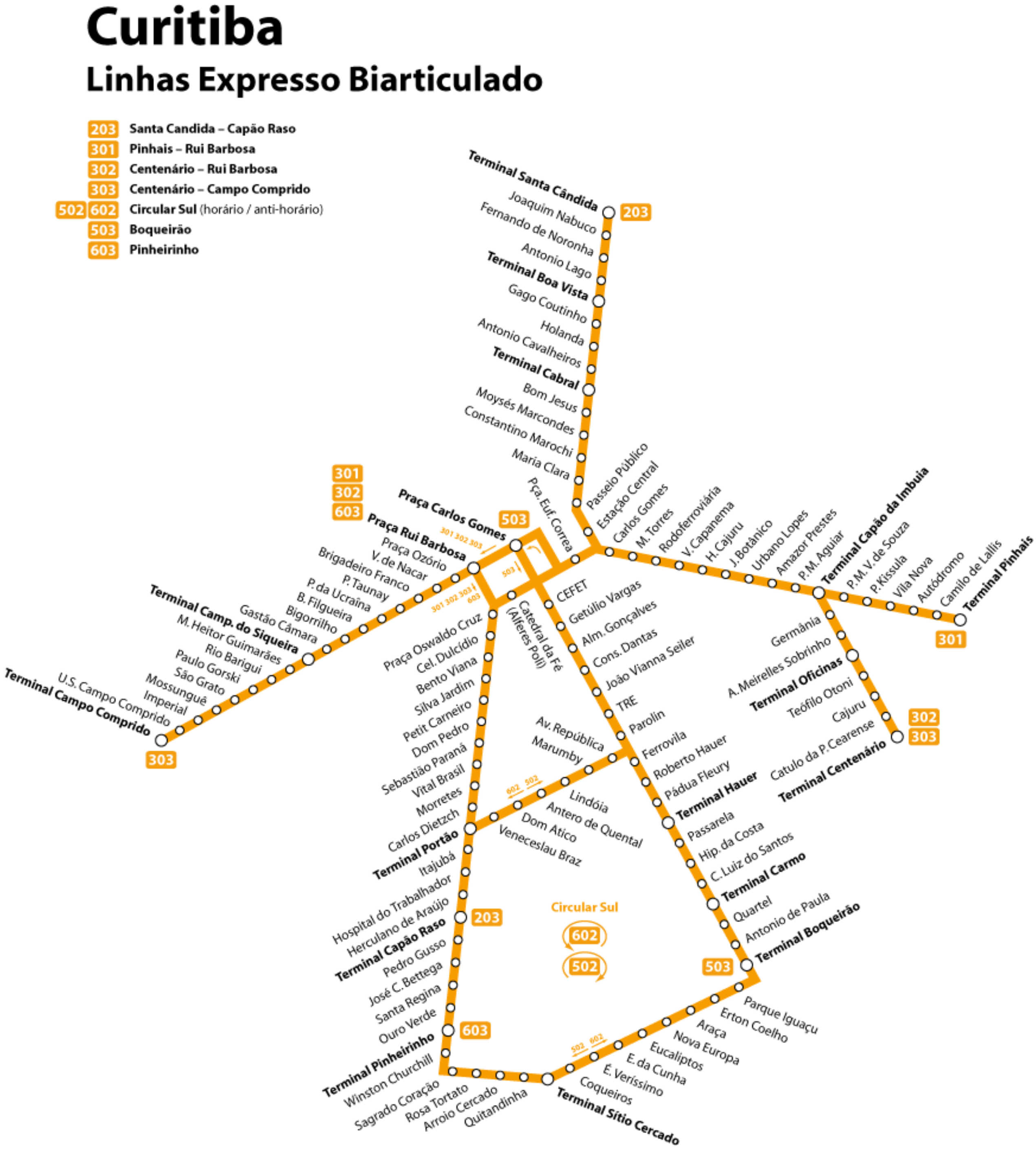

Figure 8.5 Curitiba express bus network

Source: Dörrbecker (2005), image reproduced under Wikipedia creative commons licensing. Not to scale, but map covers approximately 16.5km east-west and 14.5km north-south.

221 Free-body transfers allow passengers to transfer between routes without passing through a fare or proof-of-payment check. Transit vehicles arrive and depart from a 'fare-paid zone' and there are no barriers or other impediments for passengers who are transferring between routes, as any passenger arriving by transit vehicle has (presumably) already paid on boarding. Fare payment or proof-of-payment, however, is typically required for people accessing from the street or from services that stop outside the fare-paid zone.

Figure 8.6 Curitiba direct routes

Source: Dörrbecker (2005), image reproduced under Wikipedia creative commons licensing. Not to scale, but map covers approximately 16.5km east-west and 14.5km north-south.

The RIT network has developed gradually over a long period of time as the *Plano Diretor* and transit system has been implemented and expanded. This is discussed further in Sections 8.4 and 8.5, but Figure 8.7 provides a graphical indication of how the overall network has grown through time.

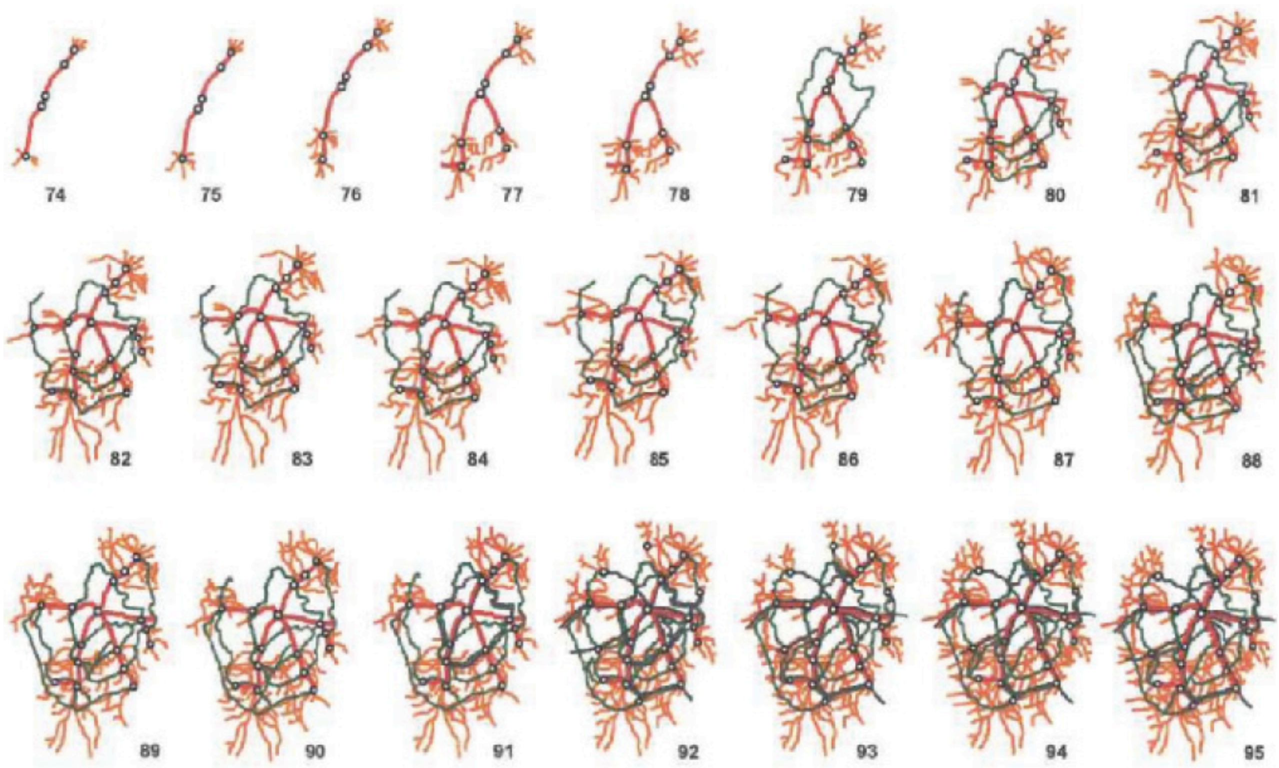

Figure 8.7 Evolution of the Integrated Bus Network in Curitiba, 1974-95

Source: Suzuki et al. (2010, p. 172)[222]

Figure 8.7 (top row, left) shows the initial north-south *structural axis* and *busway*, which opened in 1974. This was followed by the south-east axis, opened in 1977 (top row, fourth from left)[223]. Next was the introduction of cross-town routes from 1979, and then the addition of the east-west axis in 1980 (top row, second from right). Further crosstown and feeder routes were added through the 1980s and 1990s as the network was further developed (middle and bottom rows).

Two often reported features of the Curitiba transit system are the boarding tubes (Figure 8.8) and the multiple articulated buses (Figure 8.9).

[222] This image is shown in Suzuki et al. (2010, p. 172) as being sourced from a presentation at "World Bank Energy Week 2009", but that original source could not be located for this study. The image is reproduced here under the allowance of non-commercial use of materials from the World Bank website (The World Bank 2019). The URBS website (URBS undated) also has a set of maps showing the progressive development of the RIT.

[223] Ardila-Gomez (2004, p. 138) states that the busway service on the south-east (Boqueirão) axis started in 1979, rather than 1977. However, this might be referring to an express service along the busway that passengers would transfer to from feeder routes. Residents in that area had previously had a 'single seat' service to the city, which did not require a transfer, and were at first reluctant about the change in service pattern until the time savings showed that it was worthwhile. It may be that the south-east routes shown in Figure 8.7 for 1977 and 1978 are these non-express services that provided 'single seat' services.

Figure 8.8 Curitiba bus boarding tube

Source: Morio (2006), image reproduced under Wikipedia creative commons licensing.

Figure 8.9 *Busway* with multiple articulated buses

Source: Ortiz (2013), image reproduced under Wikipedia creative commons licensing.

The boarding tubes were introduced in 1992. They allow level-boarding access to specialised high-floor buses. The tubes also move fare payment and wheelchair lifts/ramps off the bus. This helps to decrease dwell times at stops as all doors can be used for boarding and alighting, and there is no need to for passengers to interact with the driver.

8.2.1 Critically examining the Curitiba narrative

Curitiba has a reputation for sustainability and developing the BRT concept (Lindau et al. 2010b)[224]. Some research has used Curitiba as a model of best practice and by which to evaluate other cities[225]. However, other researchers have questioned whether the acclaim for Curitiba and its technocratic planning regime is warranted. There are alternative narratives in some Brazilian research that suggests that citizen involvement in decision-making is limited and that city marketing uses rhetoric "that highlights the creativity of the designers and their urban proposals" (Irazábal 2005, pp. 86, 99-105). Moore (2007, pp. 95-7) similarly argues "that the Lerner regime has been extraordinarily

[224] The United Nations and other bodies have awarded various prizes and awards to Curitiba (Kroll 1999) and it is also the self-proclaimed "Ecological Capital of the World" (Boles 1992).

[225] For example, see Dera (1995) and Goodman et al. (2005).

successful at telling stories" and convincing people to try BRT in North America and Europe, but that some of this is propaganda rather than factual. It was the "almost complete lack of critical perspective…and statistics recycled again and again, as though fed by a propaganda mill" that spurred Hunt (1994, p. 67) to visit Curitiba, interview Lerner and observe the city for himself[226].

> *"Curitiba has been able to maintain its reputation as a role-model city, while its material reality has diverted from its sustainability reputation…While Curitiba's BRT system continues to receive praise in international discourses, locally it falters" (Martinez et al. 2016, pp. 351, 8)*.

Certainly it does not appear that Curitiba's transit network has always had ideal operations[227]. This is perhaps inevitable when looking at any system, in that there are always problems or the opportunity for further improvement. However, Martinez et al. (2016) suggest that the way that the BRT and boarding tubes feature so much in the existing image of Curitiba may limit the city's ability to switch to higher-capacity modes[228]. This appears interrelated with *path dependency* (see Section 3.3.3) in that there may be an emphasis on pushing the envelope of bus-based solutions[229].

Overall, this suggests a need to be cautious about the literature that discusses Curitiba[230]. Despite this, the literature clearly shows that high levels of transit priority have been successfully implemented as part of the extensive changes led by the *Plano Diretor* and the Braga / Lerner group of technocrats. Given that this study is about transit priority implementation, therefore, it is the development of the system that is focus of the remainder of this chapter.

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[226] Hunt (1994, p. 77) suggests that Lerner's world travels delivering presentations on "The City That Can Solve the Problems of the Country" might have actually been part of an effort to build his profile and run for president. Schwartz (2004, p. 77) likewise suggests that Lerner may have been on the path to a presidential campaign, noting that his "run for Governor of Paraná [was] in part…a stepping stone". In 1995, when he had an approval rating of 83% as Governor, there were newspaper articles claiming that he was being considered as a potential candidate by his political party (Schwartz 2004, p. 77). Certainly Lerner has a high profile, having been: a speaker at TED2007 (Lerner 2007), the World's Cities Summit, and the UN Annual Conference; a Professor at the Federal University of Paraná; and delivering lectures at prestigious universities in the USA and other countries (Lerner 2018). A presidential campaign, however, has not yet eventuated.

[227] Various literature reports problems and challenges, often related to overcrowding. For example. Ardila-Gomez (2004, p. 165) discusses how in the 1980s the system "was in disarray because of insufficient bus frequency, too few buses and the existing ones in poor shape, and increased costs and fares".

[228] Martinez et al. (2016) use *discursive institutionalism*, which is part of the recent shift back to the *institutionalism*-based perspectives on public policy analysis that were briefly discussed in Chapter 2, Section 2.3. *Discursive institutionalism* is an approach that considers how ideas, discourse and 'collective memories' relating to institutions influence policy development and politics.

[229] Some of the decision-making relating to plans to replace the north-south busway with an LRT is discussed in Section 8.5. This describes how the success of the *bus boarding tubes* on the other axes ultimately led to the LRT proposal being abandoned.

It is noted, however, that at various times the LRT proposal itself had a lot of legitimacy, despite never actually being built. For example, when the *bus boarding tubes and direct bus services* were initially developed by Ceneviva and Lerner they implemented them on the other axes, because they supported the proposal to build the LRT on the north-south axes (which would therefore potentially made using the boarding tubes and direct bus services to resolve capacity issues unnecessary on that axis)(Ardila-Gomez 2004, p. 196).Unfortunately, it is not possible to include a detailed analysis of the legitimacy of the LRT and other proposals for Curitiba within the scope of this study. However, alternatives are discussed where they are applicable to the three specific implementations (pedestrian mall, busways and boarding tubes) that are addressed in this chapter.

[230] Much of the literature about Curitiba is produced by authors associated with IPPUC and the government of Curitiba itself Kroll (1999) is in part inspired by a publication from the city of Curitiba. Lerner (1996, 2014, 2018) has written about Curitiba himself, in addition to making many presentations. Jonas Rabinovitch was director of International Relations at Curitiba's Municipal Prefecture (Rabinovitch 1992) and was extensively quoted in the Major (1997) profile of the system, as well as having authored various publications about Curitiba himself (i.e. Rabinovitch (1992); Rabinovitch and Leitmann (1993); Rabinovitch and Hoehn (1995); Rabinovitch and Leitman (1996); Rabinovitch (1997).

More generally, Boles (1992); Worcam (1993); Meadows (1995); Lloyd-Jones (1996); Major (1997); Longini (2001); Wright (2001); Motavalli and Schildgen (2002); Fox (2008); Wright (2010); Charner (2014); Rosário (2016) all appear to be quite positive about BRT, Curitiba and the Lerner regime.

8.3 *Rua das Flores* pedestrian mall

This section describes and discusses the conversion of *Rua das Flores*[231] in the centre of Curitiba into a pedestrian mall. The mall is not actually an instance of transit priority implementation. However, its implementation provides insights into how the Lerner regime leveraged power, outflanked potential opposition and used unconventional approaches to further their plans, gain legitimacy for the directions set by the *Plano Diretor*, alter the status quo, and build support for the later implementation of transit priority.

Figure 8.10 shows the mall in its final form. It helps to indicate how this implementation was a major departure from preceding *Agache Plan*, which would have required the removal of historic buildings in the city centre to allow for "grand boulevards radiating from the central core" (Cervero 1998). Implementing the mall as one of the first major initiatives of the *Plano Diretor*[232], and was in line with its seventh guideline, which called for the "establishment of predominantly pedestrian areas" (Schwartz 2004, p. 29)(see Table 8.1, page 168).

Figure 8.10 ***Rua XV de Novembro, Curtiba, Brazil*, also known as *Rua das Flores***
Source: Struck (2005); Ortiz (2013), image reproduced under Wikipedia creative commons licensing.

[231] *Rua das Flores* (English: the Street of Flowers) is also known as *Rua Quize de Novembro* (XV of November Street).

[232] Dera (1995, p. 31) describes a smaller tree planting campaign in 1971 as actually being the first project initiated by the Lerner team as part of the *Plano Diretor*. The tree planting scheme was "action-orientated and highly visible", and an uncontroversial, cheap way to get people involved. However, this appears to have been much smaller in scale than the pedestrian mall implementation and the later implementation of the structural axes and busways.

The successful implementation of the pedestrian mall appears to have been an important part of this general shift in planning and road use direction in Curitiba as the *Plano Diretor* was developed, legitimated and implemented. Removal of cars from the city centre had been initially suggested in 1965 during the development of the *Plano Diretor* (Schwartz 2004, pp. 13, 41-2), and appears to have fit within the larger directions of the plan to deemphasise traffic in favour of non-automobile-based activity, travel and land-use planning.

Whether the success of the pedestrian mall was a necessary step towards the high prioritisation of transit is not entirely clear[233]. However, shifting the city away from car-focused development by implementing the *Rua das Flores* pedestrian mall (i.e. completely excluding automobile traffic in favour of pedestrians) appears to have been consistent with the themes of the subsequent implementation of the *structural axes and busway* system, which is discussed later in this chapter.

Lerner announced the implementation of the mall as an intention in his first speech as mayor. He may have favoured a walkable European-style downtown, having previously spent time working in Paris[234]. However, retailers were initially reluctant due to concerns about impacts on business (Ardila-Gomez 2004, pp. 104-5).

Lerner and his team did not seek to work with the retailers to build consensus, hold public consultation sessions, or otherwise engage in an open public process. Instead, and from the perhaps slightly paternalistic viewpoint that "if they had a chance to actually see it, everyone would love it" (Lerner quoted in McKibben (2007, p. 65)), Lerner and the IPPUC spent a year planning and strategising the implementation of the pedestrian mall in secret (Hunt 1994, p. 76; Cervero 1998, p. 271). Firstly, they built support by launching a favourable media campaign, and inviting the International Architect Union (IAU) to visit Curitiba. The IAU meeting was used as an excuse to have a temporary street closure, with the overseas architects being lobbied to make favourable

[233] The pedestrian mall was not directly related to the parts of the *Plano Diretor* (items 1 and 3 in Table 8.1) that led to the development of the *structural axes and busways* as discussed in Section 8.4. However, it appears likely that the implementation of the initial *structural axis and busway* might not have gone ahead as easily without Lerner continuing to be the mayor (and having improved his legitimacy and the legitimacy of the *Plano Diretor* through the successful mall implementation). Ardila-Gomez (2004, p. 107) describes how "the appointment of Lerner as mayor of Curitiba opened the window of opportunity for the Diretor Plan" (*Plano Diretor)*, which had previously been shut because planners were not able to gain the attention of previous mayors.

As discussed further below, Ardila-Gomez (2004, p. 106) provides details of how a group of retailers opposed to the mall immediately after it was implemented tried to get the state governor to remove Lerner from his position as mayor. It is difficult to assess whether this had ever had any chance of succeeding. However, it is noted that the mall had been implemented as "a simple project (that) could be revert to car use" (ibid), and that planners had already, after consultation with businesses, reduced the scope of the initial project prior to implementation to reduce the risk of Lerner being fired:

> *"Lerner figured a demonstration segment was needed so that people could understand the project and then give useful feedback. Risk went down for Lerner and for all other parties. If the demonstration segment did not work it could be torn down. Lerner's bet worked out and the project was a success. Lerner gained significant political capital as a result"* (Ardila-Gomez 2004, p. 108).

It is not possible to be certain what might have happened if the mall had not been successful and Lerner had not gained that political capital. Perhaps if the State Governor had listened to the initial complaints of the retailers after the mall was implemented, and fired Lerner immediately, there might have been a switch back to the previous status quo of there being little action on implementing the *Plano Diretor*. However, it is not possible to have any certainty as to what might have been if the *Rua das Flores* pedestrian mall had failed or been removed.

That said, the linear progression of events in Curitiba under Lerner might suggest that the success of the pedestrian mall helped to set the agenda for the implementation of the busways. In general, it appears to be important to consider the successful implementation of the busways (see Section 8.4) within the context of the pedestrian mall implementation that preceded it, and the political capital (and legitimacy) that the mall's success provided for the Lerner regime and the *Plano Diretor* planning directions.

[234] Both as an intern (Ardila-Gomez 2004, p. 93; McKibben 2007, p. 65) and as part of a group representing Brazil at the 1969 Paris Biennial Exhibition (Lerner 2018).

statements to the press about closing the street to traffic more permanently (Ardila-Gomez 2004, p. 105).

Following the departure of the IAU, however, implementation moved to a more clandestine approach. Physical work on the permanent street closure started on a Friday after the law courts had closed, presumably to prevent interference from legal injunctions. Roads were suddenly closed, the road surface was torn up, and the new mall was completed by the following Monday (Hunt 1994, p. 76; Dera 1995, pp. 31-2; Cervero 1998, p. 271; Hawken et al. 1999, p. 289; Kroll 1999; Ardila-Gomez 2004, p. 105; Schwartz 2004, pp. 13, 41-2, 8; McKibben 2007, p. 65). Moore (2007, p. 89) states that armed police were even present during the implementation, but it does not appear that any overt use of force was required as Lerner had the backing of state governor.

Retailers opposed to the sudden transformation of the street petitioned the state governor to sack Lerner. The governor said he would meet them in 30 days. However, this meeting never took place as by then the project had proven to be a success (Ardila-Gomez 2004, p. 106).

In response to threats of legal proceedings and opposition from the retailers Lerner suggested a 30-day trial period, but this too never eventuated. Sales increased and soon shopkeepers asked for the mall to be extended (Meadows 1995; Cervero 1998; Hawken et al. 1999; McKibben 2007). The pedestrian-only precinct has since been expanded to 49 city blocks (Hunt 1994, p. 76; Ardila-Gomez 2004, p. 105).

This approach has similarities to *tactical urbanism*[235], despite pre-dating it by 35 to 40 years. In the case of the *Rua des Flores* pedestrian mall, however, sudden implementation was used by an activist mayor to bypass the conventional processes and show the possibility of change to citizens (c.f. Lydon and Garcia (2015, p. 12)). This perhaps contrasts to the sorts of bottom-up implementation undertaken independently by citizens or in a partnership between citizens and government that might seem typical in '*tactical urbanism'*. However, Lydon and Garcia (2015, pp. 8-20) discuss how *tactical urbanism* spans the gaps between unsanctioned and sanctioned; and that "tacticians are found from the bottom up, the top down, and everything in between". Hence, although the *Rua des Flores* mall appears to have been implementation with virtually no citizen involvement and driven from the top-down by the mayor, it does appear to be 'tactical' in approach[236].

[235] *Tactical urbanism* was discussed earlier in Section 3.2.3 as part of the review of approaches to changing street environments (such as *street reclaiming* and street art) that tend to challenge the status quo and may or may not be permitted, encouraged or quietly ignored by governmental authorities. Definitions of *tactical urbanism* can also extend into government-led implementation, and although "mainstreaming of Tactical Urbanism into municipal planning departments is not without its perils (it) remains a promising trend because it represents a shift in how cities are looking to deliver projects" (Lydon & Garcia 2015, p. 20). The *Rua des Flores* pedestrian mall perhaps provides a good example of these issues, given that it was:

- a government-led implementation;
- appears to have represented a major shift in the way that changes to the city were developed; and
- was somewhat perilous given the risk to Lerner's position as mayor (see Ardila-Gomez (2004, pp. 106-9)).

[236] In that: the originally planned amount of pedestrian mall to be implemented was scaled back after preliminary engagement by planners with key stakeholders because it was politically infeasible; and it was short enough that it could be implemented within the 48 hour period that was

> *"local observers…characterize this method of implementation as a brilliant but heavy-handed method of conflict suppression" (Moore 2007, p. 89).*

In general, Lerner's team appear to have had the freedom and latitude to directly respond to opposition in ways that might not be acceptable action for governmental authorities in other contexts. For example, a protest by motorists opposed to the mall was to involve a convoy of vehicles actually driving through the mall itself. However, this was defeated by the governmental authorities, who organised for a children's art festival to occur on the same day in the mall. When the protesters arrived, they found the mall filled with children, paper and art supplies. This effectively prevented any sort of drive through protest, but also demonstrated how the space could be used for non-traffic purposes (Hunt 1994, p. 76; Rabinovitch & Leitman 1996; Cervero 1998, p. 271; Hawken et al. 1999, p. 289; Kroll 1999; McKibben 2007, p. 65). It is questionable whether such tactics would be successful, or legal, in many other jurisdictions[237].

8.3.1 Legitimacy

<u>*Normative legitimacy*</u> for the mall and the Lerner regime was conferred by the military dictatorship. Lerner had legal authority and power through his direct appointment as mayor by the state governor. However, the implementation of the mall on a weekend, after the law courts had closed, suggests that he did not have complete power and that an injunction could have halted works. The elected City Council may also have had some *normative legitimacy*, but does not appear to have had involvement in the mall beyond making the *Plano Diretor* a city law six years earlier in 1966 (Ardila-Gomez 2004, pp. 78-81)).

The initial media campaign and solicitation of statements of support for IAU architects appear to be efforts to build <u>*sociological legitimacy*</u> prior to the implementation. However, while Lerner already had *normative legitimacy* to implement the mall, *sociological legitimacy* was *built <u>through</u> the implementation* itself, based on the certainty that:

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available between the closure of the law courts on a Friday night and the end of the weekend (Ardila-Gomez 2004, pp. 106, 8). It also appears to be at least somewhat 'unsanctioned' given that the implementation was sudden, secretive and perhaps skirted around typical processes that the governmental authorities would be expected to go through before making such a change to street conditions. There also appears to have been the same sort of tension between the 'sanctioned' aspects of the *Rua des Flores* pedestrian mall implementation (being according *Plano Diretor* guidelines and on the authority mayor) and the 'unsanctioned' aspects (initially against the wishes of the retailers, avoiding the possibility of a legal hearing halting the works) that is present in *tactical urbanism* (see "The Tactical Urbanism spectrum: Well-considered projects that begin as unsanctioned often become sanctioned over time" (Lydon & Garcia 2015, p. 9)).

[237] Note, however, that there are similarities to many of the tactics used in New York City, as described in *Streetfight; handbook for an urban revolution* (Sadik-Khan & Solomonow 2017). For example, in the chapter on the "Battle for a new Times Square" there is description of how "with just a few pieces of … inexpensively produced, factory-fabricated plastic containers, the traffic-choked legend of Broadway was officially closed to cars through Times Square"(p.98). However, the contrast in New York appears to be that "in the three months between announcement and implementation, the plan for Times Square became as much a public relations campaign as a transportation engineering or construction challenge" (p.95). In Curitiba the plan for the *Rua des Flores* pedestrian mall has developed in secret and 'public relations' appears to have mostly occurred after its over-weekend implementation.

Later in the thesis (Section 10.5.3) the distinction between sudden pop-ups, and more considered and formally approved trials. For these two examples it appears that the *Rua des Flores* pedestrian mall may have been akin to a pop-up, whereas New York's changes to Times Square were in effect a trial commencing on Memorial Day (May 27) until the changes became officially permanent on December 23, 2013 (Sadik-Khan & Solomonow 2017, pp. 98, 106).

> *"If they had a chance to actually see it, everyone would love it" (McKibben 2007).*

There may have been some sense that if the mall was not eventually supported by retailers it would have to be removed[238]. However, *sociological legitimacy* appears to have shifted significantly after the implementation. Initial opposition and calls that the mall (and Lerner) should be removed were replaced by calls for the mall's extension (Ardila-Gomez 2004, p. 105). However, public participation appears to have mostly *manipulation* and *therapy* as:

> *"It is critical to realize that during the military regime in Brazil, government officials were appointed, and citizen participation was discouraged…Lerner was appointed by the military. As such, he had sufficient political will and professional support, particularly through the planning agency IPPUC, to develop and implement the creative ideas that characterized the Plano Diretor" (Irazábal 2005, p. 294)*

It is perhaps not surprising that *legitimacy by public consent* would have less relevance when there is an *unconditional duty* to obey a military dictatorship. However, questions of whether the mall should be retained over the longer term appear to have been *conditional* on the outcome and impacts on businesses. These impacts proved to be positive enough that retailers later wanted the mall extended, but Lerner and his team appear to have been aware of this *conditionality* of *legitimacy* for their *normative* plans for the city. They adopted an *incremental* approach to the pedestrian mall implementation by first starting with a trial during the IAU conference and then only implementing an initial 100 metre section in their *pop-up*[239] weekend construction project. Likewise, their use of an art festival to counter protesting motorists suggests a keen awareness that *sociological legitimacy* of the idea that the streets were for traffic was *conditional* on the mall not being full of children.

This *incremental* approach and the children's art festival strategy also both appear to have been appeals to *reasonableness*. It is *reasonable* to try a small section of pedestrian mall for a six-month period, while it is un*reasonable* to stage a protest involving cars when a mall is full of children. Overall, this approach also hints at the tactical thinking of the Lerner group. This defeat of the motorist protest is comparable to the *conflict avoidance, direct confrontation* and even Machiavellian *political calculation and positioning* strategies discussed by Isaksson and Richardson (2009). However, the bedrock of Lerner's power appears to have come from the *trust* placed in his technocratic regime by the state governor and military dictatorship.

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[238] i.e. after the promised trial (Schwartz 2004; Moore 2007, p. 89), or if the complaints had continued and the state governor then later actually removed Lerner.

[239] Again, the sudden and unannounced implementation of the mall is comparable to the pop-up parks and other tactical urbanism approaches that were discussed in Chapter 3, Section 3.2.2. However, the *Rua des Flores* pedestrian mall long predates the recent establishment of tactical urbanism as a specific movement and the description of these types of actions using the 'pop-up' terminology. Perhaps this is another example of how everything old can be new again as different cities grapple with similar challenges through combinations of *people*, *problems* and *solutions*, but without always sharing learnings between and potentially reinventing methods across different iterations of policy-making, as described in the 'garbage can' model (see Chapter 3, Section 3.3.5 and Huber (1981); Das and Bing-Sheng (1999, pp. 771-2); Turpin and Marais (2004, p. 146); Reynolds et al. (2017, pp. 12-4).

The “Brazilian antipolitical, authoritarian, and technocratic tradition” (Moore 2007, p. 77) and the trust that Lerner and his IPPUC team had built up through technical skill and involvement in the development of the *Plano Diretor* appears to have led to *trust* from those in power in Lerner’s bold experimentation. Even when the retailers pushed back, the state governor apparently had enough *trust* in Lerner to wait for the mall to prove itself. However, it may be relatively easy to have such *trust* when the state governor did not have to worry about political protest or winning the next election.

In summary, the legitimacy of this implementation was due to:

- the *normative legitimacy* given to Lerner through his appointment as mayor;
- the building of some *sociological legitimacy* before the implementation, but mostly through the implementation’s successful outcomes;
- the lack of need for *public consent* for the implementation to go ahead;
- an *unconditional duty* to accept the change (at least in the short term) due to the support of the military dictatorship;
- the mall subsequently passing the *conditions* for *legitimacy* by delivering successful outcomes;
- the *incremental approach*, which provided *legitimacy through reasonableness*;
- astute manoeuvring including offering a trial period, defusing a protest by motorists, and sidestepping the possibility of judicial intervention; and
- *trust* in Lerner from the state governor.

Overall two *coups* supported Lerner: (1) the military *coup d’état*, which had given him sufficient *normative legitimacy* to begin a program of techno-rational implementation; and (2) the coup of having delivered a successful outcome, despite initial opposition to the mall’s implementation. These appear to have laid a solid foundation for the later, and more ambitious, implementations that are discussed in the following.

8.4 The structural axes and busways

The *structural axes and busways*[240] have their origins in the planning process that occurred in Curitiba in the 1960s. As part of his platform to be elected for the 1962-66 term Mayor Arzua had promised to review the 1945 *Agache Plan*. Once in office he formed URBS as a new city agency to be in charge of urban renewal. A large traffic viaduct in the city centre and street widening were proposed to resolve congestion. However, the URBS plan was met by calls from a group of young engineers and architects, which included future mayor Jamie Lerner, to abandon the *Agache Plan* entirely and find a next direction for city planning.

The Lerner group convinced the head of URBS to support the idea of a new planning process, and the state development company (CODEPAR) to fund it. CODEPAR and State Governor Braga also refused to fund further street widenings without a new plan. Hence, the *Agache Plan* was effectively over, and the Lerner / Braga group was already at the centre of events.

The development of a new plan involved a contest between two groups, each with their own ideas for the future direction of the city:

- One group was formed by a São Paulo team, including urban planner Jorge Wilhelm, who had won the city's 1964 competition to prepare a *Plano Preliminar de Urbanismo* (Preliminary Master Plan for Curitiba). CODEPAR had insisted that local planners be included in the *Plano Preliminar* preparation, and so the Lerner group had been added to the Wilhelm team, despite having submitted their own, unsuccessful, proposal to prepare the *Plano Preliminar*.
- The second group was formed when the head of the Urban Planning Department asked the Architecture Department at the Federal University of Paraná (UFPR) to prepare an alternative to the Wilhelm plan (Ardila-Gomez 2004, pp. 64-71).

There were efforts to unify these two plans, but these were rejected by the UFPR team. In June 1965, Mayor Arzua chose to hold a seminar series to decide which plan to adopt. The seminars

[240] To an extent the *busways* in Curitiba are beyond the focus in this research on on-road transit operating in a *mixed traffic* environment (ROW C), They are also towards the upper end of ROW B (*longitudinal separation*), which is identified as of relevance but approaching the limit of the scope of this research, as discussed in Section 1.3. The *structural axes* and *busways* came about because of the *Plano Diretor.* This may also be more akin to the larger-scale efforts to implement full-BRTs, which is the focus of much BRT and planning research, than the priority improvements to 'conventional buses' that are considered in this study (see discussion in Section 2.4.1, in particular surrounding the distinction made by Pettersson and Sørensen (2019)). However, the implementation of the *busways* are considered important for the study of on-road transit priority implementation because of Curitiba being the originator of BRT, which has helped to encourage efforts to improve bus services elsewhere.
With the structural axis system, the *busways* are also relatively integrated into the streets, as opposed to a completely separate busway along an independent corridor (i.e. ROW B.1 or A.2). The assessment made here is that in Curitiba there has been a change from buses operating in ROW C.11 (*mixed traffic*) to (only) ROW B.3 (*non-mountable kerb separation*). In amongst this, as well, is that other bus services within the city have remained within mixed traffic operating environments, and that the implementation of the *structural axes* and *busways* is part of the broader narrative in this chapter that ends with the implementation of the *direct bus services* and *boarding tubes* in mixed traffic on the other roads of the structural axes. This appears to be a contrast to examples such as the York University busway and the Adelaide O-Bahn, where buses run for sections that are not paralleled by other traffic, or many other full-BRTs where buses run without much interaction with other traffic from the inception of services.

mostly involved the city's economic and intellectual elites. However, two sessions were specifically aimed at the working class and the general public.

In one of the seminars, a member of UFPR team, Pinto, was very critical of the Wilheim plan.

> *"…(Pinto) seemed not to have understood the political importance of the hearings, which were not so much to analyse a technical plan but to legitimize it in political terms (Ardila-Gomez 2004, p. 74).*

Following this mis-step Pinto was excluded from the remainder of the seminar series, the UFPR team withdrew from the seminars and **their plan was no longer considered**. As a result, Mayor Arzua came to support the Wilhelm plan and the head of the Urban Planning Department resigned.

Arzua founded a new government department, the *Assessoria de Pesquisa e Planejamento Urbano de Curitiba* (APPUC), as recommended in the Wilhelm plan. This had powers over city planning that were formerly exercised by the Urban Planning Department. In December 1965 APPUC was transformed into IPPUC, an autonomous institute rather than a city agency[241].

IPPUC then prepared the formal *Plano Diretor* legislation and submitted it to the City Council for approval. However, the plan contained few details, which gave IPPUC considerable flexibility to change directions at a later time. There was initially concern in the City Council that this would give IPPUC too much power. This was overcome by the addition of a restriction so that the *Plano Diretor* could only be altered by IPPUC's board of directors, giving the City Council and other agencies some oversight and control of the *Plano Diretor*. The City Council passed the *Plano Diretor* into law in July 1966.

By the end of Arzua's term in 1966 the military dictatorship had taken power and elections for mayor had been suspended. Arzua was reappointed by the state governor, but then resigned in 1967 to become a minister of state. A new mayor, Omar Sabbag, was appointed, but he conflicted with IPPUC, which restricted IPPUC to a planning role until the end of his term in 1971. During this period IPPUC prepared a *Preliminary Mass Transit Plan*, which considered a range of rail, bus and other technologies for the transit system along the north-south structural axes[242].

Lerner was appointed as mayor in 1971. He gave the IPPUC implementation powers and appointed IPPUC staff to head various city agencies. This provided IPPUC essentially a free hand to implement the *Plano Diretor*. Negotiations with the bus operating companies in 1974 (as the end of their

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[241] To retain control of IPPUC, two members of the City Council and representatives of other city agencies were included on the IPPUC's board of directors. However, "conflict between IPPUC and other agencies developed quite frequently" (Ardila-Gomez 2004, p. 80).

[242] Jamie Lerner was one of the transit plan's authors and pushed for the inclusion of bus-based solutions. The final report recommended BRT as stage one. Stage two would have involved conversion to a new "Transit Expressway" technology involving small electric rubber tyred vehicles operating on concrete rails. Later on, conversion to the "Transit Expressway" technology was dropped from the plan.

The concept of the trinary road system came about as a solution to the lack of sufficient road cross section to accommodate the *busways.* Existing road cross-sections along the structural axis were 30 metres wide, which was insufficient to accommodate the planned transit corridor. Instead, the 60 metres of width needed for the entire transportation corridor was provided across three streets.

Prior to the implementation transit operated in *mixed traffic* (ROW C.11). After the implementation transit operated with *longitudinal separation with non-mountable kerbs* (ROW B.3). This takes the form of a seven-metre-wide *busway*.

concession contracts approached) led to their acceptance of new bus designs to suit the BRT system and greater control over transit planning and operations for IPPUC. By the end of Lerner's term as mayor in 1975 the north-south *busway* was operational.

Another of the Lerner / Braga group, Saul Raiz, was then appointed mayor to continue the implementation of the *Plano Diretor*. Three new structural axes (south-east, east and west) were added to the plan. These were progressively implemented during Raiz's mayoral term and the subsequent second term of Lerner, which ran 1979 to 1983. Further negotiations with the bus operators led to the introduction of inter-district lines, free transfers, the creation of the Integrated Transit Network (RIT), articulated buses on the north and south axes, and the renewal of the bus concession contracts in 1981.

In general, the implementation and outcomes of the busways and the *Plano Diretor* have been highly successful. However, this may have more to do with the power and *legitimacy* of the technocratic regime than the BRT technology itself, as discussed in the following section.

8.4.1 Legitimacy

In general, the events suggest that there was a gradual increase in power and <u>*normative legitimacy*</u> for the Lerner group. They moved from being an outside group lobbying for the replacement of the *Agache Plan*, through a period of being part of the Wilhelm team, and eventually ended up ensconced in the IPPUC and mayoral office with significant power over implementation and planning within the city. Irazábal (2005, pp. 94-6) and Hunt (1994, pp. 76-7) both discuss the relevance of the military dictatorship in giving IPPUC and the Lerner group of technocrats the initial power and stability to become a major part of the city governance system, and how they maintained this position during the transition back to democratic rule.

Normative legitimacy for the BRT system was provided by the military dictatorship's support of the appointed mayor. However, it and the position of mayor were not the only source of authority that shaped the implementation. Rather, CODEPAR (with power over funding), the City Council (with the legislative power to pass the *Plano Diretor*), and various city agencies (especially IPPUC) also had *normative legitimacy* and the ability to control or influence the implementation.

<u>*Sociological legitimacy*</u> has relevance in the decision-making process surrounding the abandonment of the *Agache Plan* and the eventual adoption of the *Plano Diretor.* While Mayor Arzua had considerable power to direct planning policy himself, the seminar series appears to have been an exercise in searching for sufficient *sociological legitimacy* to support one of the two competing plans for the city. Despite having the backing of the military dictatorship, Arzua did not appear to believe that <u>he **should** be the **sole decider** of the city's future direction</u>:

> *"Arzua kept thinking as an elected politician who needed to have minimum consultations before making a decision" (Ardila-Gomez 2004, pp. 72-3)*

Sociological legitimacy also appears to have been a major factor in the abandonment of the UFPR plan. Pinto's criticism of the Wilhelm plan led to him, and the plan he was a representative of, being excluded from further involvement in the seminars. Pinto appears to have come from a technocratic viewpoint that <u>only planners **should** be</u> involved in the planning process, so it is somewhat ironic that the idea that he <u>**should not** continue to be involved in the seminars</u> became the dominant position, despite him being a member of the faculty at the UFPR Department of Architecture and co-author of one of the technical plans.

Sociological legitimacy has also been relevant to the negotiations with the bus companies about the new *busway* services, vehicle designs and inter-district services that crossed the boundaries of the 'selective' areas. In the 1960s the system of 13 'selective' areas appears to have become a principle that could not be changed by city (Ardila-Gomez 2004, p. 53), despite the city and mayor having the legislative power and *normative legitimacy* to do so. The renewal of the concession contracts in 1974 was negotiated with the incumbent operators, rather than being opened to external competitors. The idea that the <u>existing bus operators **should remain**</u> in place without too much change to the status quo appears to have had significant *sociological legitimacy*. However, the Lerner group were willing to a least threaten to use their *normative legitimacy* to replace the private operators with publicly run services (Ardila-Gomez 2004, pp. 121-6)[243].

<u>*Public consent*</u>, or at least the consent of intellectual and economic elites, appears to have been significant in the development of the replacement for the *Agache Plan*, at least in the mind of Mayor Arzua. This is evidenced by his decision to run the seminar series. However, public participation does not appear to have been any higher than *consultation* and may have dropped lower once IPPUC took over the planning process.

Later, during Lerner's period of mayor, public participation in the *Plano Diretor* appears to have dropped further into the realms of *tokenism*. Irazábal (2005, p. 85) suggests that the lack of public participation threatens to "delegitimize the planning process". However, this appears to be more to do with the return to democratic governance in the 1980s than there having been any history of public involvement in decision-making at all during the "brilliant start in the 1960s" and the "outstanding implementation in the 1970s" while the military dictatorship was in power. Given the non-democratic regime in power at the time, it is perhaps not surprising that *public consent*, and in particular the consent of the general public, had only limited importance during the implementation process.

<u>*Reasonableness*</u> appears to be very relevant to the process in that:

[243] Note that there appears to have been considerable negotiation, use of power and other factors at play in the relationship with the incumbent bus operators and how this was adjusted to accommodate changes to the network. Ardila-Gomez (2004, pp. 38-54, 121-6) provides an extensive narrative of changes in the relationship between the city and the incumbent bus operates, which at one point included threats to move buses to other cities, a lockout when buses were hidden in nearby municipalities so that the city might not be able to seize them, and other events. As with other issues, this chapter in general only touches briefly on the relationship between the city and the bus operators <u>as it relates to legitimacy and transit priority</u>. However, readers should note that, as in all cities, there was much more going on at various times in Curitiba that was less directly related to, or on the periphery of, the issues of legitimacy and transit priority implementation that are addressed in this thesis.

- abandonment of the *Agache* Plan was founded on the lack of *reasonableness* of the traffic viaduct and street widening required to accommodate traffic;
- as argued by the Lerner group, a new plan was the only *reasonable* course of action;
- the broad guidelines of the *Plano Diretor* itself (Table 8.1) appear to be *reasonable*;
- the choice of cheaper bus-based technology rather than heavy or light rail also appears very *reasonable* in the context of Curitiba and Brazil's financial positions and the lack of an existing LRT industry;
- the trinary road system is a *reasonable* solution to the problem of requiring a 60-metre cross section to accommodate the *busways*, but not wishing to demolish existing buildings to widen roads[244]; and
- once the implementation of the initial busway and trinary road system on the north-south axis had proven successful, the expansion of this approach (using the same bus-based technology) to cover other parts of the city by adding addition axes was a *reasonable* expansion of the *Plano Diretor*.

In general, the implementation of the *structural axes and busways* appears to have followed a pattern of *incremental* and *reasonable* change that gradually moved the city in the direction of the broad goals outlined in the *Plano Diretor*. This is a pragmatic approach that Schwartz (2004); McKibben (2007); Moore (2007, pp. 111-3) describe as being based on engineering best-practice, 'action scripts' or 'rule-of-thumb' methods. It also appears to be based on solving the immediate problem, rather than comprehensive rational analysis, and so may be an example of *disjointed incrementalism* (Lindblom 1979), *quasi-satisficing* and/or *heuristics* (Janis & Mann 1977; Parsons 1995, pp. 355-8; Schwartz 2010; Jones & Thomas III 2015, pp. 277-8)[245]. To a certain extent, the busway and trinary road system also appears to have been developed and then 'tried out' on the north-south axis (although not specifically through a formal 'trial'), before being adopted more generally across the city through the addition of other axes to the plan. This appears to be an advantage of incremental planning and development, or expanding on previous successes, in that technologies might appear more *reasonable* and proven after they have already worked once[246].

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[244] The trinary road system also provided traffic capacity (through the one-way streets) as well as transit capacity (via the busway) and traffic access to buildings (with the central streets carrying the busways also having traffic lanes for access). See discussion in Section 8.2.3 around Figure 8.4.

[245] See Chapter 3, Section 3.3.1.

[246] This sort of incremental development through extensions or the development of similar projects elsewhere in a city once a technology or initial line has proven itself appears to be common in transport. For example, Currie and Delbosc (2010) provide details of the expansion of BRT systems across Australasia, such as further BRTs in Brisbane after the success of the initial South East Busway or the gradual expansion of the Melbourne *SmartBus* network through the gradual addition of new routes. Flexibility to expand or adjust a network is an often-mentioned advantage of bus-based priority technologies, compared to rail-based systems which might be harder to change in small increments. That said, though, the recent extensions to the Melbourne tram network (see Chapter 5, footnote 157) suggest that 'relatively' incremental additions are not impossible for LRT.

This issue of the advantages of incrementalism-based approaches in priority implementation is discussed further Chapter 9 (Section 9.4.3) and Chapter 10 (Sections 10.3.2 and 10.5.1). Some of the challenges of having a larger-scale and non-incremental based approach are relevant to the previous discussion of the *Transit City LRT Plan* in Chapter 6 (given that it called for seven new LRTs across the suburbs, while the closest example

<u>*Legitimacy as unconditional duty*</u> clearly had relevance at the national level, given there was a need to obey the military dictatorship and those they placed in authority. Continuing the implementation of the *Plano Diretor* after it was established and the Lerner group had commenced its implementation may have become an *unconditional* duty, as there was little that subsequent opposition mayors (Fruet and Requiao) could do to change direction (Irazábal 2005, p. 96). This and the continued use of bus technology relate to *path dependence*[247], but perhaps also to the importance of the bus in the image of Curitiba. The bus is such a “trademark of the city’s planning success” (Irazábal 2005, p. 108) that actually adopting alternatives to address the need for more capacity might have been all but unthinkable. Many proposals for rail based transit modes in Curitiba have failed, although some of the best parts of these proposals been adapted to improve the BRT (Duarte et al. 2011). An *unconditional duty* to continue along the same path may have been a factor, as these alternatives might have lessened the importance of BRT.

Unconditional legitimacy also has relevance to the existing bus operators. The ‘selective’ area system, with the city divided into 13 areas in which an individual company or corporative had a monopoly on service provision, had become a virtually *unconditional principle* in the 1960s. However, it ultimately became <u>*conditional*</u> and negotiable when the city threatened to operate buses itself.

<u>*Conditional normative legitimacy*</u> was also relevant to the decision-making during the seminar series between the alternative Wilhelm and UFPR preliminary plans. The *legitimacy* of the UFPR plan appears to have been ended not due to a problem with its technical merits, but due to the manner in which Pinto questioned and criticised the alternative (Ardila-Gomez 2004, pp. 72-5). From the events of that seminar it appears that Pinto had lost the *legitimacy* through trust that he had by being a UFPR faculty member and planner, and this led to the withdrawal of the plan he had a hand in developing. The plan’s *legitimacy* therefore appears to have been conditional on its authors’ reputation, standing and actions, not just on its technical merits.

<u>The trinary road system</u> appears to have provided <u>a solution that met a range of conditions</u> because:

- property acquisition for road widening to accommodate the busways was not needed (*status quo* largely retained for existing buildings / property owners);
- traffic access was also provided to buildings on the same street as the busway; and
- traffic capacity was provided through the one-way streets a block away.

In this manner it appears to have met the *normative* goal of transit prioritisation (by providing a busway), yet still met conditions of providing access and capacity for car and other traffic.

in the city of what these might have been like was perhaps the St Clair Avenue West streetcar separation project that had been embroiled in the “Battle of St Clair” (Bow 2016)).

[247] See Chapter 3, Section 3.3.3 and Page (2006); Weaver (2010); Andersen (2011); Marier (2015, pp. 402-3) amongst many other authors who have discussed *path dependency*.

Legitimacy through trust is a common theme throughout the implementation of the Curitiba *structural axes and busways*. *Trust* in the architects, planners and engineers of the Lerner group and the IPPUC has helped to provide *legitimacy* for the transit priority implementation, and for the technocratic regime itself. However, this *trust* does not appear to have been automatic, rather it has been built up through:

- the *Plano Diretor* planning process,
- the successful implementation of the *Rua das Flores* pedestrian mall,
- the first of the *busways*, and
- through the development of IPPUC into an autonomous and skilled institution with a reputation for successful implementation.

The clear message from this section is that the successful *structural axes and busways* implementation involved:

- the development of a ***reasonable*** and ***sociologically legitimate*** set of goals in the *Plano Diretor* that still allowed significant flexibility;
- the adoption of a ***disjointed incremental*** implementation approach;
- the ***normative legitimacy*** provided by the support of the military dictatorship and the Lerner group's various positions of power and authority;
- sufficient ***trust*** that has been built up in the technocratic regime.

As a contrast, the next section discusses another successful transit priority implementation in Curitiba, but one that was achieved after the transition back to democratic rule and so without the *normative legitimacy* and power provided by being backed by the military dictatorship.

8.5 The direct bus services and boarding tubes

The *bus boarding tubes* are an iconic feature of the Curitiba BRT system. An example was shown earlier in the chapter in Figure 8.8 (see page 173). They include an enclosed glass passenger waiting area, a wheelchair lift and facilities for *off-board fare collection*. However, less well known is that the *tubes* were introduced 11 years after the *busways*, and that they were initially only used on the new *Linhas Direta* 'direct' bus services (operating in *mixed traffic*), rather than along the *busways* themselves.

Lerner's second term as mayor had ended in 1983, and he then returned to technical rather than political work. The *boarding tubes* idea was initially developed in 1984 by Lerner while he was working on transit planning for Rio de Janeiro. However, it was not implemented there. Instead, during Lerner's third term as mayor (1989-92)[248] the *boarding tubes* were introduced in Curitiba as part of a response to high passenger loads on the *busway* services.

URBS had developed an idea[249] for direct bus services with limited stops running along the one-way streets. These would provide extra capacity to supplement the at-capacity *busways*, and also decrease travel times for longer trips. The *boarding tubes* where incorporated into this new service to further improve travel times by reducing dwell times[250]. The *direct bus services* were first introduced on the south-east axis, and then extended to the east and west axes at the end of Lerner's mayoral term.

At the same time, IPPUC was developing a plan for LRT along the north and south axes IPPUC. This plan stayed around until midway through the subsequent term of Mayor Greca (1992-96). The LRT had an estimated capital cost of $280 million and high operating costs, which would have needed subsidy from the city, and so was not well supported at hearings Greca held to consider the issue. However, the LRT plan was not completely abandoned until futurist Alvin Toffler visited Curitiba, saw the BRT and *boarding tubes*, and told Greca to use that approach on the north and south axes

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248 Note that Lerner ran unsuccessfully for mayor in the first election after the return of democracy (for the 1985-88 term), but that this has been reported as been partly because of election fraud (see McKibben (2007, p. 83)).

249 The development of both the boarding tubes and bus services appear to have similarities to the '*garbage can'* model. The *problem* was increasing demand straining *busway* capacity. The *solutions* were Lerner's previous bus tube idea, and the URBS idea for adding *direct bus services* on the one-way (non-*busway*) streets of the trinary road system. The *people* were Lerner, Ceneviva and URBS. However, there does not appear to be much remaining information available about these boarding tubes, other than the tubes themselves. Notably, the tubes were exported to New York (see footnote 41), but failed to gain sufficient legitimacy for permanency there. Likewise, the tube designs do not appear to have spread to other cities seeking to address level-boarding problems (such as Melbourne which has developed its own bespoke designs (Currie & Smith 2006; Currie & Reynolds 2010; Currie et al. 2012; Currie, Delbosc, et al. 2013)).

250 The measures implemented are in the *stop-priority* and *transit planning and operations* categories, (see Figure 2.5 and Section 2.2.5, Chapter 2), consisting of *platform stops* and *off-board fare payment*. The introduction of the new direct bus lines might not be an example of 'transit priority' under a strict definition (see discussion in Section 2.2.4, Chapter 2). However, this did involve a limited stopping services with stops approximately every three kilometres, which is similar to *skip-stop* operation.

The new services and the boarding tubes were introduced on the one-way streets of the structural axes, not along the *busways*, and operated in *mixed traffic*. As such, the ROW shifted from *mixed traffic* (without transit) to ROW C.11 *mixed traffic* (with transit). The introduction of bus stops and services along the one-way roads in the trinary road system, which had previously carried only general traffic, and the boarding tubes throughout the network represents a significant change in the way that the road reserves were used, which was advantageous to transit. As such, it is an example of transit priority implementation, albeit a bit different to installing *time* or *space* priority measures to advantage an existing bus service.

as well. Together with bi-articulated buses, the *boarding tubes* were then introduced on the north and south axes, and then progressively across the entire network.

These measures appear to have had successful implementation and outcomes. Importantly, they provided a higher level of service and capacity without the costs associated with the LRT alternative.

8.5.1 Legitimacy

Lerner's position as mayor provided *normative legitimacy* for the implementation. He and his appointees had the power and authority to implement the measures, supported through the election results and democratic governance system. It is unclear whether any planning permission process was required (such as had been required for *Clarendon Street Tram Priority Pilot* in Melbourne, which had involved new *far side stops*), but this appears to be unlikely or somewhat procedural given the context of Curitiba's governance system.

Sociological legitimacy is relevant to the way the tubes along the north and south axes were delayed until input from futurist Alvin Toffler. Toffler's opinion on what should be done convinced Mayor Greca to select the boarding tubes and bus option for the north and south axes. This was in addition to the various hearings and analysis that had showed the LRT alternative was more expensive, but it appears that endorsement of the tubes by a futurist may have been sufficient for the tube option to pass a tipping point.

The Lerner and Greca administrations appear to have been legitimized through *public consent*, as both were directly elected by voters rather than appointed. However, *public consent* may not have been directly relevant to the implementation of the *direct bus services and boarding tubes* themselves, as there does not appear to have been public involvement in the decision-making. After restoration of democracy in Curitiba, public participation has been in the range of *information* with the public having:

> *"two main venues for inputting into governance and planning processes: voting to elect representatives, and expressing approval of their performance" (Irazábal 2005, pp. 66-8, 293-4)*[251].

Reasonableness appears to have supported the legitimacy of the *boarding tubes* and *direct bus services* implementation. It was a sensible continuance of Curitiba's incremental approach to solving the immediate problems. There also appears to have been *path dependency* effect that made it *reasonable* to continue using bus-based services and technological improvements. There may have also been some elements of *conditional normative legitimacy* with respect to support from the

[251] Irazábal (2005) discusses how Curitiba tends to have a synergistic, representative management approach to public decision-making where public participation is limited to voting for or against representatives, rather than the synergistic, participatory planning typical in other governance systems where the public are more active participants.

established bus companies, who would have been supportive of further improvements to the system, but not of the LRT, which might have cut them out or required them learn rail-based technology and change their operations[252].

Finally, it appears that the general level of ***trust*** in Lerner, due to his successful two terms as mayor, may have helped *legitimise* the implementation. The tube design was originally his idea, and he was elected with 49% of the vote in a five-way contest. This, and his reputation of success built through delivering the *busways*, would likely have lent legitimacy to the implementation. How much of this is due to *trust* and how much of this is due to the power and authority of his position as mayor cannot be clearly distinguished.

[252] *Path dependency* effects (briefly discussed in Section 3.3.3) appear likely to have been relevant to this issue. See also, the larger status of Curitiba as "the world's cradle for bus rapid transit (BRT)" (Lindau et al. 2010b) potentially leading towards the city favouring bus-based solutions, as discussed briefly in Section 8.2.4.

8.6 Conclusions

This chapter has discussed three inter-linked examples of implementation in Curitiba, being: (1) the conversion of the *Rua das Flores* into a pedestrian mall in the early 1970s; (2) the implementation of the *structural axes and busways* between 1974 and 1980; and (3) the introduction of the *direct bus services and boarding tubes* in the early 1990s. All three have been a continuation of the process started when the *Agache Plan* was abandoned and the *Plano Diretor* passed into law in 1965, shortly after the transition of Brazil to a military dictatorship.

The military regime provided the authority, and hence *normative legitimacy*, for Lerner as mayor and an *unconditional duty* to support the technocrats and their initial implementations. However, this was not the only source of *legitimacy*. Rather, implementation through the 1970s and 80s had foundations on:

- the Lerner group's *reasonable* calls to replace the 1945 *Agache Plan* back in the early 1960s;
- *trust* and *sociological legitimacy* built by the Lerner group through their deep involvement in the development of the Wilhelm Plan and its selection over the competing UFPR Plan;
- the adoption of the *Plano Diretor* into city law by the City Council, providing *normative legitimacy* and *unconditional duty*;
- the *reasonableness* of the plan itself; and
- the creation, powers and independence of the IPPUC institution, providing both *normative legitimacy* and a *trusted* organisation.

Early on during the mayoral term of Arzua it was the seminar series that was the venue to see which of the competing plans would have sufficient *sociological legitimacy* to be adopted. These seminars also helped to build *legitimacy through consent* from amongst elites and, to a small extent, amongst the public. Following the early implementation successes of the pedestrian mall and initial *busways*, the *legitimacy* of the *Plano Diretor* appears to have increased so that continuing its implementation became virtually an *unconditional duty* for future mayors.

The implementations in Curitiba appear to have been supported by the *reasonableness* of the options selected, and the gradual, pragmatic and *disjointed incremental* approach to implementation. This appears to have been based on *quasi-satisficing* and dealing with the immediate problem at hand, rather than prescriptive and very detailed master plans based on *full rationalism* approaches.

However, it was the power of the military dictatorship that gave the technocrats in the Lerner group and IPPUC the initial time and space to work, and sufficient *normative legitimacy* and authority to start to implement change as they saw fit. This appears to have allowed the initial steps towards the goals and visions in the *Plano Diretor* to be made relatively unhindered (although not without protest), and a chance for the technocrats to build *legitimacy* ***through*** *implementation.* This appears to have built *trust* in them in their own right through successful delivery and the development of a supportive institutional structure and power base in the form of IPPUC. *Public consent*, or at least the consent of elites, appears to have been somewhat important to maintaining this *legitimacy* over the long term. However, as shown in the *Rua das Flores* mall implementation, Lerner had the opportunity and power to implement the project first, so that the public could see it and only then pass judgment on its merits (c.f. McKibben (2007, p. 65))[253]. This contrasts to the more typical situation in democratic governance systems where the public gets to have a say on a project during the planning stage, or at least gets some information before or during construction, and so may have passed judgement on an initiative before it is fully implemented.

Perhaps this is the key message that can be taken away from Curitiba: initially, Lerner and his group were supported by the military dictatorship, and so had a relatively free hand to do as they wished. Due to their backgrounds in architecture, engineering and planning their choices were techno-rational, *reasonable* and successfully implemented. This appears to helped to build *trust* in them and therefore, when the public was asked if they wanted the Lerner team back for more of the same the public consented[254].

[253] An alternative interpretation might be that not have mattered too much whether the mall, the busways or other elements of the changes were actually 'legitimate' in a broader public policy-making arena, given that the Lerner group had power and authority (especially through the military dictatorship period when they were the appointed mayors). Regardless, the events of the mall implementation (with deputations to the State Governor, avoidance of the potential for judicial injunctions that might halt the works, and the protest by drivers) suggest that the Lerner group's power and authority was not *unconditional* and did rely on continuing support and legitimacy from amongst elites and the powerful, if not as much from the populace at large as might be the case in more democratic contexts.

[254] Albeit after Lerner initially lost an election to Requião in 1984 in the first poll after the return of democracy, which McKibben (2007, p. 83) suggests was due to electoral fraud.

Part D: A framework and pragmatic strategies

Chapter 9: Building a framework

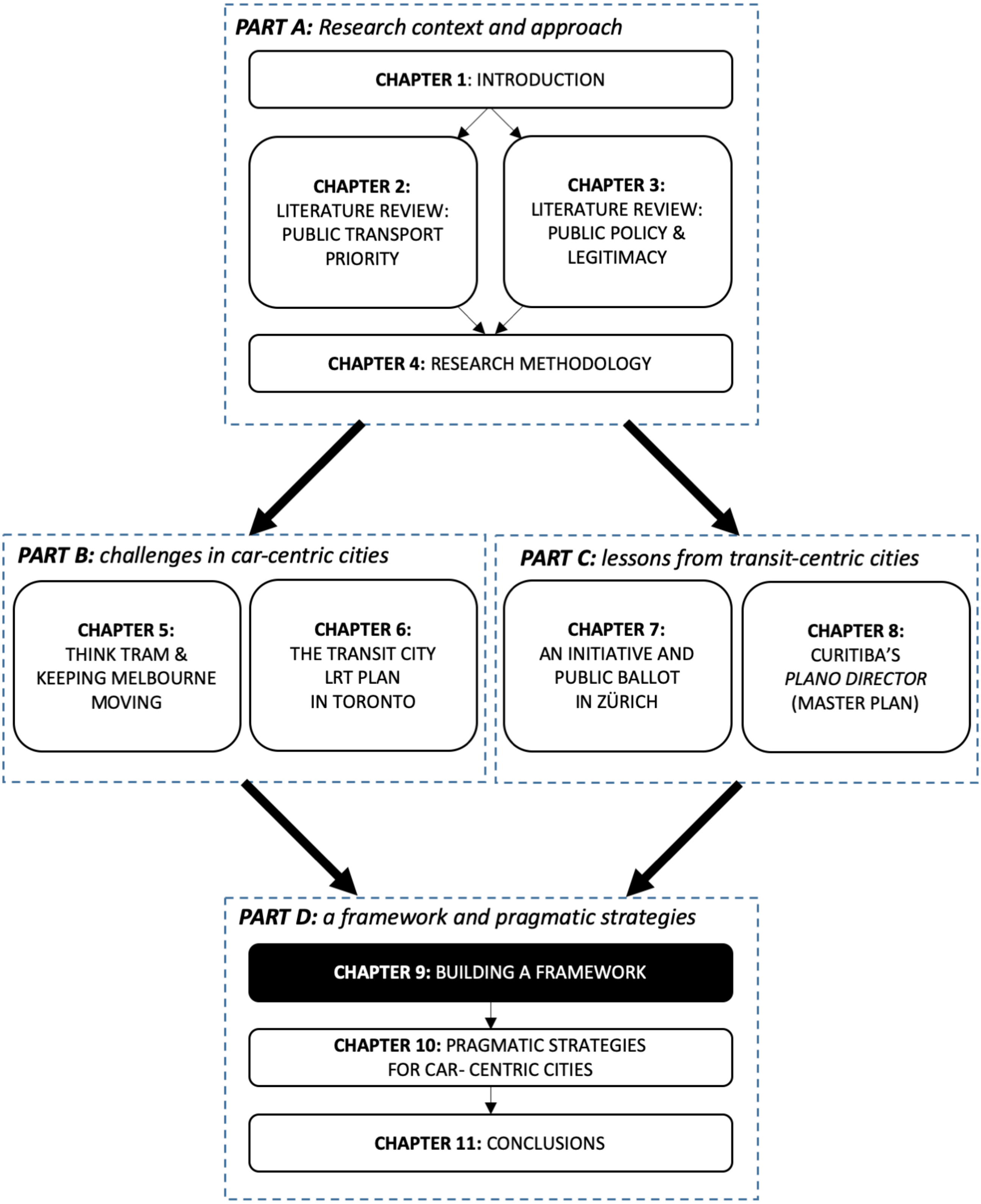

Figure 9.1 Position of Chapter 9 in thesis structure

9.1 Introduction

Previous chapters have discussed how legitimacy influenced transit priority implementation in Melbourne, Toronto, Zürich and Curitiba. However, legitimacy comes in a wide range of overlapping forms. The interactions of *normative* and *sociological legitimacy*, the importance of *public consent* versus the underlying *reasonableness* of preferencing vehicles with greater passenger-carrying capacity, and the impacts of other types of legitimacy all appear to be highly complex in real-world implementation. The four case cities considered in this study show much variation in the levels of support for transit prioritisation. However, the governance, political and institutional structures are unique to each city and the specific circumstances of each individual implementation also appear to have strongly influenced outcomes.

In reporting the case study research, Chapters 5 to 8 have provided extensive narratives. However, these have not yet been generalised so that they can be applied to understand and improve priority implementation in other contexts. A more generalised theoretical basis is therefore needed to help to understand legitimacy's influence on transit priority implementation.

In this chapter, a conceptual framework is presented to assist in understanding the impact of different forms of legitimacy on transit priority implementation. The new conceptual framework has emerged from the case studies described in the earlier chapters through a process of drift, iteration and refinement during the research. It was developed to consolidate the insights from the findings from the cases studied into a generalisable framework, and to better allow cross-comparison between transit priority implementation in different cities and circumstances. The framework uses lessons drawn from the case studies to create a generalised theoretical model for understanding transit priority implementation in *car*- and *transit-centric cities*.

The narrative in this chapter therefore shifts back and forth between building complexity into generalised findings and simplifying the empirical context. Section 9.2 presents a simple, generalised graphical structure through which to explore, interrogate and understand relationships between transit priority and legitimacy. This general structure is then used to review and compare the empirical context across all four cases in Section 9.3, which closes with a discussion of the impact of mode shares on the legitimacy of transit priority in the cities of Zürich and Curitiba (*transit-centric*) versus Melbourne and Toronto (*car-centric*). Section 9.4 returns to generalisation by developing and presenting the new conceptual framework generated in this study. The generalisability of this framework is then defended in Section 9.5. The chapter concludes in Section 9.6 with a summary of the findings and a discussion of what the framework means for *car-centric cities*, where transit prioritisation may be more likely to face legitimacy challenges.

9.2 A graphical structure for exploring transit priority legitimacy

This section starts generalising the findings of the case studies by presenting a simple graphical structure for exploring, interrogating and understanding relationships surrounding legitimacy and transit priority implementation. To aid in this simplification and generalisation legitimacy is taken throughout this chapter as being dichotomous, so that an amount of transit priority is either legitimate or illegitimate. Legitimacy itself is also simplified into an overall status, with the various forms of legitimacy (*normative*, *sociological*, *public consent* etc.) considered to be constituent parts of a whole[255].

Figure 9.2 presents a conceptual structure that relates the total amount of transit priority (y-axis) to the amount of transit priority that is legitimate (x-axis).

[255] This is part of the generalisation involved in the structure and framework that are developed in this chapter. It also recognises that what makes an amount of transit priority legitimate or illegitimate is likely to vary from one context to another. For example, in one jurisdiction the *normative legitimacy* of an exclusive bus lane may be sufficient to legitimise the restriction on general traffic. In another (perhaps less law-abiding) jurisdiction the extent to which other drivers consider the bus lane off-limits might be more related to the amount of education, encouragement and enforcement, or even whether physical (engineered) separation measures prevent access (see discussion of 4 E's framework in Section 2.2.3).

Similarly, one type of priority measure might require a process and some form *public consent* (perhaps expressed through elected representatives) for its implementation to be legally permitted. Another measure (e.g. TSP) might be within the purview of engineers within a road authority. In that case the engineers are effectively *trusted* to make decisions as to what is legitimate and should / will be implemented, versus what is not and is to be rejected.

Sociological legitimacy appears likely to make up a large component of whether an amount of transit priority is (overall) legitimate or not. However, this again might vary considerably between contexts, governance structures, and which decision-making venue actually has the power to decide what shall or shall not be tolerated on the road system. The case of Zürich provides an example where the decision-making on the *Citizens' Transit Priority Initiative* had occurred in a City-of- Zürich-wide vote but, at least prior to further lobbying efforts, this does not appear to have legitimised the idea of extensive prioritisation within the city departments who had charge of actually delivering the implementation. This links back to the power and discretion that 'street-level' bureaucrats (in this case those within the city departments) can have in delivering policy, and how the outcomes delivered might be quite different to those desired by policy-makers (in this case the proponents of the Initiative and the voters who approved it)(see discussion in Section 3.3.4 and Parsons (1995, p. 469)).

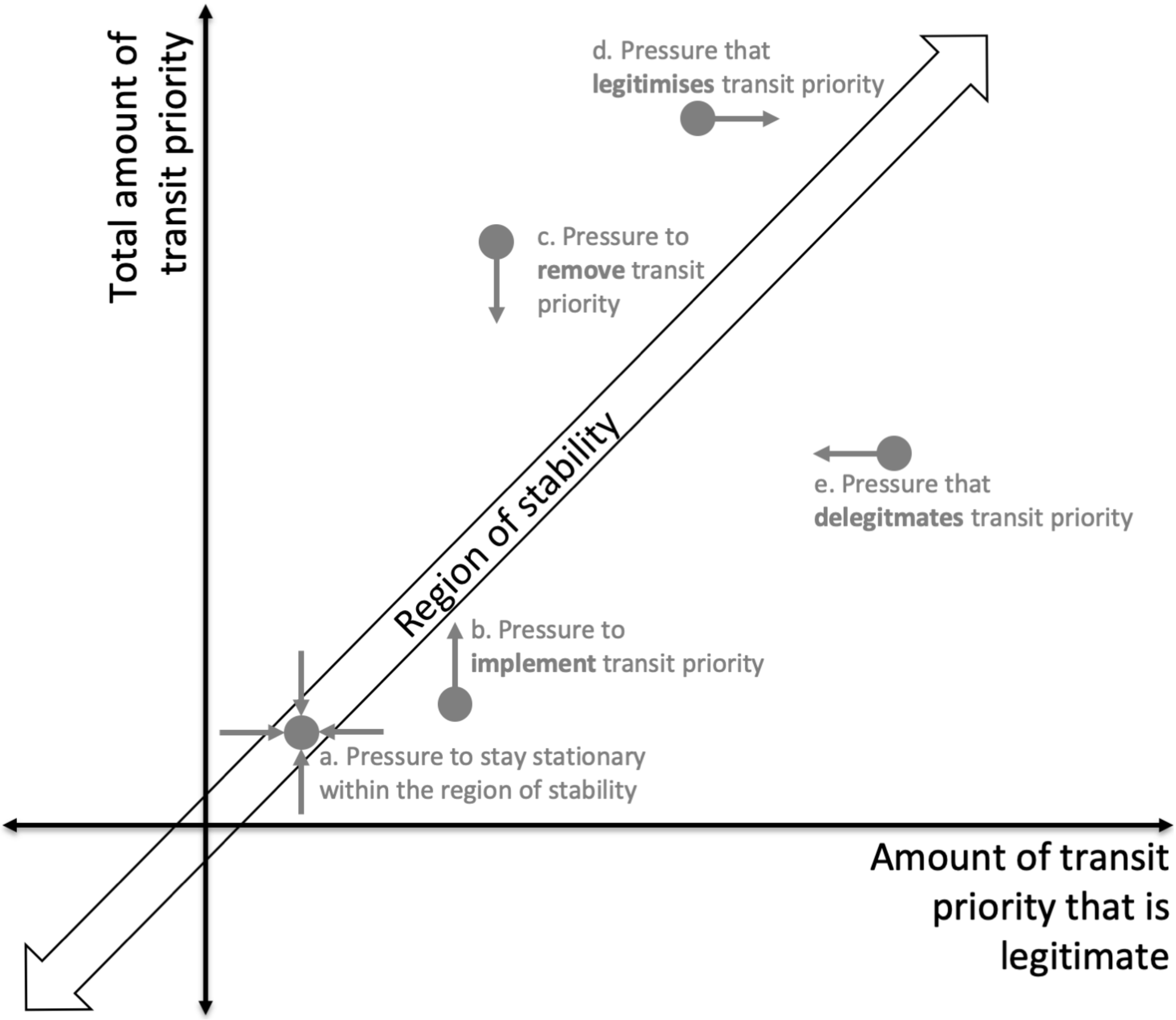

Figure 9.2 Conceptual structure for transit priority implementation and legitimacy

Source: Author's concept.

Figure 9.2 suggests that the **total amount** of transit priority will tend to become **equal** to the **amount that is legitimate** over the medium-to-long term. This is indicated by the diagonal arrow marked as the 'Region of stability' that lies along the line where $y = x$.

Therefore, the primary proposition of this conceptual structure is:

Proposition 1 *That there is pressure to either:*

a) stay within the region of stability; or

to move towards the region of stability through:

- *b) the implementation of transit priority measures,*
- *c) the removal of transit priority measures,*
- *d) an increase in the amount of transit priority that is legitimate, or*
- *e) a decrease in the amount of transit priority that is legitimate.*

Figure 9.2 indicates examples of these various mechanisms in grey.

The first of these policy mechanisms is shown as '*a. Pressure to stay stationary within the region of stability*'. This describes the case of doing nothing so as to maintain the status quo. It is supported by the discussions in Chapter 3[256] of how the existing status quo has legitimacy due to widespread resistance to change. Chapter 2 similarly discussed how a road authority might have little motivation to implement or approve transit priority measures, particularly if by doing so there would be traffic impacts.

The second and third policy pressure mechanisms involve pressure to either '*b. Pressure to Implement…*' or '*c. Pressure to remove transit priority*'. This suggests situations where practitioners need to solve a problem[257] that might be caused by a mis-match between the *legitimate* amount of transit priority and the amount that is currently provided. It might be seen where there are political, institutional or other pressures to 'do something' (e.g. resolve public complaints, address an identified issue etc.), with the obvious solution being to make a change to the current conditions on the road network or transport system.

The fourth and fifth policy pressure mechanisms similarly provide solutions to a mis-match between the amount of priority that is legitimate and the amount that is provided. However, here it involves a change in the amount of priority that is legitimate. This might involve ' d*. Pressure that legitimises transit priority*' measures that have already been installed. Alternatively, through public, political and/or institutional opposition there might be '*e. Pressure delegitimates…*' a proposal to implement more transit priority.

The diagonal region of stability divides Figure 9.2 into two distinct areas. Below and to the right of the diagonal is an area where there is legitimacy for more transit priority than the amount that is currently provided (i.e. transit is under-prioritised). Above and to the left of the diagonal is an area where there is more transit priority than the amount that is legitimate (i.e. the transit priority that exists is under-legitimised). These two areas and the progressions of implementation, removal, legitimisation and delegitimation that might occur within each of them are discussed below.

9.2.1 Legitimacy for more transit priority

Figure 9.3 shows how legitimacy for more transit priority (i.e. under-prioritisation) might develop, and three ways in which there might be a return to the region of stability.

[256] See discussions of the status quo and how it relates to tactical urbanism, activism and protest in Section 3.2.2, incrementalism in Section 3.3.3, NIMBYism in Section 3.4, and *sociological legitimacy* in Section 3.5.1.
[257] As per the 'garbage can' model discussed in Chapter 3, Section 3.3.5.

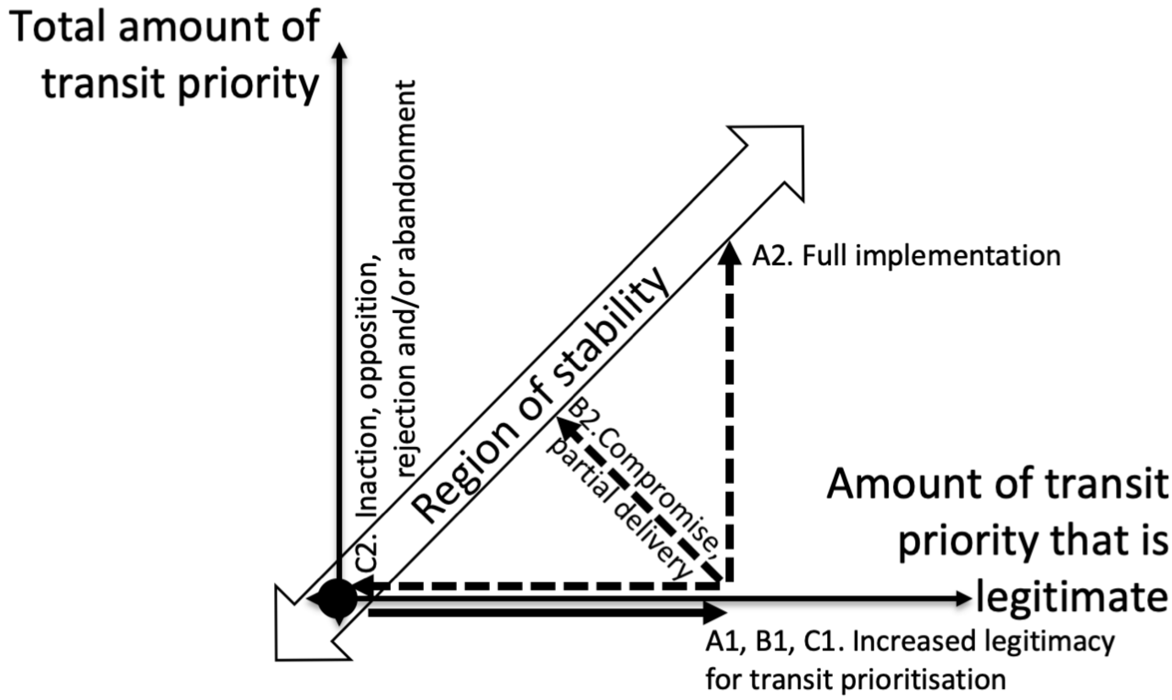

Figure 9.3 Increased legitimacy for transit priority

Source: Author's concept.

As shown in Figure 9.3 a situation where there might be legitimacy for more transit priority may occur through:

- Progression A: (*A1) increased legitimacy for transit prioritisation* followed by (*A2) full implementation* of that amount of priority;
- Progression B: (*B1) increased legitimacy for transit prioritisation* followed by (*B2) compromise and partial delivery* where only some of the transit priority is implemented; or
- Progression C: (*C1) increased legitimacy for transit prioritisation* followed by (*C2) inaction, opposition, rejection and/or abandonment* that results in implementation not going ahead and the proposal being delegitimated.

There are examples of Progressions A and B evident in the cases and implementations included in this study[258]. Unfortunately, examples of Progression C are not as easy to identify. This is in part

[258] Examples from the cases of Progression A include:

- in Zürich the ballot in favour of the *Citizens' Transit Priority Initiative* that together with further advocacy provided legitimacy for priority implementation, which led to the full implementation of the programme and a shift to the *Waiting Time Zero* policy.
- in Curitiba the development of the *Plano Diretor* and the appointment of Mayor Lerner provided pressure to implement the *structural axes and busways*;
- in Melbourne the adoption of the *Melbourne 2030* plan provided pressure to deliver *Think Tram* and the *Clarendon Street Tram Priority Pilot* scheme; and
- in Melbourne the *Keeping Melbourne Moving* program provided pressure to implement the *Stud Road Bus Lanes*.

Examples of Progression B, where there is a compromise and partial delivery, include:

- in Toronto the *Transit City* plan was only partially delivered, with the *Eglington Crosstown LRT* implementation continuing, but the rest of the plan being abandoned as part of the 'end of the war on cars';
- in Melbourne the scaling back of *Think Tram* after the partial removal of the *Clarendon Street Tram Priority Pilot*; and

in Zürich the initial transit priority implementation efforts along route 10, when the city had implemented some measures and was working towards "a less ambitious priority system that would not inconvenience motorists" (Mees 2010, p. 131).

because an effort to build legitimacy for transit priority that is then rejected prior to any implementation occurring may leave little evidence behind[259]. However, the initial inaction in Curitiba during the mayoral term of Omar Sabbag from 1967-71 provides one example of how opposition or delay might prevent implementation, at least temporarily[260].

9.2.2 More transit priority than legitimacy

Figure 9.4 shows how a situation where there is more transit priority than legitimacy (i.e. under-legitimisation) might develop, and how conditions might then return to the region of stability.

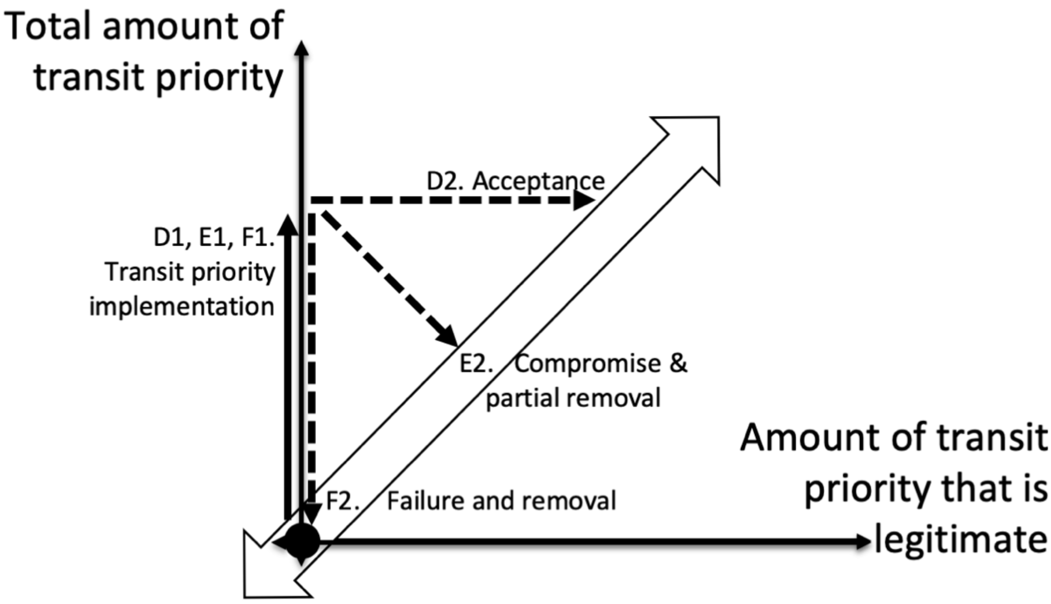

Figure 9.4 Build first approach to transit priority implementation

Source: Author's concept.

As shown in Figure 9.4 more transit priority than the amount that is legitimate might involve:

- <u>Progression D</u>: (*D1) transit priority implementation* followed by (*D2) acceptance*;
- <u>Progression E</u>: (*E1) transit priority implementation* followed by (*E2) compromise and partial removal*; or
- <u>Progression F</u>: (*F1) transit priority implementation* followed by (*F2) failure and removal*.

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[259] Refer again back to the 'garbage can' model discussed briefly in Chapter 3, which suggests that the knowledge, analysis and other leftovers of a decision-making process (that remain in the metaphorical garbage can) tend to be lost. This is a particular challenge for researchers when the outcome of the decision-making process did not include any actual implementation (i.e. the do-nothing option was selected), as there is unlikely to be any physical evidence in the road environment that a decision-making process actually occurred. The comment that "authorities are also keener to publish success stories than to share learnings resulting from system failures" from Currie (2016a, p. 490) hints at this problem, in that authorities are also unlikely to report on transit priority implementation efforts that did not move beyond an initial concept or design stage.

Fortunately, there is likely to be some remnants available in the various technical reports, meeting minutes and other records, as well as the memories of participants that researchers and historians can potential use to help improve understanding of why some technically-sound plans might fail to gain sufficient broader support or lose legitimacy in the face of opposition. For example, Osbaldeston (2008) provides a review of plans that failed to gain sufficient legitimacy for full implementation in *Unbuilt Toronto: a history of the city that might have been*. It includes discussion of the unbuilt Queen Street streetcar subway, which has been part of a long running, but never realised, plan for transit priority along that corridor in Toronto.

[260] Despite significant technical and *normative legitimacy* having already been built through the development and passing of the *Plano Diretor* by the City Council in 1966, it was not until Lerner was appointed mayor that the *structural axis and busway* plan became more than ideas on paper. See Ardila-Gomez (2004, pp. 80-1) and Chapter 8, p.29-33 for further discussion of this period of inaction in Curitiba.

In general, there appears to usually be at least some efforts to build legitimacy prior to implementation in the real-world. All of the cases examined in this research have involved at least some engineering analysis, design or the building of (techno-rational) legitimacy before a transit priority measure has been implemented[261]. It may be that, short of *tactical urbanism*-style direct action[262], there will always be at least some legitimacy built prior to the implementation of a transit priority measure.

Engineering staff or other implementers are unlikely to go ahead with the implementation of new transit priority measure without planning and regulatory approval, or some other form of legal authority and *normative legitimacy* for making changes to the road environment. Even if a traffic engineer independently implements a signal timing plan that provides passive priority to a bus route there will be at least some legitimacy prior to the implementation, in that: the traffic engineer would have some authority to enact signal timing plans; the plan would need to meet various minimum standards (e.g. the *unconditional legitimacy* of minimum green times); and the engineer themselves would need to consider the plan to be *reasonable*.

However, Figure 9.4 provides a suitable metaphor for where transit priority measures have been implemented with little to no *legitimacy* built in the **broader public policy and political arena** prior to implementation. Despite there being sufficient *reasonableness* and *normative legitimacy* within a smaller, more technically-orientated, policy arena and within the implementing institutions, this legitimacy may not be known about or be relevant to the general public, motorists or politicians.

[261] Note, however, that such activity itself might not be 'purely' techno-rational. Engineering analysis, design or other activity (e.g. transport planning) is often prompted by political or other non-technical events, and the range of options that might be included in such activities may be limited by non-technical factors. For example, some (potentially) technically feasible changes to road environments may not be considered or reported on in technical studies because they have already been identified as (politically) impossible. Alternatively, it might be that a decision has already be made to focus only on a limited selection of options before technical analysis has commenced. See also the discussion of previous research about the Brisbane busway in Section 2.4.1 and footnote 29, which suggests that there was "only cursory analysis of an LRT option for the corridor" and the consultant report supporting adopting BRT in Brisbane had "negligible evaluation and very little technical analysis" (Tanko & Burke 2015). Section 3.2.1 also touches on this issues, and included discussion of the problem of 'announce then justify' styles of planning in footnote 48.

[262] Direct action 'guerrilla' bike lane creation has already been seen 'in the wild' amongst bicycling activists. Citizen-constructed bike lanes have been implemented in Seattle, Washington DC and New York (Fucoloro 2013; Goodyear 2013; Strupp 2018). These implementations do not appear to have been undertaken with any involvement or approval by the road authority, but rather in part-protest and part-desire by interested citizen's to help to improve a city's infrastructure. Such efforts appear to have similarities to the invention of the *woonerf*, some forms of *tactical urbanism*, and even the protest and direct modification of urban spaces such as is found at the intersection of street art and graffiti, which were discussed in Chapter 3, Section 3.2.

Of particular interest is the implementation of a pylon-protected bicycle lane in Seattle, undertaken by a group calling themselves the Reasonably Polite Seattleites. Their implementation was politely removed by the Seattle Department of Transport (SDOT), but this was undertaken together with a direct email from a traffic engineer offering to arrange for return of the pylons. The removal was due to the pylons being too tall and potentially interfering with bicycle handlebars, but the protected lane was later reinstalled by SDOT, using shorter pylons, along with bicycle boxes and further bike lanes in the surrounding area (Goodyear 2013).

Along similar lines, The Better Block Foundation (2019b) provides a simple 'recipe' that might be followed to build a bicycle lane using just tape, paint, a bike stencil and only three people. These instructions are described as allowing anyone to "gather the supplies for and implement (a bike lane) in their own neighbourhood" and, while making mention of the need for traffic control and some partnerships with local institutions on previous projects on the accompanying website (The Better Block Foundation 2019a), there is an emphasis in this and other 'recipes' that are provided on their site on implementation by non-experts (i.e. not necessarily involving traffic engineers and leaving the question of official 'permission' somewhat open).

Whether a similar **citizen-constructed lane for buses** could ever be built without extensive detailed design, involvement and sign-off by technical experts does not appear to have yet been tested, and would seem unlikely. At the current time it would seem that any such attempt would likely result in much more serious repercussions than the polite letter, temporary removal and later co-opting of the design that resulted from the citizen's effort on the Seattle bike lane. However, testing this might be a possible direction for (enterprising and confident) future researchers who are interested in pushing the boundaries of transit priority implementation.

Instead, there might be only a small amount of *consultation*, *information* or other *tokenism*, or even *non-particitipation* of the public entirely, prior to construction commensing[263]. Therefore, there may be little to no *sociological legitimacy* for transit priority implementation, despite it being approved through official channels.

There are examples of Progressions D and E evident in the cases and implementations included in this study[264]. Unfortunately, no clear examples Progression F appear within the studied cases. The reasons for this are likely to be similar to the reasons for there being few examples of failure and abandonment that were discussed above in Section 9.2.1. Also, transit priority implementation would seem unlikely without any supporting legitimacy at all, and if there was an immediate backlash such unsupported measures are more likely to be quietly removed and forgotten about than reported in the research literature.

The example of the *Stud Road bus lanes* provides some indication of how Progression F might unfold in practice. The *bus lanes* had some legitimacy when they were implemented due to the underlying support of transportation plans and as a government-led project. However, they were later delegitimated when public opposition lead to political decision-makers ordering their removal[266].

9.2.3 Instability and topography

Taken together, Figure 9.3 and Figure 9.4 show similar patterns of a how there might be a return to the region of stability. This suggests that the diagonal 'region of stability' may have the characteristics of a valley or saddle between two peaks, as shown in Figure 9.5.

[263] Comes from the Arnstein (1969) ladder. See Chapter 3, Section 3.4.

[264] Examples from the cases of Progression D include:

- in Curitiba the sudden implementation of the *Rua des Flores* pedestrian mall, which resulted in acceptance and then further extension of the mall through much of the downtown; and
- in Curitiba the implementation of the *direct bus services and boarding tubes* appears to have similarly been accepted and later expanded across the city, and went on to replace the proposed north-south LRT.

Examples from the cases of Progression E, where there is a compromise partial removal, include:

- The *Clarendon Street Tram Priority Pilot* where implementation lead to partial removal through compromise with the opposed traders[265].

[265] There was, again, initial some background support for the pilot scheme implementation through the *normative legitimacy* provided by the planning approvals process and the almost *unconditionality* of the *Melbourne 2030* planning directions that led to *Think Tram*. However, only approximately 6 months passed between the initial mentions of the pilot scheme and presentation of initial concepts to the formal launch of the overall *Think Tram* program in Clarendon Street (as the measures were installed). This included the 14-day planning permit advertising period during which the general public had the opportunity to make submissions to the council (Smith 2005). Given this relatively rapid pace of implementation and that the public involvement appears to have been limited to some discussion with traders and a brochure *informing* the public, it appears there was little legitimacy built within the local *public and political policy arenas* prior to the implementation.

[266] This type of progression, where an existing legitimate measure is delegitimated after some time has passed, is discussed further in Section 9.2.4 below.

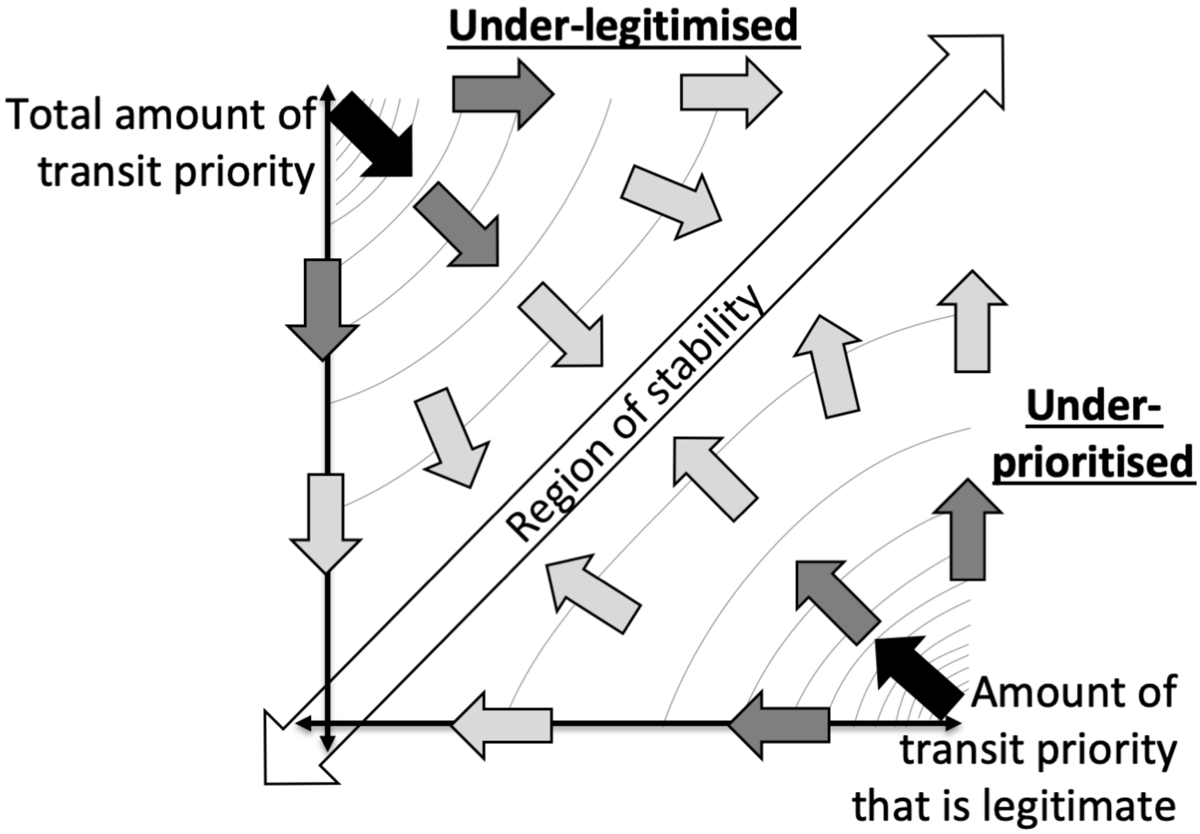


Figure 9.5 ***Under-legitimised*** **and** ***under-prioritised*** **areas: a valley or saddle between two peaks**

Note: grey lines indicate contours, arrow direction indicates downwards, and darker arrows indicate increasing slope inclination.

Source: Author's concept.

The upper left of Figure 9.5 shows an ***under-legitimised*** area, where the amount of priority is greater than that which is legitimate (as per Figure 9.4). An ***under-prioritised*** area is similarly shown in the bottom right of Figure 9.5, where there is legitimacy for more transit priority than is currently provided (as per Figure 9.3). Both of these areas are unstable, with the shading of the arrows and the spacing of the contours suggesting that:

Proposition 2

The further from the region of stability the greater is the pressure to either:

- *remove priority measures or abandon proposals for implementation;*
- *to compromise; or*
- *to justify or accept measures or proposals for implementation.*

However, the topography shown in Figure 9.5 does not explain all of the empirical findings from case studies. In particular, the *Stud Road Bus Lanes* provides an example where transit priority measures that were fully implemented and appear to have had the supporting legitimacy were later delegitimated and removed (after the next election). On this basis, Proposition 2 might not be generalisable to all instances, which perhaps shows that there is a need to further explore how existing (and legitimate) transit priority measures might later become illegitimate.

9.2.4 Delegitimation of existing transit priority measures

The events relating to the *Stud Road Bus Lanes* appear to have involved two separate progressions:

- Progression A, where an initial increase in legitimacy for transit prioritisation (through technical planning)[267] led to successful implementation of the *bus lanes*; and then later
- Delegitimation through public opposition and political responses to complaints[270], which led to the removal of the *bus lanes* as a distinct change in policy.

This second progression is something new, which is not yet described in the various progressions identified in this section. It involves a move away from the region of stability, which has occurred over some time after the initial implementation. This does not fit with the topography in Figure 9.5, which suggests that there should be movement towards the region of stability over time. Nor does it fit with the first part of Proposition 1 (Section 9.2, page 197) that suggests there is pressure to stay stationary if already within the regional of stability. Instead, the *Stud Road Bus Lanes* show an instance where an existing and legitimate level of transit priority became illegitimate. This suggests that existing transit priority measures **can be delegitimated**, as shown in Figure 9.6.

[267] Note, as discussed in Chapter 5 the *Stud Road bus lanes* appear to have been legitimised by their inclusion in the *Keeping Melbourne Moving* strategy (i.e. a strategic plan). However, there does not appear to have been a technical justification made for the bus lanes based on the frequency of buses at the time of implementation. This issue is addressed in the discussion of *reasonableness* in Section 5.3, and it is particularly of note that the apparent failure to meet the bus lane warrants at the time of their installation (e.g. "the Stud Road bus lane has 6-7 half full buses an hour" (Tudge 2010)) was used as a justification for their removal.

To some extent it appears that the technical warrants were 'weaponised' by opponents against the bus lanes, effectively ignoring the *strategic objectives* perspectives that had justified the lanes being included in the *Keeping Melbourne Moving* strategy. For example, by referencing "…Australian and international research which suggests that at least 17 full buses per hour are required to justify a dedicated bus lane…" Tudge (2010) may have succeeded in reframing the debate to be about meeting a bus warrant right then, rather than the potential for the bus lanes to protect and/or develop for future needs. Note, however, that such reframing appears likely to have already occurred informally, given that the calls for the lanes to be removed were brought about because of complaints about increased traffic congestion on Stud Road in the then present. In general, it appears that the larger strategic issues (longer term projections of passenger growth and bus frequency increases) did not come into the debate that surrounded the second progression through delegitimation to removal.

Perhaps waiting for passenger growth and bus frequency increases to occur before building the bus lanes might have helped to prevent the delegitimation. The harder-to-define justification, based on some future condition[268] ,would have been unnecessary if the bus lane implementation had not happened until there actually were the close to the 17 buses per hour that Tudge (2010)) stated were "required to justify a dedicated bus lane".

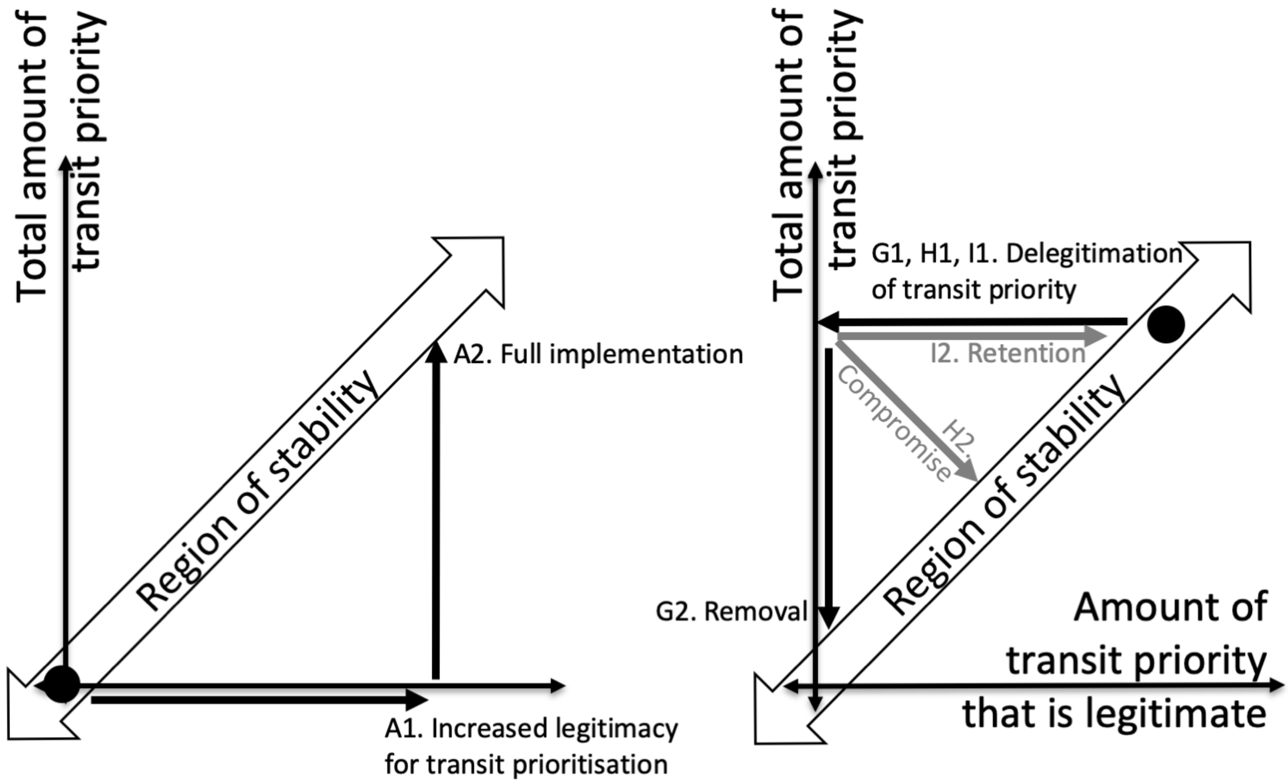
Alternatively, building an HOV lane first, which could then later be converted to a dedicated bus lane, might have helped to prevent delegitimation. However, the bus frequency was still lower than the ">10 buses per hour" that Litman (2016, p. 10) shows as justifying conversion of a traffic lane to an HOV lane under the Australia Capital Territory (ACT) warrants[269]. This may help to explain why the PTUA's calls for the bus lanes to be converted to HOV lanes in a compromise (Bernecich 2011b) did not appear to gain much attention, or influence the debate and outcome. Regardless, the use of HOV lanes as a permanent solution or as an incremental step towards a future exclusive lane may have been a pragmatic strategy (see Section 10.4.3 and 10.5.1).

However, this is mostly hypothetical, given that these are just potential 'might-have-been' possibilities if other options had been attempted and gained legitimacy. The key point that is drawn from the empirical evidence of the *Stud Road bus lane* to support this part of the framework development is kept narrower. It is limited to a finding that measures that have been legitimated through a planning process (which in this case resulted in the *Keeping Melbourne Moving* strategy) can be delegitimated after implementation through public and political opposition. This may involve shifting of the perspectives under which they are assessed, as in this instance where the initial justification that relied on a *strategic objectives* perspective may have countered and defeated by a narrower assessment (made by non-technical specialists) based on a *traffic* perspective and bus lane warrants. The potential for, and instances of, warrants and other such *normative* rules to be used by opponents to delegitimate an existing transit priority (or other transport) measure might provide an opportunity for future research. This issue is also potentially relevant to the issue of whether a lack of legitimacy is due to failed plans rather than a failure of planning itself, which is discussed in Section 11.3.3.

[268] i.e. anticipating that more buses per hour might be added in the short-to-medium term as part of service development, or as per the PTUA's calls (Bernecich 2011b) and support for this from the Royal Automobile Club of Victoria (RACV)(Bernecich 2011c).

[269] Victoria-specific warrants for bus or HOV lanes could not be found. These appear unlikely to exist given that Tudge (2010) relies on warrant values in research literature rather than providing a comparison with a Victoria-specific warrant.

[270] Such as Tudge (2010) and the promise to remove the *bus lanes* in the lead up to the election.



a) Initial implementation: Progression A. **b) Delegitimation: Progressions G, H & I**

Figure 9.6 Two stage process of implementation and then delegitimation

Source: Author's concept.

Figure 9.6a) shows an initial implementation involving Progression A, in which there is *increased legitimacy* followed by *full implementation*. Figure 9.6b) shows three progressions that might arise through later delegitimation:

- Progression G: *(G1) delegitimation of transit priority* followed by *(G2) removal*;
- Progression H: *(H1) delegitimation of transit priority* followed by *(H2) compromise and partial removal*; and
- Progression I: *(I1) delegitimation of transit priority* followed by *(I2) retention and re-legitimisation*.

Progression G occurred for the *Stud Road Bus Lanes*, with the *bus lanes* being delegitimated and then fully removed (in sections where they had replaced existing general traffic lanes). It is notable that in the *Stud Road Bus Lanes* example there was a call for a compromise conversion of the *bus lanes* into *HOV lanes* (Public Transport Users Association 2011), but this does not appear to have progressed further. Figure 9.6 therefore also suggests that Progression G (black arrow) may be the more likely outcome, given that impetus for full removal has already been built up by the delegitimation[271]. In, contrast Progression H or Progression I (grey arrows) would require a major

[271] Extending the topography metaphor further, this impetus for full removal might be equivalent to speed. If a steeply inclined down-slope of delegitimation has already been traversed, then significant speed might have already been built up. This might have few other outlets than to continue down the steepest slope towards full removal. Once at the position indicated by the solid black circle in Figure 9.6 the act of turning back 'uphill' to re-legitimise the existing transit priority measures would appear to be difficult without assistance from an external force.

shift in the prevailing policy direction, and so appears to be unlikely once delegitimation has commenced[272].

Figure 9.7 shows an interpretation of the delegitimation progressions shown in Figure 9.6, but as a topography in the manner of Figure 9.5.

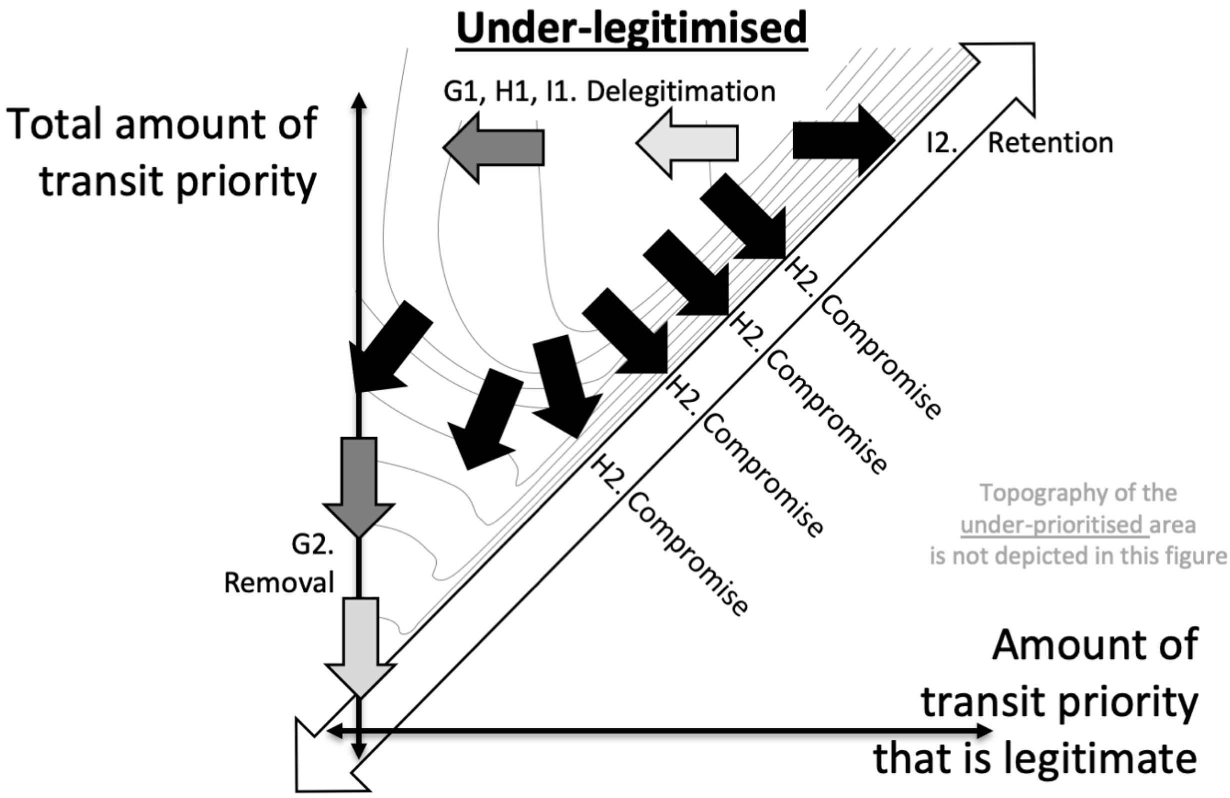


Figure 9.7 Delegitimation as a topography

Note: grey lines show indicative contours, arrow shade denotes incline. Source: Author's concept.

In Figure 9.7 *(G1, H1, I1) delegitimation* is shown as a relatively flat decline from right to left across the top of the graph. In contrast, the pressure to *(H2) compromise and partially remove transit priority* is shown as having a steep gradient towards the diagonal region of stability. Along the y-axis the slope downwards towards *(G2) full removal* is shown as steep, but then flattening toward y=0.

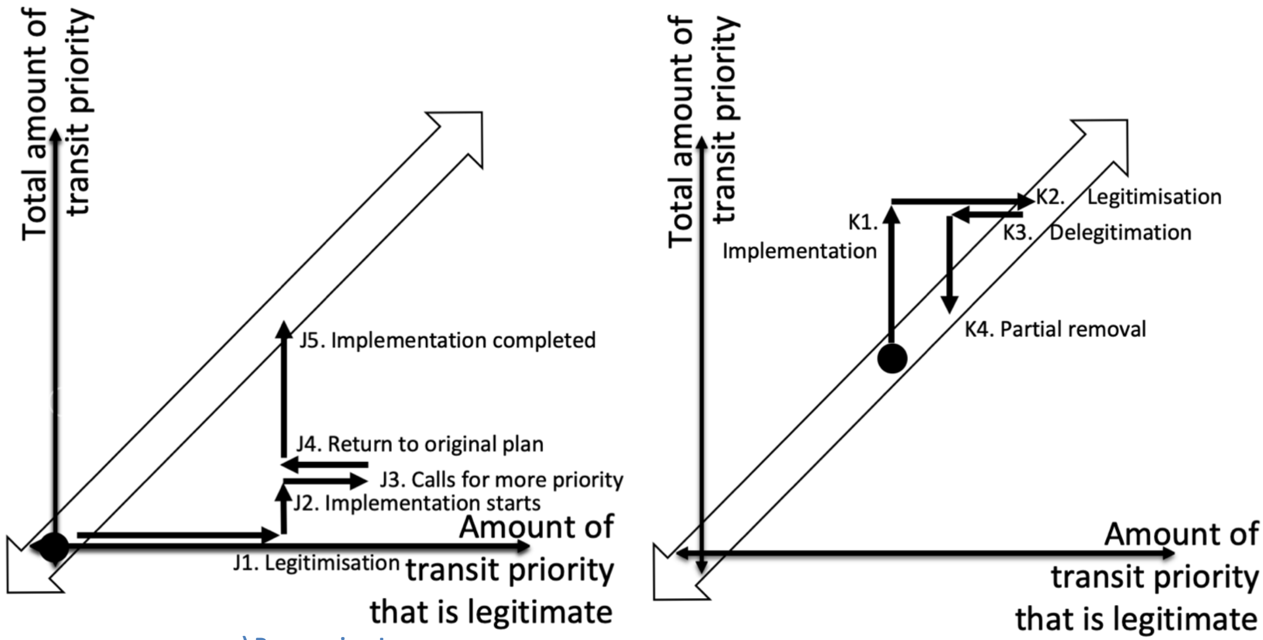
While Figure 9.7 shows a varied topography describing how delegitimation might be more likely to result in full removal than in retention or compromise, it is simply an interpretation. There is likely to be significant variation between cities and between implementations in the topography of legitimacy and priority levels. Local conditions and the strength of opposition to prioritising transit are likely to vary, and not just for instances of delegitimation.

However, this might be starting to stretch the topography metaphor close to its breaking point, or at least beyond the level of confidence that can be achieved from the empirical context contained within the studied cases. As such, the following section (Section 9.2.5) gradually transitions back towards firmer ground and comparatively simpler metaphors, progressions and paths through transit priority and legitimacy.

[272] However, as a counter example, in the *Clarendon Street tram priority pilot* there appears to have been a significant delegitimation through the opposition from public and local business owners. The push for the removal of the scheme appears to have been further supported by the signing of the Clarendon Street Charter by the Mayor. However, the Smith (2005) report appears to have reversed this delegitimation and the push for full removal of the scheme by building a case for removing the *far side stops* only and retaining the rest of the measures.

9.2.5 Various progressions

It appears likely that there are many different possible progressions and topographies depending on local conditions and political context. As an example, Figure 9.8 shows two more possible progressions, which are discussed below.



a) Progression J.

b) Progression K.

Figure 9.8 Two progressions through legitimacy and transit priority

Source: Author's concept.

Figure 9.8a) shows Progression J, which consists of *(J1) legitimisation* followed by *(J2) commencement of implementation*, but then a *(J3) call for more transit priority*, which fails and results in a *(J4) return to the original plan*, which is then *(J5) implemented*. This is largely similar to the progression for the *Eglinton Crosstown LRT* in Toronto[273].

Figure 9.8b) shows Progression K, which involves implementation, legitimisation, delegitimation and partial removal. This progression does not match directly to any of the cases included in this study. Instead, it is included in Figure 9.8 as an example of how the concepts described in this section might be generalised and applied to other instances beyond the cases studied in this research. Both of the progressions shown in Figure 9.8 might be used as the basis for drawing another topography, in the same way that the progression shown in Figure 9.6 was used as the basis for the topography shown in Figure 9.7.

However, the progressions, topographies and other details shown in Figure 9.3 to Figure 9.8 are indicative only. It remains unclear whether there is some globally applicable topography that could describe how legitimacy and transit priority implementation interact in all cases. Unfortunately,

[273] Transit priority implementation was first legitimised through development of the *Transit City* plan. *Transit City* was cancelled, but the implementation of the *Eglinton Crosstown LRT* went ahead. However, Mayor Ford pushed for the entire line to be grade-separated, but this was defeated in City Council and the *Eglinton Crosstown LRT* implementation is now continuing as per the original (*Transit City*) plan.

seeking a unifyng topography may be an unpromising direction for future research, as it has been suggested that "**all politics is local**"[274]. The influences on transit priority implementation are unique to each city, the specific implementation effort and site location. Governance, transportation and institutional systems, the policies and traffic laws, the advocacy coalitions and decision-makers involved, and all the many other factors that directly or indirectly cause outcomes will be different for every transit priority implementation effort. Hence, local context is likely to be too variable and important a factor for there to be one topography that fits all transit priority implementations. This is already demonstrated by the four cases that have been examined in this study.

Curitiba and Zürich took very different routes towards successfully implementing high levels of transit priority. Curitiba's path involved a top-down plan for the city, and implementation by a group of technocrats. In Zürich the path to high levels of on-road transit priority was decidedly anti-establishment, with a citizen-initiated planning direction prevailing over central government reluctance. That these two cities had vastly different routes to success is not at all surprising, given that one has a governance system involving direct public decision-making on citizen-submitted ballot initiatives while the other was at times under a military dictatorship.

Similarly, there are yet more progressions and outcomes evident across Melbourne and Toronto. Despite both Australia and Canada being part of the British Commonwealth and having Westminster-style parliamentary systems, there are large differences between the amount of power over implementation that is invested in local councils versus state/provincial governments[275]. The *Stud Road Bus Lanes*, the *Clarendon Street Tram Priority Pilot*, *Think Tram*, *Transit City* and the *Eglinton Crosstown LRT* provide contrasting examples of the influence of local politics versus more centralised transport planning on transit priority implementation, and how local context can have different impacts on the enactment of transport policy.

This is not to say that there cannot be further development of theory. However, this section has exhausted what can be achieved without a return to more directly to the empirical context of the cases. The following section, therefore, turns back to the cases and implementations, but now armed with the expanded conceptual structure developed in this section.

[274] Often attributed to House Speaker Thomas P. "Tip" O'Neill, Jr. (1912-1994) in 1935, but also earlier in 1932 to Washington bureau chief for Associated Press and columnist Byron Price (1891-1981)(Shapiro 2006, p. 566; Popik 2009).

[275] As discussed in Chapters 5 and 6, power over roads and transit in Melbourne is generally vested in the Victorian State Government, although local government authorities have an important role in the planning system, control over local roads, and is responsible for footpaths and on-street parking. In contrast, the City of Toronto has direct control over the road environment and transit is run by the Toronto Transit Commission (TTC), which is a separate organisation, but part of the City's institutional structure.

9.3 Cross-case comparison

Figure 9.9 shows a cross-case comparison of the implementations in Zürich, Curitiba, Melbourne and Toronto, which is discussed in the following.

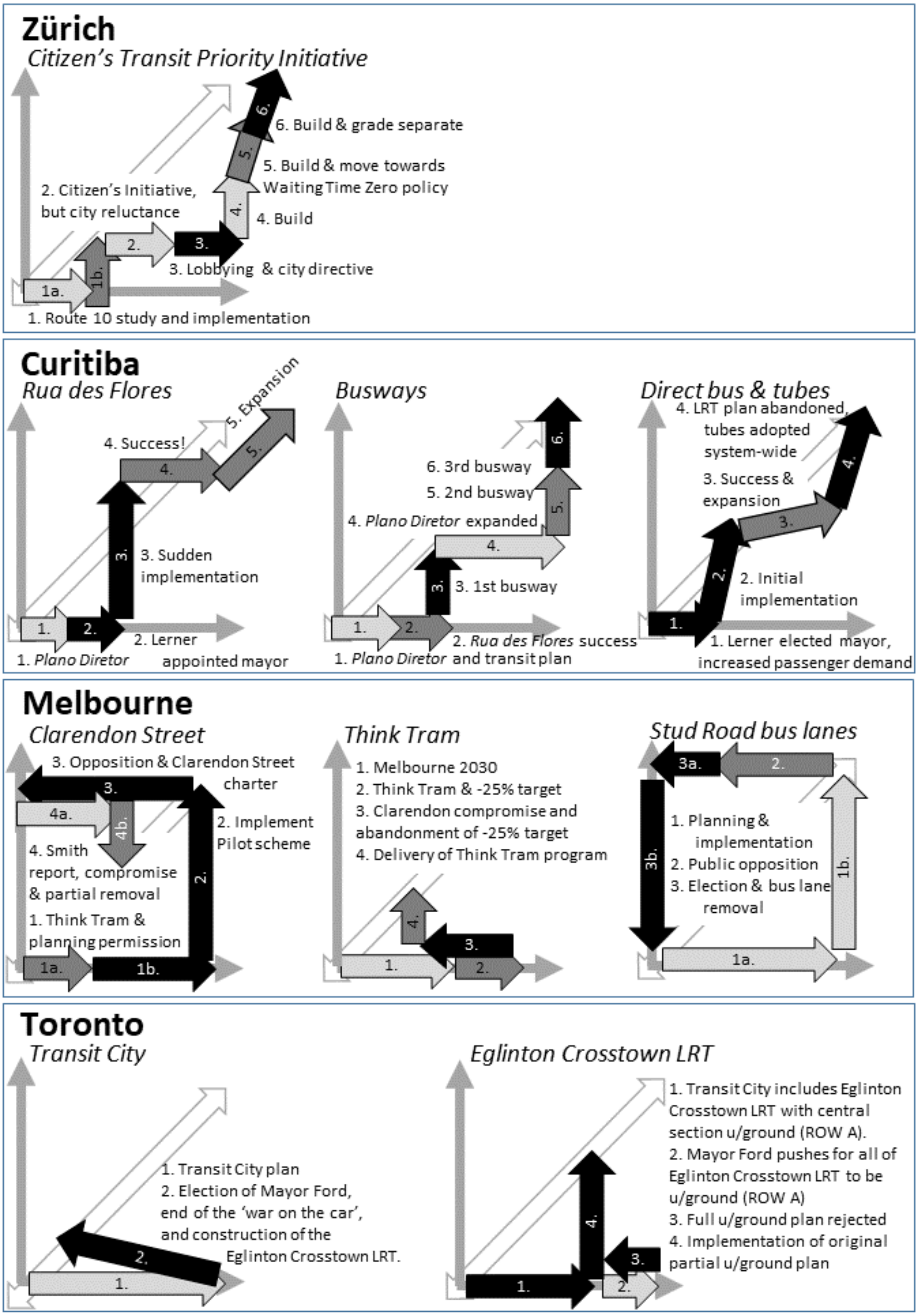


Figure 9.9 Cross-comparison of cases and implementations: Zürich, Curitiba, Melbourne and Toronto

Notes: See footnote 276 on next page. Source: Author's concept.

9.3.1 Under-prioritised

Under-prioritised refers to conditions where there is **legitimacy for more transit priority** than the amount that is provided at a particular point in time[277], and is the case when below the diagonal 'region of stability'. Such *under-prioritisation* is widely apparent across all four of the case study cities. Implementations that have remained entirely *under-prioritised* up until the point that implementation has occurred are:

- all of the transit priority implementation in Zürich[278];
- the implementation of the *busways* in Curitiba[279];
- the overall *Think Tram* program in Melbourne[280];
- *Transit City*[281] and the *Eglinton Crosstown LRT*[282] in Toronto.

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[276] Notes to Figure 9.9:

1. The arrow shading in Figure 9.9 (light grey, dark grey, black) represents an interpretation of the pressure (or 'slope') for change in legitimacy or the amount of priority (low, medium, high). For example, in the case of Zürich there appears to have been on a low amount of impetus for the initial technical planning for the Route 10 study (item 1a., light grey), but once the preliminary study was prepared this provided a medium amount of pressure to implement the Route 10 measures (item 1b., dark grey). Following on, the development and later passing of the *Citizens' Transit Priority Initiative* might have been expected to put a high degree of pressure for an increase in the amount of transit priority that would be legitimate (and so item 2. would be shown in black), but the reluctance of the City to support the initiative and then implement it once passed (due in part to concerns about traffic impacts) provided pressure in the opposite direction (hence downgrading item 2. to be shown in a light grey arrow). Later on, the increasing pressure for the implementation of the *Initiative* as passed to become legitimate (and the reduction in importance of concerns about traffic impacts) resulted in lobbying and the city directive (item 3. black arrow).
   Of course, this is a qualitative assessment and only indicative. It is difficult to compare the amount of pressure for change in legitimacy or the amount of priority across different contexts, and so the assessment is somewhat relative to events within each implementation.
2. Detailed description of Figure 9.9, summarising the item-by-item narratives, are provided in following footnotes.

[277] Refer back to previous discussions in Sections 9.2.1 and 9.2.3.

[278] As shown in Figure 9.9 (top left) transit priority implementation appears to have always been *under-prioritised* in Zürich. The initial technical work supporting the improvement of Route 10 (items 1a. & 1b.) and then the *Citizens' Transit Priority Initiative* provided strong justification and impetus for implementation. However, the city's reluctance to bring the Initiative to a vote and then, after it was passed, to deliver the level of transit priority envisaged in the Initiative slowed the building of legitimacy for extensive change (2.) This was overcome by further lobbying and the city directive (3.) that provided sufficient legitimacy for transit priority implementation (4.). In time this led to the *Waiting Time Zero* policy and further implementation (5.) that has continued through to the present day, when grade-separation is being undertaken on *Rosengatenstrasse* to move traffic underground and so further improve conditions for surface transit services (6.).

[279] As shown in Figure 9.9 (second line from top, centre) transit priority implementation of the *busways* in Curitiba appears to have always been *under-prioritised*. The *Plano Diretor* and the transit plan (item 1.) built initial legitimacy for transit priority implementation. This was reinforced by the appointment of Lerner as Mayor and the success of the *Rua des Flores* implementation (2.), which helped to provide an impetus to implement the first *busway* (3.). The *Plano Diretor* was then expanded to legitimise two more *busways* (4.), which were subsequently implemented (5. & 6.).

[280] Figure 9.9 (third line from top, centre) indicates that the overall *Think Tram* program in Melbourne was always *under-prioritised*. *Think Tram* shows pattern of legitimisation, delegitimation and partial delivery, which is similar to the *Eglinton Crosstown LRT* in Toronto. The *Melbourne 2030* program provided the initial legitimacy (item 1.) to support the planned implementation of tram priority measures. However, the launch of *Think Tram* with an -25% journey time target (2.) appears to have provided added pressure for delivery of a higher level of transit priority. Following the compromise partial removal of the Clarendon Street pilot the -25% target was abandoned (3.) and a more modest program was gradually implemented across the wider network (4.).

[281] For *Transit City* the original planning (Figure 9.9,bottom line, left, item 1.) provided legitimacy for priority implementation. However, this was compromised by the election of Mayor Ford on a platform of ending the war on cars and halting the implementation of LRT, with the exception of the Eglinton Crosstown (2.)

[282] Looking at the *Eglinton Crosstown* implementation in isolation shows that the *Transit City* plan initially provided strong pressure that legitimised the part-at-grade and part-underground LRT plan (Figure 9.9,bottom line, right, item 1.). Surprisingly, the election of Mayor Ford actually resulted in legitimacy for **increasing** the amount of transit priority (2.), as there was **pressure to move the *Eglinton Crosstown* line entirely underground** to reduce its impact on traffic. However, this plan was rejected (3.) and the line is currently under construction, as per the original plan with only the central part grade-separated (4.).

The general pattern across all of the cases is that:

Proposition 3

Transit priority implementation tends to be preceeded by techno-rationally-driven legitimacy building, typically in the form of transport plans or project proposals.

However, the examples of *Think Tram*, the *Eglinton Crosstown LRT* and *Transit City* highlight that:

Proposition 4

Being under-prioritised *does not necessarily mean that there is sufficient support for the implementation and long-term retention of the high levels of transit prioritisation the might be called for in techno-rationally driven plans or proposals.*

This is demonstrated in the way that there was sufficient legitimacy to support the originally planned *Eglinton Crosstown LRT*, but not enough to sustain the rest of the *Transit City* plan. Further examples of there being insufficient legitimacy to sustain the planned high levels of transit priority are provided by the implementations from Melbourne. However, in both the *Clarendon Street Tram Priority Pilot* and the *Stud Road Bus Lanes* implementations the reduction in legitimacy occurred post-implementation, and involved a shift into the region of being *under-legitimised*.

9.3.2 Under-legitimised

Under-legitimisation is defined as when there is more transit priority than the amount that is legitimate at a point in time[283]. Short periods of *under-legitimisation* are shown in Figure 9.9 for:

- the sudden implementation of the *Rua des Flores* pedestrian mall in Curitiba[284]; and
- the initial implementation of the *direct bus services* and *boarding tubes* in Curitiba[285];

These two examples from Curitiba suggest that:

Proposition 5

Under-legitimisation *caused by* pop-ups *or* trials *may provide a pathway to successful legitimisation and retention of transit priority measures. This may,*

[283] *Under-legitimisation* was discussed in Section 9.3.2. It suggests that transit priority which has already been implemented is not (or no longer) fully supported. This may have occurred through **overreach**, being implementation beyond what had legitimacy in the broader *public and/or political policy arenas* (Section 9.2.2), **or through delegitimation** (as discussed in Section 9.2.4).

[284] The implementation of the *Rua des Flores* pedestrian mall (Figure 9.9, second line from top, left) was supported by the *Plano Diretor* (1.) and the appointment for Lerner as mayor (2.). However, by implementing the mall suddenly, in secret and without public involvement (3.) Lerner appears to have gone beyond what legitimacy there was in the hope that “if they had a chance to actually see it, everyone would love it” (McKibben 2007, p. 65). As discussed in Chapter 8, this approach to implementation was not without its problems, as there were threats of legal proceedings and opposition from shopkeepers that led to Lerner offering a 30-day trial period, and an attempted direct-action protest by motorists. However, Lerner’s initial optimism was shown to be correct through the subsequent success of the pedestrian mall (4.) and its later expansion (5.). Refer back to the discussion of the *Rua des Flores* mall implementation in Chapter 8, Section 8.3.

[285] The *direct bus services and boarding tubes* (Figure 9.9, second line from top, right) appears to have similarly had a short excursion into being *under-legitimised* followed by a return to being *under-prioritised*. Following Lerner’s election as mayor and problems of increasing passenger demands on the *busways* (Figure 9.9 2nd line, right, item 1.) the initial implementation of the boarding tubes on the south-east axis appears to have been supported by little except Lerner’s suggestion of the idea, some preliminary designs, and the agreement of the head of the transport agency (URBS). However, the success of this concept led to expansion to the east-west axes (3.), and then the later abandonment of the LRT that was planned for the north-south axes in favour of expanding the boarding tubes to the entire network (4.).

however, require that the under-legitimisation *be generally limited to only a small amount of change from the status quo, so that that conditions stay close to the region of stability.*

In contrast, in Melbourne there are two examples of *under-legitimisation* due to delegitimation, which led to either partial or full removal of transit priority measures. These are:

- the opposition to the *Clarendon Street Tram Priority Pilot*[286]; and
- the opposition to the *Stud Road bus lanes*[287].

Both of these examples involved the *under-legitimisation* being caused through delegitimation of transit priority measures that had already been implemented[288], rather than through implementation that may have pushed beyond the boundaries of what was immediately legitimate[289]. For both the *Clarendon Street Tram Priority Pilot* and the *Stud Road bus lanes* it appears that once an existing measure had faced substantial public and political opposition and been delegitimated, there was little chance of re-legitimisation and full retention[290].

The implementations discussed in this section suggest that:

Proposition 6

Where under-legitimisation *is caused by the delegitimation of an installed measure there may be a tendancy towards partial or full removal.*

Other examples provide some addition support for this Proposition, including:

- the removal of *transit lanes* in Brisbane in both 2012 and 2013 (Feeney 2013); and
- the removal of *bus lanes* in Atlanta, Boston, Chicago and New Jersey (USA), and Bergen (Norway); and the downgrading of bus priority in other cities (Vuchic et al. 1994, pp. 25, 9).

[286] In the *Clarendon Street tram priority pilot* it was the commencement of the *Think Tram* program and the granting of planning permission for the pilot (Figure 9.9, 3rd line from top, left, items 1a. & 1b.) that provided the initial legitimacy for implementation (2.). However, the public opposition and the signing of the Clarendon Street Charter agreement between local shopkeepers and the mayor (3.) delegitimated the pilot scheme. The Smith (2005) report recommendations to remove the priority measures that impacted parking, but retain the *subservient* measures (4a.) provided the legitimacy necessary to support the partial, rather than full, removal of the scheme (4b.).

[287] The *Stud Road bus lanes* were similarly legitimised and implemented through typical processes of planning, approvals and delivery (Figure 9.9, 3rd line from top, right, items 1a. & 1b.). Just as in Clarendon Street, the *Stud Road bus lanes* faced public opposition (2.), but in this instance there was no technical report leading to a partial compromise. Instead, the promises prior to the election by the then-opposition, and their election victory fully delegitimated the *bus lanes* (3a.) and led to their complete removal (3b.).

[288] As per the illustration of 1. delegitimation shown in Figure 9.6.

[289] This refers to the manner in which the *Rua des Flores* pedestrian mall was implemented over a weekend when the law courts were closed, and the way that the *direct bus services and boarding tubes* were implemented through what appear to be bottom-up processes and agreement between Lerner and Carlos Ceneviva (the head of URBS) and then incrementally introduced across the network rather than as part of a top-down implementation plan. This contrasts to the processes in the examples from Melbourne and Toronto, where the introduction of transit priority appears to have always been legitimised before implementation through planning approvals or similar processes. This is perhaps not surprising, given the history of Curitiba as having a technocratic approach to public decision-making, both during the period of military dictatorship at the national level and after the return of democratic elections, (see Irazábal (2005) and Chapter 8)..

[290] For Stud Road even a compromise proposal to convert the *bus lanes* to *HOV lanes* did not appear to garner much support.

While these examples have not been examined in detail in this study, they all suggest that the delegitimation of otherwise (techno-rationally) appropriate transit priority measures may be a significant challenge, particularly in *car-centric cities*. The next section therefore discusses how transit priority implementation in *car-centric cities* (like Melbourne and Toronto) might differ from implementation in *transit-centric cities* (like Zürich and Curitiba).

9.3.3 Car- versus transit-centric cities[291], and mode share

In general, the cross-case comparison shown in Figure 9.9 shows an overall pattern of:

- legitimacy building and implementation success in the *transit-centric cities* of Zürich and Curitiba; versus
- delegitimation through public and political opposition, and a mix of partial success and failure in the *car-centric cities* of Melbourne and Toronto.

A key difference between Zürich and Curitiba, and Melbourne and Toronto is transit mode share. Zürich and Curitiba have transit mode shares around 75% for the journey to work and 40-45% for all trips (Nash et al. 2018, p. 8)[292]. In contrast, Melbourne has a journey-to-work transit mode split of 12% (Australian Bureau of Statistics 2017), while in Toronto it is 23% (Statistics Canada 2011).

> *Is it possible that transit mode share is a key factor that may help to explain the different transit priority implementation outcomes in car- and transit-centric cities?*

This may represent a circular argument, or even a self-fulfilling prophecy. Transit mode share and ridership is rather obviously a major difference between *car-* and *transit-centric cities*. However, the key point made here is that the **importance of on-road transit in *transit-centric cities* may help to explain why transit priority is more likely to maintain legitimacy** in *transit-centric cities* than in *car-centric cities*. Transit priority implementation in Zürich and Curitiba was clearly supported by the *reasonableness* of prioritising on-road transit[293] and high levels of *public consent*[294]. In contrast, in

[291] Refer back to Section 1.1 (footnote 1) for discussion of how *car-* and *transit-centric cities* are used in this thesis to describe generic categories, and that in reality all cities are unique and exist on a spectrum of car-or-transit-centric-ness. Hence, there is no arbitrary cut-off at which a city switches from being one or another, just that Melbourne and Toronto appear to be towards the *car-centric* end of the spectrum, whereas Curitiba and Zürich are towards the *transit-centric* end.

[292] There are various reports for the Curitiba journey to work transit mode split including: 70% (Longini 2001; Levinson, Zimmerman, et al. 2003b, 2003a; Goodman et al. 2005) and 75% (Rabinovitch & Leitmann 1993, p. 18; Worcam 1993; Rabinovitch & Hoehn 1995, p. x; Major 1997; Cervero 1998, p. 267; Smith & Hensher 1998, p. 143; Nieri 2000, p. 173; Wright 2001, p. 124). However, as discussed in Chapter 8, sources are unclear and these figures match the mode share reported for 1965 (Mees 2010, p. 118), suggesting that the 1965 value may have just continued to be used. Similarly the transit mode split for all trips is variously reported as: 45% of motorized trips (Cervero & Dai 2014, p. 130) or all trips (Fox 2008; Martinez et al. 2016).

[293] Zürich and Curitiba do not have underground heavy rail (metro) systems, unlike many other *transit-centric cities* (e.g. London, Paris, New York etc.). Nor was there appetite for the high costs involved in constructing underground transit systems in either Zürich and Curitiba (perhaps especially Zürich, where this option was explicitly rejected by the voters on the ballot questions relating to the *Tiefbahn* and *U-Bahn / S-Bahn* plans). Hence, prioritising on-road transit appears to have been particularly reasonable in both Zürich and Curitiba, as there was no other way to improve transit services except increasing priority levels for on-road transit.

[294] *Public consent* was obviously demonstrated in Zürich through the Initiative ballot result. However, it appears to have assisted implementation in Curitiba through the involvement of some of the public (although mostly just elites) in the initial hearings surrounding the development and adoption of the *Plano Diretor*, through the acceptance and success of the *Rua des Flores*, and through the later endorsement of Lerner through his direct election following the return to democracy. Refer back to the discussion in Chapter 9, Table 9.3, about case study question A21 for detailed comparison of *public consent* in Zürich and Curitiba.

car-centric cities transit priority implementation that impacts on other traffic is unlikely to be as politically *reasonable*, regardless of its technical merits, because more of the voting public are regular drivers. Legitimacy for transit priority implementation through *public consent* in a *car-centric city* would appear to be almost impossible to obtain as most voters will not be frequent transit users and so will likely be worse off if transit priority is implemented[295].

This discussion returns, to an extent, to the *conceptual model for the 'state of the art' in transit priority policy* (Currie 2016a), which was discussed in Chapter 2[296], but is shown again here in Figure 9.10.

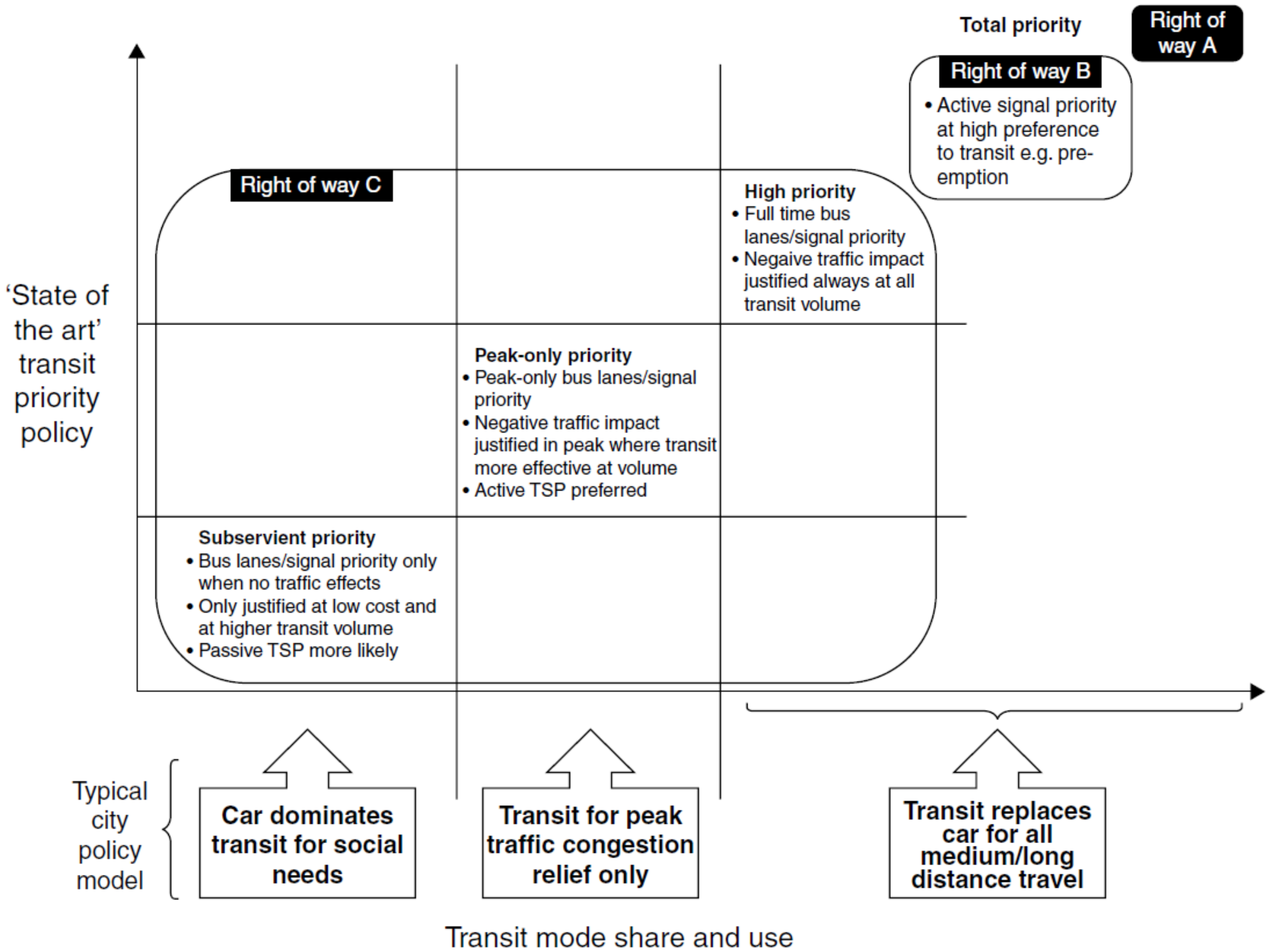

Figure 9.10 Conceptual model for the 'state of the art' in on-road public transport priority design.

Source: Currie (2016a).

Speaking more broadly, it is perhaps not surprising that there appear to have been higher levels of *public consent* for prioritising on-road transit in Zürich and Curitiba than in Melbourne and Toronto. In a city where there is a greater proportion of transit riders amongst the community, it appears likely that there is likely to be greater *public consent* for transit prioritisation. Again, this might perhaps be a bit of a self-fulfilling prophecy, but it appears worth pointing out that *public consent* for transit priority implementation will be easier to obtain in a city where more people ride transit.

[295] There may be second-order benefits of transit priority to drivers in a *car-centric city*. For example, the introduction of priority measures might encourage some existing drivers to switch to transit, which might be enough to reduce traffic demands sufficiently for conditions to improve for the remaining drivers who then get a faster trip. However, this appears to be unlikely to be a certain outcome of introducing transit priority, or something that might lead many current drivers to support priority implementation.

[296] See discussion in Chapter 2, Section 2.3.3. The Currie (2016a) conceptual model of the 'state of the art' in transit priority policy provides a guide to the appropriate level of transit priority in *car-centric cities* where transit provides only for social purposes (*subservient priority* only) or for peak-only congestion relief (*peak-only priority*), and in *transit-centric cities* where transit is a replacement for the car for trips beyond walking or cycling distance (*high* or *total priority*).

The model from Currie (2016a) is a normative model of what transit priority policy should be in different types of cities, but is also highly conceptual. In practice the 'typical city policy model' is unlikely to be consistent across an entire city, and there might be significant variation across different areas (e.g. inner city versus outer suburbs) or between different corridors (e.g. commuter-focused express bus services along a freeway corridor, compared to social transit services providing local connections across nearby suburbs).

The cases examined in this study show evidence of such variation within a single city[297]. However, the consistent pattern across the **implementations** examined in Melbourne and Toronto is that attempts to introduce transit priority that significantly impact on other traffic have led to efforts to scale the implementation back so that it is *subservient* to general traffic. In contrast, in more *transit-centric*[298] Zürich and Curitiba there has been the successful implementation of *high* or *total priority* that does impact on other road uses.

This lends empirical support to the 'state of the art' model being illustrative of the limits of what can actually be achieved in different (generic) types of cities. Figure 9.11, therefore, illustrates one of these limits that appears to apply to *car-centric cities*, namely the limit related to *subservience*.

[297] For example, in Melbourne there appears to be much difference between tram prioritisation in the CBD (ROW B.3 kerb separation or C.3 mountable-kerb separation is common) compared to the inner suburbs (ROW C.11 mixed traffic is common due to limited road reserve widths, although ROW B.1 is often provided along major arterials where trams operate in a wide median) and the middle suburbs (where ROW B.1 is perhaps more common due to wider road reserves, for example recent tram extensions along arterials). Likewise, there is a clear distinction between the commuter-focused bus services running along the Eastern Freeway's shoulder (ROW C.5) , compared to other high-priority corridors along arterials (e.g. the rest of the *SmartBus* routes that often have ROW C.4, exclusive, or C.7, peak-period, bus lanes) and the local bus routes in the middle to outer bus routes (typically ROW C.11 mixed traffic).

There also appears to be some contrast between the two implementations studied in Melbourne, given that the *Clarendon Street tram priority pilot* was in an inner suburb while the *Stud Road bus lanes* were along a cross-town corridor in the middle suburbs. The compromise in Clarendon Street resulted in ROW C.10 conditions, where trams receive a form of *subservient priority* through turn restrictions and *hook turns*. In contrast, the original plan for Stud Road was to provide ROW C.4 full-time exclusive bus lane conditions, but through a road widening so that was minimal impacts on traffic (and so was perhaps a form of *subservient priority*). The way that the bus lanes tend to stop short of intersections, so that there was little to no impact on the extra traffic capacity provided by auxiliary turning lanes, also suggests a *subservient priority* approach. A difference between Clarendon Street and Stud Road, therefore, that appears to relate to their inner versus middle suburban contexts is that the end result for some sections of Stud Road was *no priority* at all.

Toronto may provide a more illustrative example, with contrast between the eventual success of transit prioritisation in mid-town areas, but the cancellation of the LRT lines further into the suburbs envisaged in the *Transit City LRT Plan*. The implementation of ROW B.3 kerb-separated transit lanes on St Clair Avenue was ultimately successful, although controversial and challenged in the "Battle of St Clair" (Bow 2016). Likewise, the Eglinton Crosstown LRT, which also passes through the mid-town area and is only a few kilometres further from the central parts of the city than St Clair, is also going ahead in its original part-underground (to avoid traffic impacts in sections with narrow road reserves) and part-at-grade (where traffic impacts might be less severe because there is more space available in the cross-section) form. However, the rest of the LRT lines proposed in *Transit City*, which would have been well into the suburbs and provided *high priority* for transit with major impacts on traffic, were the ones that were cancelled. Again, there is a need to be cautious about drawing conclusions, given the influence of the contexts specific to each of these implementations, but there appears to be a tendance for higher levels of priority to ultimately be legitimised in more central, and (generally speaking) less car-centric, parts of the city.

[298] Again, as part of the generalisation involved in developing a framework here in this chapter cities are grouped dichotomously. See also footnote 1 and discussion further below in Section 9.4.4 of the how the framework illustrates generic *car-* and *transit-centric* city types, but with the acknowledgement that all cities (and places within a city) are in reality on a spectrum of car-versus-transit-centric-ness. In particular, it appears important in the context of this section's definition of 'limits in a car-centric city' to acknowledge that limits are unlikely to be exactly the same across an entire city. There may be a need in practice to consider different parts of a city (e.g. suburbs versus inner city), transit corridors, and other possible division at a disaggregate level. As per the 'state of the art' model (see Chapter 2) "in practice all cities probably exhibit aspects of policy of each of the types…in separate parts of the city" (Currie 2016a, p. 492).

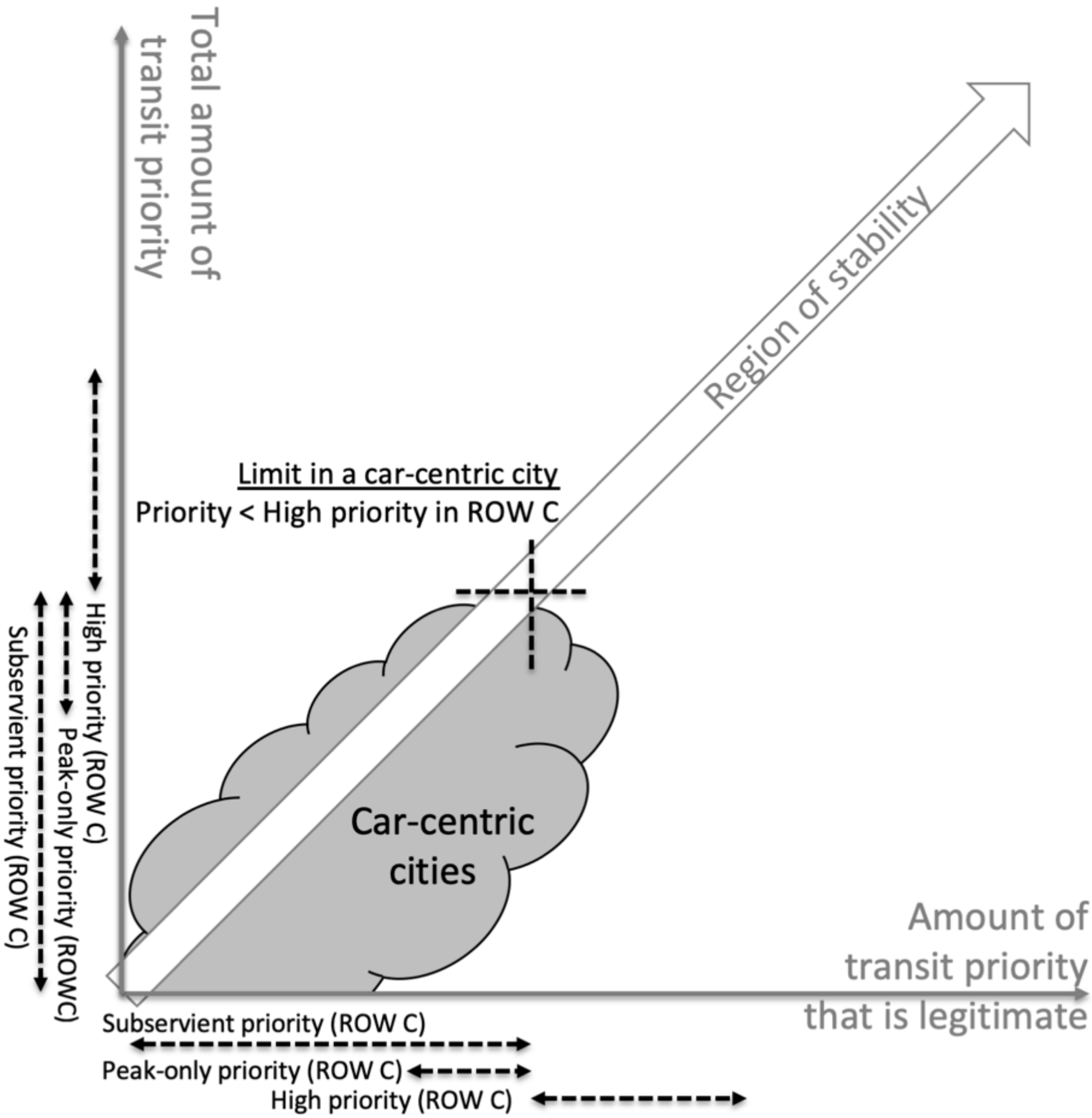

Figure 9.11 Conceptual diagram of legitimacy limits for *car-centric cities*
Source: Author's concept, building in part on the normative model of the 'state of the art' from Currie (2016a)

Figure 9.11 suggests that *car-centric cities* are limited to having less than *high priority*[299] for on-road transit operating in ROW C. *Subservient priority* or *peak-only priority* may be possible in a *car-centric city*, as impacts on other traffic are either minimal or can be shown to be a *reasonable* way of providing mobility during periods of heavy congestion. However, *high priority* in ROW C is shown in

[299] Figure 9.11 and subsequent figures in this chapter adopt the definitions of *subservient*, *peak-only*, *high*, and *total priority* used in Currie (2016a). *Subservient priority* implies the use of transit priority measures that have limited impacts on other vehicles, such as using High Occupancy Vehicle lanes instead of *exclusive bus lanes*, or having *TSP* systems that do not significantly increase delays for other road users. *Peak-only priority* implies transit priority measures that only operate when traffic congestion is high in the peak morning and afternoon periods. *High and total priority* includes measures that might negatively impact on other road users, such as through re-allocating road space from general traffic to exclusive transit use at all times. *Total priority* might involve *longitudinal-separation* with transit operating in ROW B, or a *full-exclusive* right-of-way with transit operating in ROW A conditions with either *full grade-separation* (ROW A.1) or with *railway-style at-grade crossings* with full priority for transit (ROW A.2).

Figure 9.11 as being beyond the limit of what might be achievable[300]. There is, however, another possibility, which has emerged from the cases studies, though which transit can be prioritised in *car-centric cities*. This is to shift to **fully grade-separate on-road transit**, so as to remove impacts on other traffic entirely. Figure 9.12 shows this graphically.

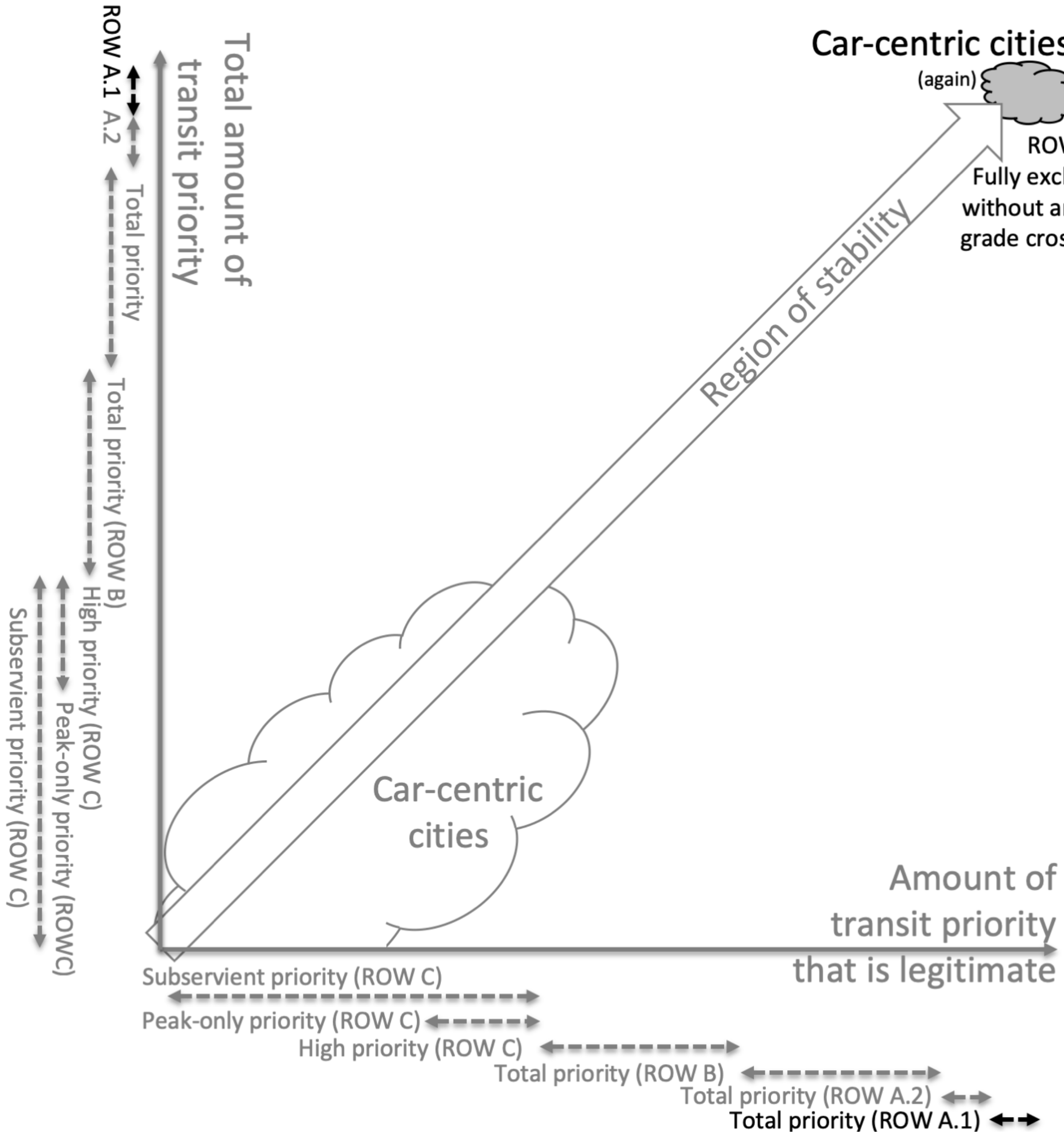

Figure 9.12 Conceptual diagram of legitimacy limits for *car-centric cities*, including grade-separation
Source: Author's concept, building in part on the normative model of the 'state of the art' from Currie (2016a)

Figure 9.12 shows how there is another region that is possible in *car-centric cities*, being the region where there is legitimacy for *total priority in ROW A.1*. Evidence for this is provided by the

[300] As with all of these conceptual diagrams and models, Figure 9.11 seeks to demonstrate general trends, rather than precisely delineate all conditions that might occur in a *car-centric city*. Conditions are likely to vary considerably across any city, and the politics and legitimacy surrounding each implementation will be unique. However, the 'state of the art' of transit priority model (Currie 2016a) and the experiences in Melbourne and Toronto both suggest that gaining legitimacy for much more than *subservient* or *peak-only priority* is politically challenging, and difficult to be achieved in practice in a *car-centric city*, particularly outside inner and more transit focused areas of a city.

experiences in Toronto[301] and Zürich[302], where there was pressure to grade-separate on-road transit so as to avoid impacting other traffic.

However, *total priority in ROW B* (longitudinal-separation) or *in ROW A.2* (*fully exclusive* but with *at-grade crossings*) may be, like *high priority in ROW C*, outside the limits of what might be achievable in a *car-centric city*. *Total priority in ROW B* or *in ROW A.2* and *high priority in ROW C* will likely have negative impacts on other traffic, unlike *total priority in ROW A.1* which avoids significant impacts on other traffic by grade-separation.

This might therefore suggest that there is a legitimacy gap in *car-centric cities*. There may be enough legitimacy to support *subservient priority*, and also *peak-only priority* where it can be justified on the ground of providing mobility at peak times. However, in a *car-centric city* it is likely to be difficult to generate and maintain sufficient legitimacy to support *high* or *total priority in ROW B* or *in ROW A.2* because of the negative impacts on traffic and (voting) drivers. The legitimacy gap in *car-centric cities* arises because *total priority in ROW A.1* will tend to make conditions better for motorists, and so is more likely to be supported than other forms of *total priority* if the high costs can be (politically) justified.

Transit-centric cities, in comparison, appear likely to have more appetite for negative impacts on traffic. Figure 9.13 shows an interpretation of the limits of legitimacy for *transit-centric cities* based on the above thinking.

[301] A push for the grade-separation of transit is particularly evident in the *car-centric city* of Toronto. Political pressure to move more of the Eglington Crosstown LRT underground and, more generally, to move to grade separating transit and subway construction was based primarily 'ending the war on cars'. Hence, it is not the idea of providing high-speed and highly reliable transit services that was opposed by Mayor Ford. It was doing this in a manner that would worsen conditions for drivers.

[302] Similar pressure for grade-separation may also have been a factor back in the early periods in Zürich, when the undergrounding of streetcars (the 1962 *Tiefbahn Plan*) and the 1973 *U-Bahn / S-Bahn* proposals were put to a public vote. Despite having a long history of high transit usage and quality of services, transportation policy directions in Zürich prior to the *Citizens' Transit Priority Initiative* appear to have been generally car-centric, in that: "the goals of the *Tiefbahn Plan* were to speed up the streetcars and free space on the surface for private vehicle traffic" (Nash 2001, p. 52).

Similarly, the focus of *U-Bahn / S-Bahn plan* was on improving conditions for regional transport and to improve road conditions for traffic. The realignment of the existing streetcar and bus network to connect to the U-Bahn / S-Bahn system would have increased transit travel times for trips within the city, which does not appear to be a particularly transit-centric outcome at the local level. In general, the planning in Zürich through the 1960s and early 1970s appears to have been led by the same freeway and automobile-centric narratives, with a primary purpose of underground transit plans to be to increase available road capacity through separating traffic from transit, and also providing for peak-only travel. See Chapter 7 and also Nash (2001, pp. 51-8).

In general, transport policy planning in Zürich in the 1960s and 1970s, prior to the passing of the *Citizens' Transit Priority Initiative*, appears to have been focused on transit as an alternative to the car during the peak-only, to reduce traffic congestion and for local trips. This suggests that transport policy was, like in much of the world at that time and despite the high transit ridership in Zürich, dominated by car-centric narratives. A gradual shift towards more transit-centric policies appears to have only started after the defeat of the *U-Bahn / S-Bahn plan* and the passing of the Initiative.

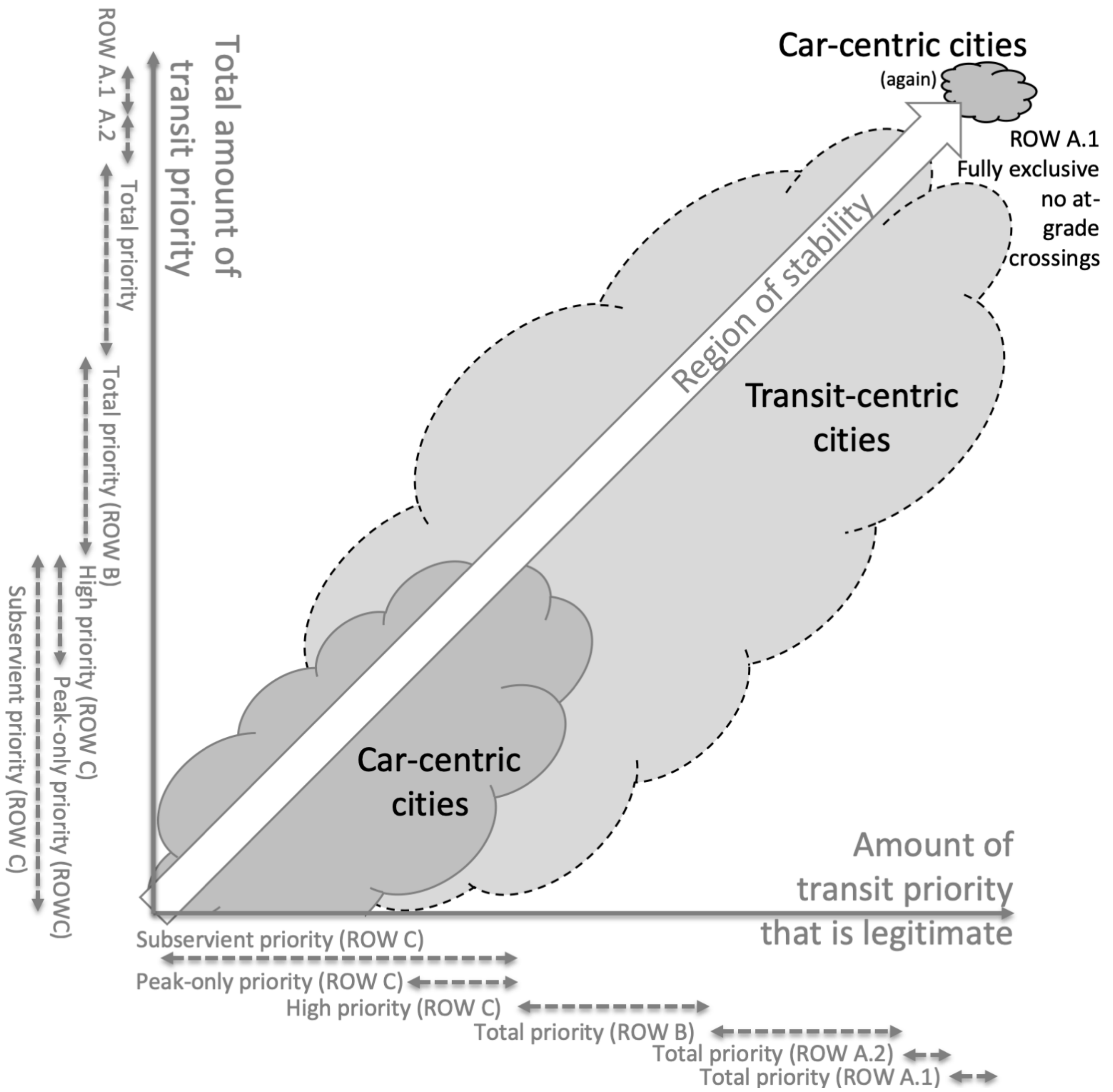

Figure 9.13 Conceptual diagram of legitimacy limits for *car-centric* and *transit-centric cities*
Source: Author's concept, building in part on the normative model of the 'state of the art' from Currie (2016a)

Figure 9.13 posits that *transit-centric cities* have sufficient legitimacy to support all levels of transit priority implementation, albeit that legitimacy may need to be built locally based on the context and conditions of specific projects and programs[303]. This, therefore, starts to provide an understanding of why transit priority has been successful in some cities, but not as successful in others. It is this difference in what might be legitimate that provides a basis for the new *conceptual framework for transit priority and legitimacy*, which is discussed further in the next section.

[303] However, the high costs of *total priority in ROW A* may limit its acceptability in a *transit-centric city*, as demonstrated by the rejection of grade-separation in Zürich and the rejection of heavy rail (metro) in Curitiba (see discussion of mode choice in Curitiba in Chapter 8, Section 8.4, and also in Ardila-Gomez (2004, pp. 82-8,98)). There may be less opposition to having *total priority in ROW B* in a *transit-centric city*, because of there being fewer drivers and so a lower proportion of voters who are negatively impacted. Therefore, it might prove more difficult to justify the large expense of moving transit from *longitudinal*- (ROW B) to *grade-separated* (ROW A.1) conditions.

9.4 A framework for transit priority and legitimacy

This section turns back towards generalisation by presenting a new *conceptual framework for transit priority and* legitimacy. It builds on the findings from the cross-case comparison in the previous section, which found that:

- there are legitimacy limits that tend to restrict transit priority implementation efforts in *car-centric cities*; and
- the first step in transit priority implementation tends to be the building of techno-rational legitimacy.

This second finding is not surprising. The engineers and others involved in road space management and intersection time allocation tend towards techno-rational approaches towards evaluation and decision-making, as discussed in Chapter 2. Hence, it is unlikely that transit priority implementation would be proposed by them unless it has a benefit-cost ratio greater than one, improves overall mobility or accessibility, or otherwise performs well from a technical evaluation perspective[304]. An important question therefore for understanding transit priority and legitimacy is:

> *What happens **after** the initial techno-rational legitimacy for priority implementation has been developed?*

This section considers this question by exploring the various progressions that might develop in *car-* and *transit-centric cities* once an increase in transit priority has been found to be technically justified[305]. The initial legitimacy-building for transit priority implementation might be followed by:

- *uncontested implementation*, which is discussed in Section 9.4.1;
- *pressure for grade-separation*, which is discussed in Section 9.4.2; or
- *delegitimation and/or inaction*, which is discussed in Section 9.4.3.

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[304] Transit priority implementation that is initiated by an outside group, external to the road and transit authorities or government, appears to be relatively infrequent. Only in Zürich has implementation been found to be primarily due to an outside initiative, whereas most other implementations have involved inside access to decision makers or the mobilization of support to put it onto the public policy agenda (Pulichino & Coughlin 2005, pp. 81-3). Even in the case of Zürich, however, the group that initiated the *Citizens' Transit Priority Initiative* included transportation experts and students who likely used technical evidence to help to build public support, but who happened to be outside of the governmental institutions.

[305] There is no standard definition of what makes a transit priority measure technically justified, as conditions and institutional requirements vary from city to city. Chapter 2 discussed transit priority evaluation in Section 2.3, including the various traffic, mobility, accessibility, safety, strategic planning and other perspectives on technical evaluation. However, the thresholds for acceptance will vary between cities, and between projects based on priorities and which evaluation perspectives are of particular importance in each local jurisdiction.

There are, however, some lower thresholds that are likely to apply across all cities and below which a transit priority implementation would fail to be technically justified. For example, if the costs of an implementation are greater than the benefits (i.e. BCR < 1) it will fail to be justified from an economic evaluation perspective. Likewise, a measure that decreases social equity, worsens environmental performance, or reduces mobility or accessibility will fail to be technically justified from each of those perspectives. Vuchic (2007, p. 245) provides the example of "the most conservative warrant" for *bus lanes* as being when there are more people in the buses than per lane in the cars in the adjacent lanes.

However, whether a proposal is technically justified from a strategic planning perspective will depend on what is in the city's transport planning documents as far as strategic objectives. Likewise, economic evaluation using BCRs might make transit priority implementation technically justified if it is the best performing option, but the opposite if there is some other option that has a higher BCR and is affordable. But, regardless of what might be the technical evaluation criteria in any particularly jurisdiction, the general finding from the cross-case comparison is that there was legitimacy for transit prioritisation amongst the engineering or planning specialists as a first step, prior to implementation or introduction of the proposal to the broader *public and political policy arenas*.

9.4.1 Uncontested implementation

The term *uncontested implementation* is used here to refer to situations where the building of technical legitimacy for transit priority is followed, uninterrupted, by the implementation of these technically justified measures. Figure 9.14 shows how *uncontested implementation* might lead to **success** though Progression L in *car-centric cities* or Progression M in *transit-centric cities*.

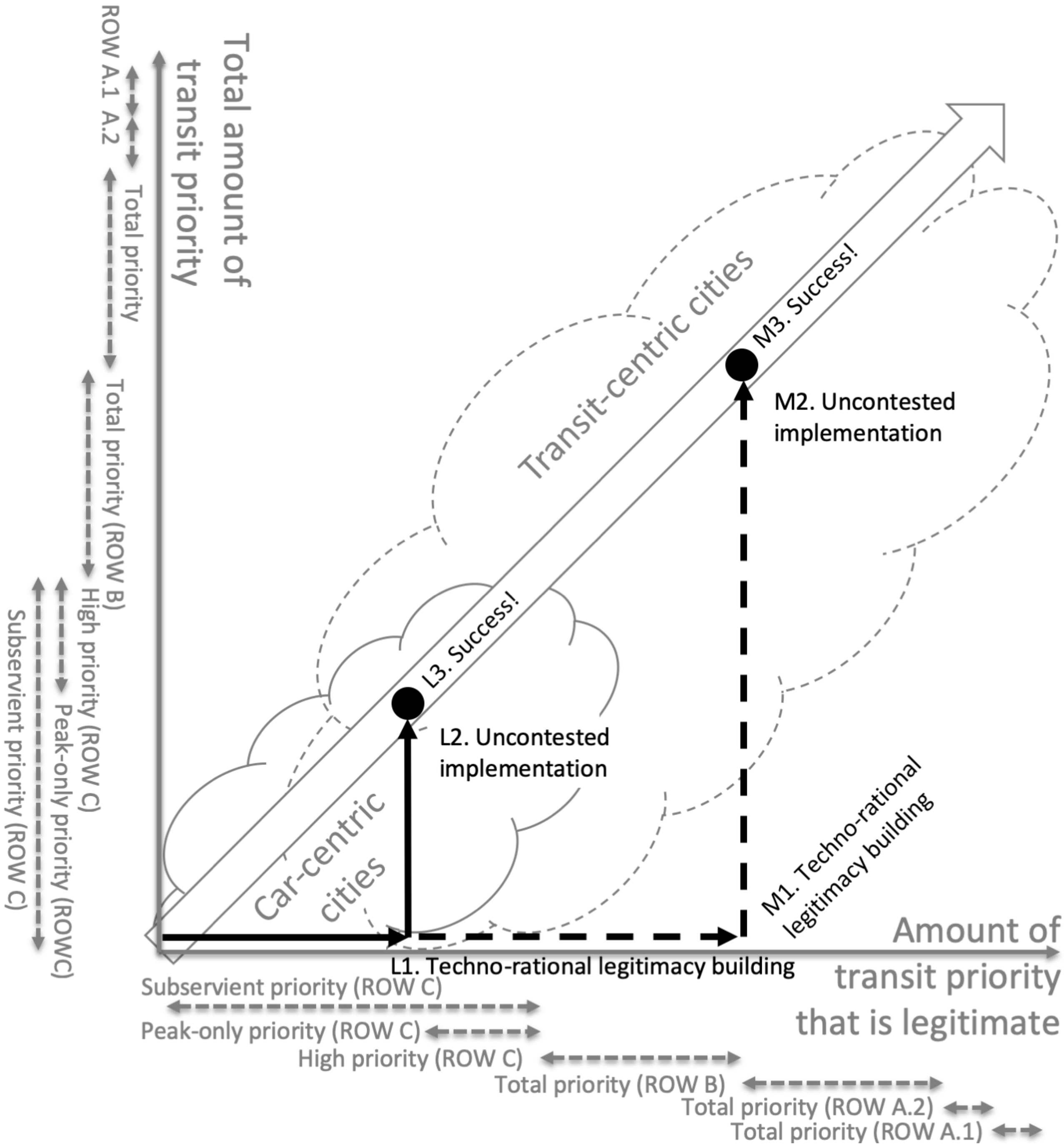

Figure 9.14 ***Progression L: uncontested success (in a car-centric city)*(solid lines), and *Progression M: uncontested success (in a transit-centric city)*(dashed lines)**

Source: Author's concept

Figure 9.14 shows *(L1, M1) techno-rational legitimacy building* for priority implementation being followed by *(L2, M2) uncontested implementation* and *(L3, M3) success*. The difference between

Progression L and Progression M, however, is just the amount of transit priority that it might be possible to implement successfully in a *car-centric* or *transit-centric city*.

Attempting to implement only modest amounts of technically justified transit priority that do not have unreasonable impacts on motorists would appear likely to be unopposed and therefore lead to success in *car-centric cities*. Figure 9.14 shows this as Progression L, which suggests that in *car-centric cities* uncontested and successful implementation is only likely for *subservient priority* measures or *peak-only priority*[306]. In *transit-centric cities* it may be possible to have *uncontested implementation a*nd then success when implementing higher levels of transit priority, including the implementation of measures that negatively impact other traffic. Figure 9.14 shows this as Progression M, which results in either *high priority* (in ROW C) or *total priority in ROW B*[307].

However, events in Melbourne suggest that *uncontested implementation* might not always lead to success. Instead implementation might lead to delegitimation, compromise and partial removal, which are shown in Figure 9.15 as Progression N and Progression O.

In Figure 9.15 the same steps of techno-rational legitimacy building and *uncontested implementation* are shown as in Figure 9.14. However, delegitimation might result in either partial or full removal instead of success, as discussed previously in Section 10.2.4. Examples from the cases suggested that this process is more likely in *car-centric cities* when attempting to implement *high priority in ROW C*[308]. It is unclear from the cases that have been studied here whether similar delegitimation might occur for other levels of transit priority, or in *transit-centric cities*. It may be that for *total priority* in a longitudinally-separated facility (ROW B) the sunk costs of implementation might help to limit the likelihood of delegitimation[309].

[306] Examples of this from the cases include:

- the implementation of generally *subservient* transit priority through the latter part of the *Think Tram* program in Melbourne; and
- the Route 10 study and implementation, and other early transit priority implementations prior to the adoption of the *Waiting Time Zero* policy in Zürich, which show a similar modest approach focused on avoiding impacts to cars;

[307] Examples of this from the cases include:

- the later implementations in Zürich, following the shift to the *Waiting Time Zero* policy, which suggested unconditional acceptance of a higher level of priority implementation; and
- the implementation of each of the *busways* in Curitiba, which appear to have involved first building technical legitimacy, then implementation and success.

[308] As discussed above the *Clarendon Street tram priority pilot* and the *Stud Road Bus Lanes* implementations in Melbourne were both initially legitimate, but were then delegitimated due to public opposition are they had been implemented. These implementations provide two examples of the processes shown in Figure 9.15, where delegitimation led to partial or full removal of *high priority* in ROW C.

[309] For example, in Toronto the sections of ROW B operation for streetcars along St Clair Avenue West and Spadina Avenue appear to have been relatively immune from removal after they have been constructed. Similar sections of kerb-separated tram tracks in Melbourne appear to have been kept in place once they have been constructed. However, these are just isolated examples and it is unclear whether LRT or BRT in ROW B is more likely to avoid delegitimation than LRT or BRT in ROW C. This may be an avenue for future research, particularly with respect to whether the sunk costs involved in longitudinal separation help to decrease the likelihood of priority delegitimation and removal.

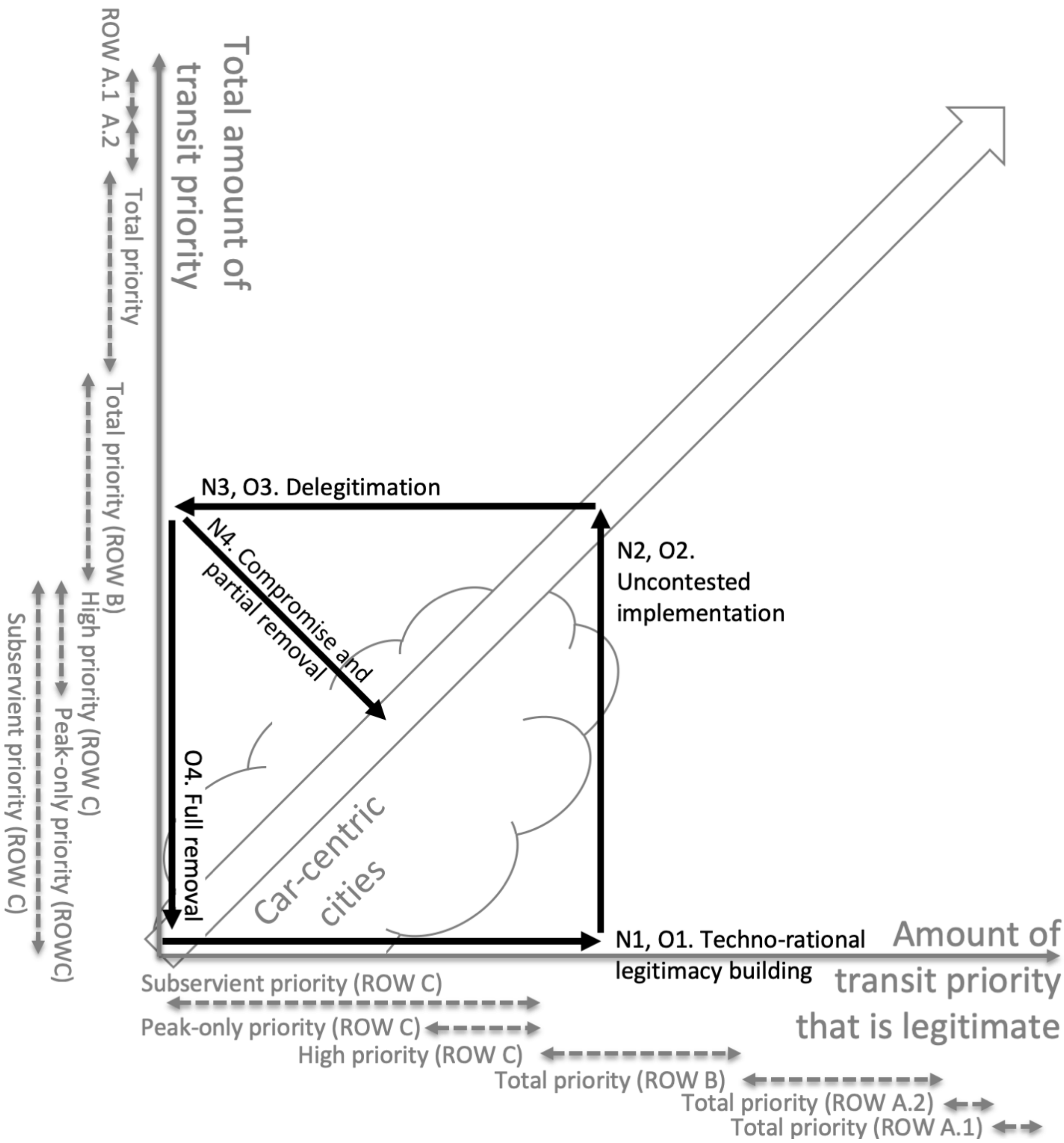

Figure 9.15 ***Progression N: Partial removal*****, and** ***Progression O: Full removal*** **in a** ***car-centric city***

Source: Author's concept

9.4.2 Grade-separation

Technical justification of transit priority implementation might not immediately lead to *uncontested implementation*. The example of the *Eglinton Crosstown LRT* suggests that in some instances non-technical legitimacy might be built for grade-separation, as Mayor Ford pushed for all of the Crosstown LRT to be built underground despite this not being justified technically. Figure 9.16 shows this as Progression P.

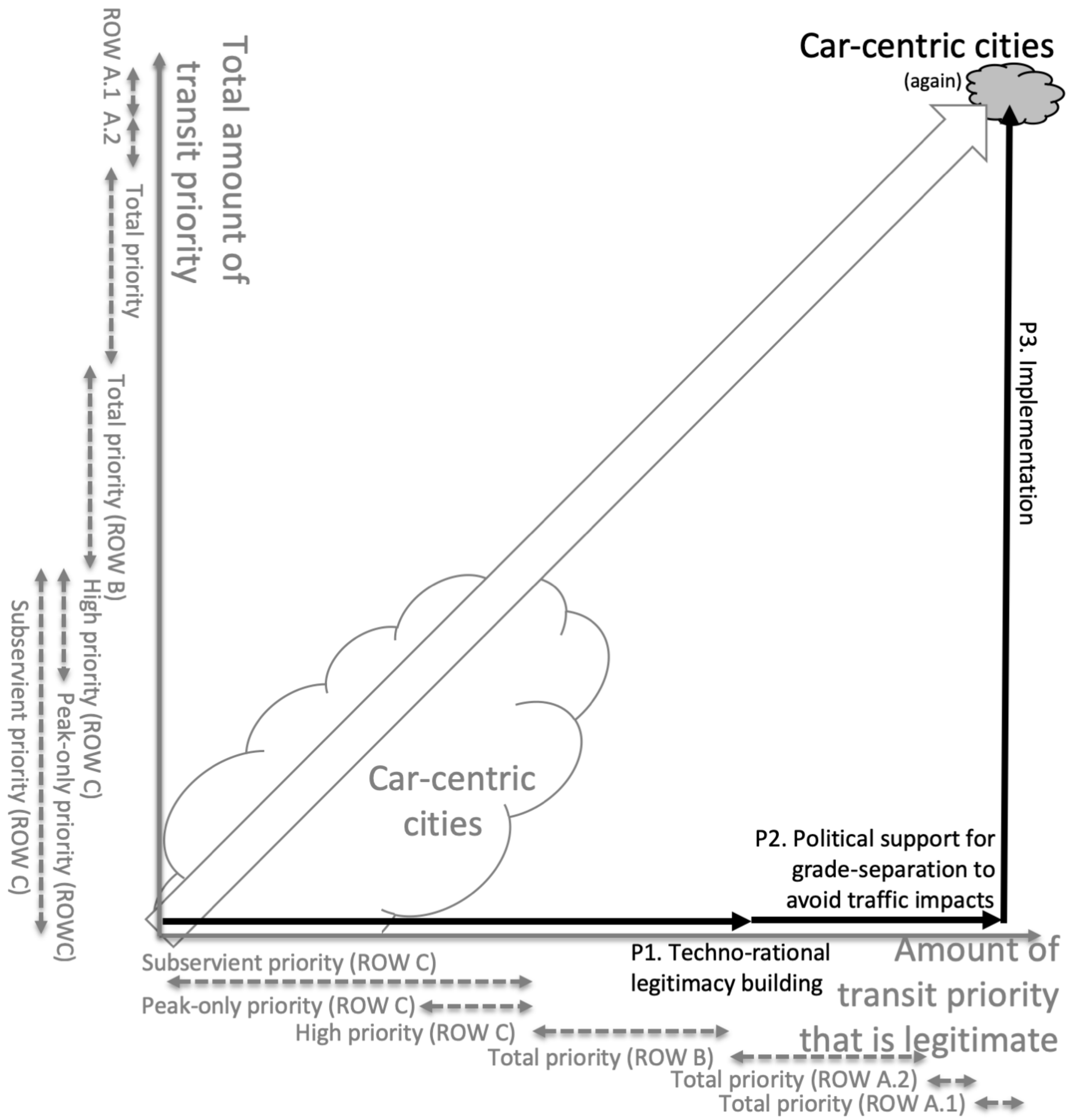

Figure 9.16 *Progression P: full grade-separation* in a *car-centric city*

Source: Author's concept

Figure 9.16 shows Progression P involving *(P1) techno-rational legitimacy building* for *high priority* (in ROW C) or *total priority in ROW B*, followed by *(P2) political support for grade-separation* and *P3. Implementation.* However, this additional legitimacy building is not based on any technical *reasonableness* for having on-road transit operating in ROW A.1 conditions. Rather, it is **political support for improving conditions for traffic through grade-separation** that legitimises the idea of implementing ROW A.1 conditions[310].

[310] In another example, but one related to a heavy rail, Melbourne is currently undertaking an extensive program of level crossing removals across the suburban train network (Level Crossing Removal Authority 2020). While increasing safety is a key benefit that helps to legitimise the large

While the events in Toronto provide the inspiration for this progression, it did not actually occur there in reality due to a push back by city councillors relating to the high costs of *grade-separating* the entire *Eglinton Crosstown LRT* line. However, support for *grade-separation* to avoid the impacts of transit on traffic, and vice versa, has been similarly observed in the early *Tiefbahn* and *U-Bahn / S-Bahn proposals* in Zürich, when transport policy development was perhaps dominated by more car-centric narratives. Additionally, Mayor Ford's push for *grade-separation* of the entire *Eglinton Crosstown LRT* appears to have come close to succeeding, and so there is support for including this progression as a possible path in a generic *car-centric city*.

9.4.3 Delegitimation and/or inaction

The initial building of techno-rational legitimacy for transit priority implementation might not always result is some form of action, such as implementation or calls for grade-separation as discussed above. Instead, a technical case for implementing transit priority measures might be met by *delegitimation and/or inaction*. This might then result in:

- gradual and incremental success over time;
- compromise and partial implementation; or
- failure and abandonment.

These outcomes and the progressions that result from delegitimation of and/or inaction on otherwise technically appropriate plans for priority implementation are discussed below.

Figure 9.17 shows how delegitimation might eventually result in gradual and incremental implementation of transit priority over time.

expense, reducing traffic congestion is also one of the many factors that are typically included in the technical analyses that are prepared to support such rail-road crossing removal projects (De Gruyter & Currie 2016). The *Frankston Factsheet: Traffic improvements* website page produced by the Level Crossing Removal Project (2018) provides an example of how significant traffic congestion improvements might be highlighted by a proponent as a key reason to support the grade-separation of transit.

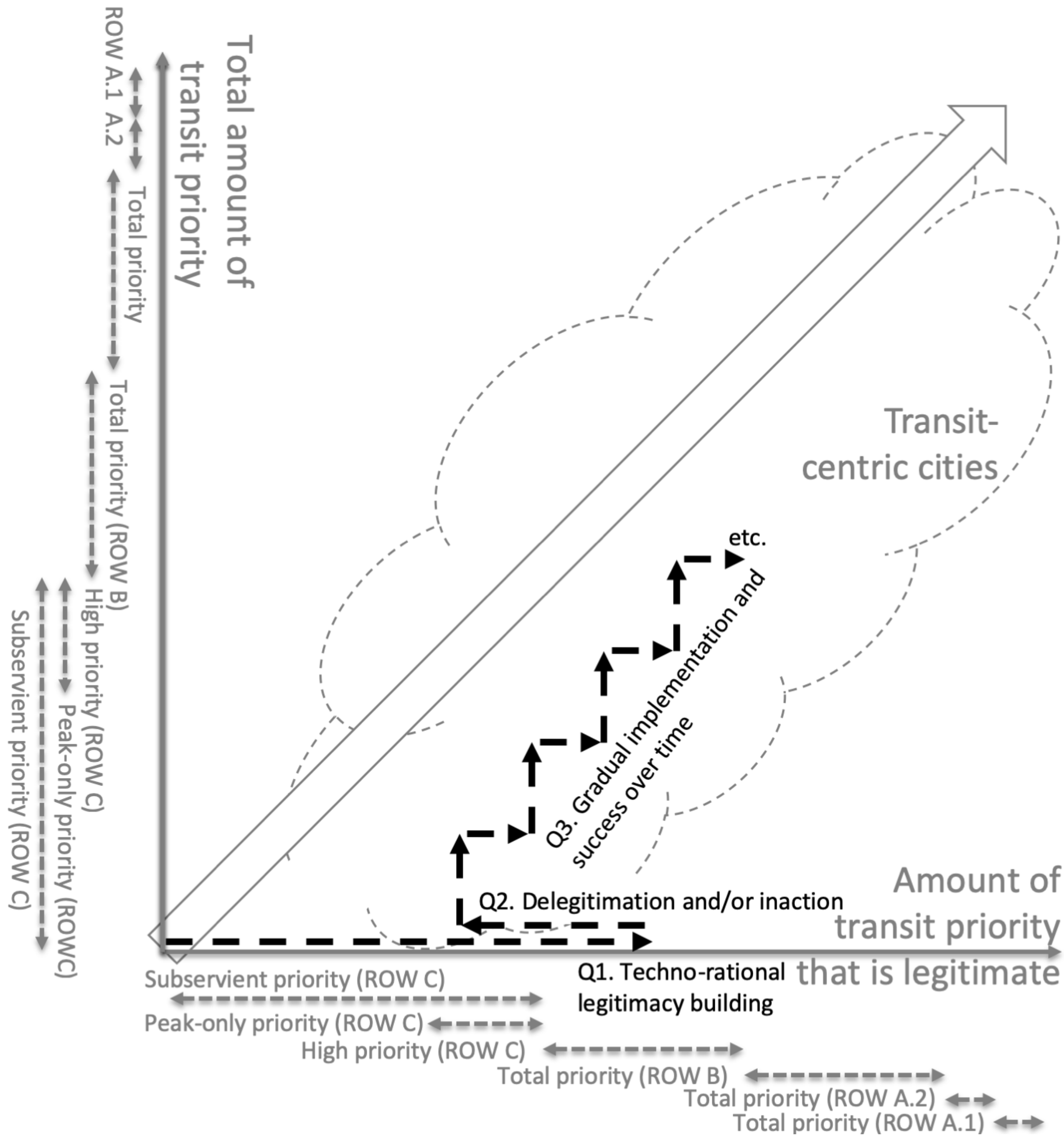

Figure 9.17 ***Progression Q: gradual implementation and success over time*** **in a** ***transit-centric city***

Source: Author's concept

Figure 9.17 shows <u>Progression Q</u>, which involves an initial *(Q1) building of techno-rational legitimacy* for priority implementation, but followed by (*Q2) delegitimation and/or inaction*. This is eventually followed by *(Q3) gradual implementation and success over time* as implementers overcome the initial reluctance and incrementally introduce transit priority. This progression appears to have applied in the *transit-centric cities* that have been included in the case studies[311]. However, the more

[311] As discussed earlier in the thesis, :

- in Zürich, the inaction related to the initial reluctance of the city to implement transit priority due to concerns over impacts on cars being gradually overcome through the initial Route 10 implementation, a city directive, further implementation, the shift towards the Waiting Time Zero policy and, eventually very high levels of transit priority;

car-centric cities reviewed in this study appear to have had less favourable outcomes after delegitimation of techno-rational plans for priority implementation, as shown in Figure 9.18.

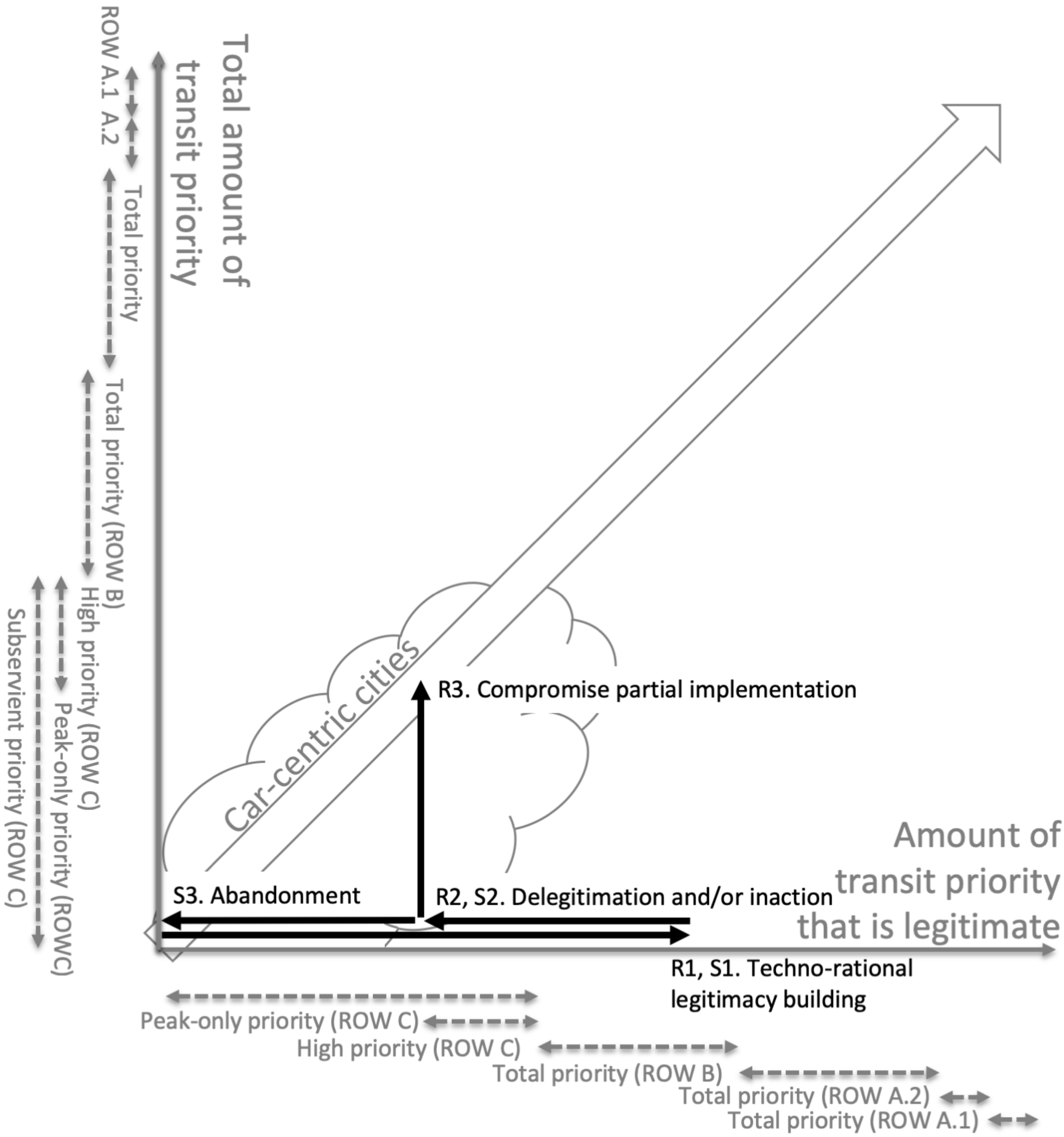

Figure 9.18 ***Progression R: partial implementation*** **and** ***Progression S: abandonment*** **in a** ***car-centric city***

Source: Author's concept

Figure 9.18 shows Progression R and Progression S, which appear to have applied in implementations in the *car-centric cities* included in this study. In both progressions there has been

- in Curitiba the Plano Diretor and associated planning provided techno-rational legitimacy for transit prioritisation, but there was inaction until Lerner was appointed mayor. While the implementation of an entire busway may stretch beyond the definition of 'incremental', it is included here because the Plano Diretor itself was expanded to add further axes once the first had proven to be successful; and
- later in Curitiba, the bus boarding tubes were added to provide additional capacity to the system, but were later incrementally added to the rest of the network and, together with bi-articulated buses, replaced the LRT proposed for the north-south axis.

(R1, S1) techno-rational legitimacy building for transit priority implementation that has met with public and political opposition resulting in *(R2, S2) delegitimation and/or inaction* prior to implementation. However, these have resulted in either (*R3) compromise partial implementation*, as in *Think Tram,* or in *(S3) failure and abandonment*, as in *Transit City* in Toronto (except for the already-under-construction *Eglinton Crosstown LRT*).

9.4.4 Moving from progressions to a conceptual framework

Figures 10.14 to 10.18 have presented seven generic progressions of transit priority implementation and legitimacy. These are based on patterns identified from thinking about cross-case comparison of the empirical context of implementations included in this study (in Section 9.3), together with generalisation to more than just the cases examined (in Section 9.2 and above in Section 9.4). The generic progressions are summarised in Table 9.1, together with a cross-tabulation of the types of city to which each progression might apply, and the most likely final outcomes[312].

Table 9.1 Summary of generic progressions of transit priority implementation and legitimacy in *car-* and *transit-centric cities*

Progression	Progression outcome	City type		Priority outcome & ROW							Shown in:
				C				B	A.2	A.1	
		Car-centric	Transit-centric	No priority	Subservient	Peak-only	High priority	Total priority	Total priority	Total priority	
L	Uncontested success (in a car-centric city)	✓			✓						Figure 9.14
M	Uncontested success (in a transit centric)		✓				✓	✓			Figure 9.14
N	Partial removal	✓			✓						Figure 9.15
O	Full removal	✓		✓							Figure 9.15
P	Full grade-separation	✓								✓	Figure 9.16
Q	Gradual implementation and success over time		✓				✓	✓		✓	Figure 9.17
R	Partial implementation	✓			✓						Figure 9.18
S	Abandonment	✓		✓							Figure 9.18

Source: Author's concept

Table 9.1 shows generic progressions that all start with *techno-rational legitimacy building*. However, the second steps of *uncontested implementation*, *political support for grade-separation*, or *delegitimation and/or inaction* lead to dramatically different final outcomes. This suggests that techno-rational justification for transit priority implementation is just the first step. Techno-ration justification may not be sufficient to legitimise transit priority on its own, and may lack importance once decision-making has shifted into the wider public policy arena. Instead, *delegitimation and/or inaction* may lead to *compromise and partial implementation*, *partial or full removal* or the *abandonment* of otherwise (technically) justified transit priority measures.

The progressions in Table 9.1 provide the basis of the proposed **conceptual framework for transit priority and legitimacy**, which is shown in Figure 9.19.

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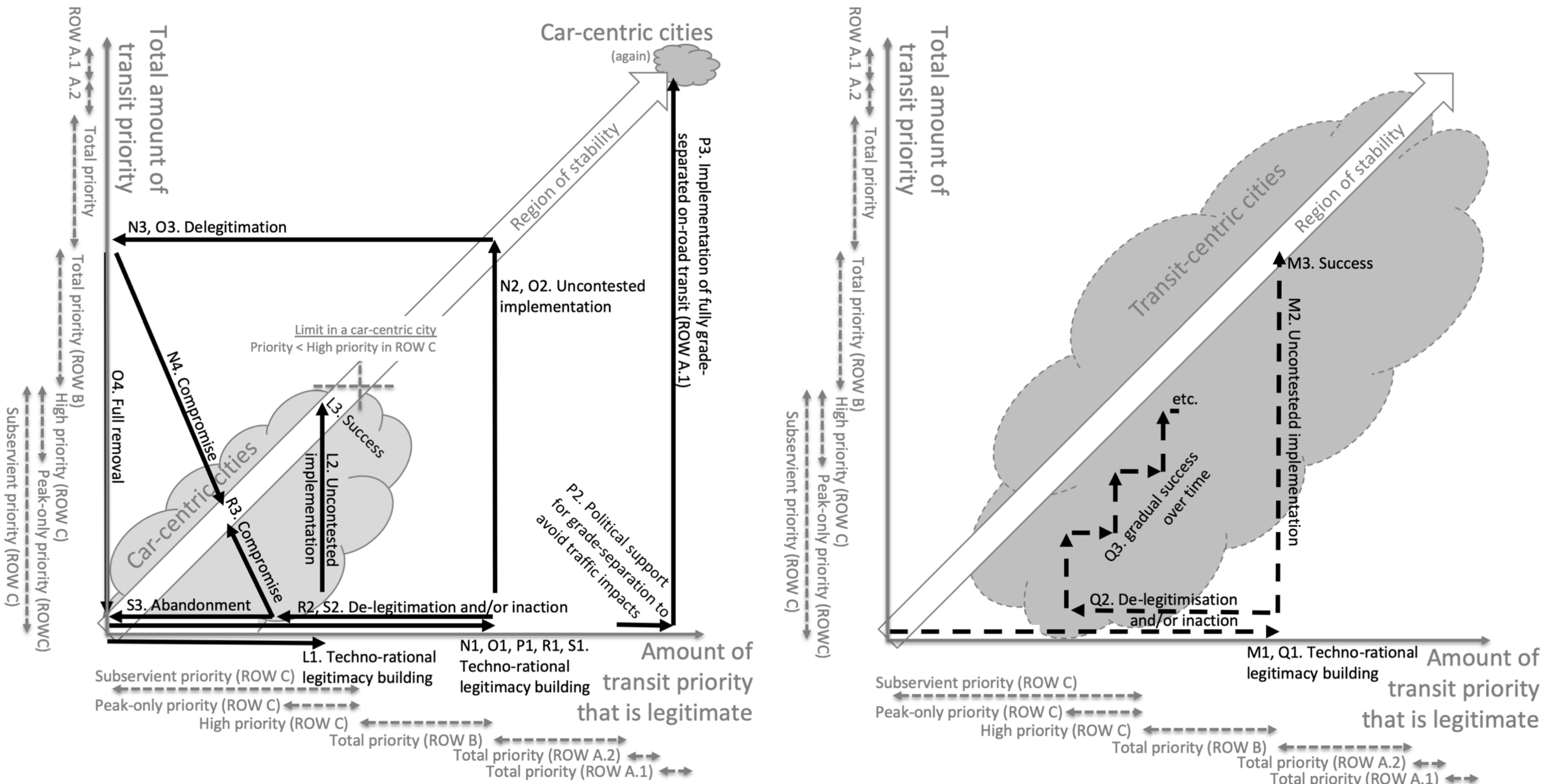
[312] Progressions N, O, P, R and S suggest that efforts to implement *high priority in ROW C* or *total priority in ROW B* in *car-centric cities* are unlikely to be successful. Instead, the final outcome tends towards either abandonment, partial or full removal, a compromise *subservient priority*, or (even) pressure to grade-separate. The outcomes stem from pressure to limit the impact of transit priority on other traffic, which appears to be a large driver of legitimacy and/or delegitimation is *car-centric cities*. This might also be relevant to a certain extent to Progression L, especially if the techno-rational evaluation is focused on traffic impacts, which might sometimes suggest that transit priority options that have significant impacts on other traffic might have already been discarded as illegitimate prior to any technical decision-making.



a) *car-centric cities*

b) *transit-centric cities*

Figure 9.19 Conceptual framework for transit priority and legitimacy

Source: Author's concept

Priority implementation in ***transit-centric cities*** is shown in Figure 9.19a) as involving either:

- *techno-rational legitimacy building*, *uncontested implementation* and *success,* or
- *techno-rational legitimacy building*, followed by *delegitimation and/or inaction*, but then *gradual success over time* as gradually higher levels of priority are incrementally implemented, thereby helping to build legitimacy for further implementation.

For ***car-centric cities*** Figure 9.19b) shows a more complex series of progressions due to the gap in what is legitimate. These progressions involve:

- s*ubservient priority*, which is shown as being legitimate and possible in *car-centric cities* because it does not significantly impact on other traffic, and where implementation involves either:
    - the *uncontested implementation* of *subservient priority* (Progression L),
    - a *compromise and partial removal* of non-*subservient* measures (Progression N), or
    - a *compromise and partial implementation* of only *subservient priority* (Progression R);
- *total priority in ROW A.1* (with *full grade-separation*), which is shown as being legitimate and possible in *car-centric cities* (Progression P) because it also does not significantly impact on other traffic; and
- *high priority* (in ROW C) or *total priority in ROW B or A.2* being potentially out of reach, or at least much more difficult due to the likely *delegitimation* of transit priority implementation that involves negative impacts on general traffic in *car-centric cities*.

This new *conceptual framework for transit priority and legitimacy* therefore helps to provide explanations for the progressions of transit priority and legitimacy that have been evident in the implementations examined in the case study cities. However, in reality all cities exist on a spectrum, rather than being neatly categorizable as either (exclusively) *car-* or *transit-centric*[313]. Hence, the two diagrams in Figure 9.19 represent archetypes of transit priority legitimacy for generic *car-* or *transit-centric cities*. It appears likely all cities, different parts of cities and perhaps even individual implementations will have their own 'legitimacy topography' that is unique to the particular context, extent of *car-* or *transit-centric-ness* of the surrounding location, and the many other factors that might impact on transit-priority-related policy-making.

Additionally, transit priority implementation is not a self-contained system. It exists within a large governance, public decision-making and policy environments. Hence, broader factors might impact on the legitimacy and amount of transit priority in a particular context. This suggests a need to view the framework within such a larger context, in the manner that many public policy analysis models

[313] Refer back to discussion in footnote 1 (Section 1.1).

seek to include external or longer-term factors in their description of policy-change and decision-making[314]. Likewise, connections might be made from this legitimacy framework to other theories and frameworks in public policy analysis, given that they are all addressing public decision-making and policy from different perspectives[315].

The new conceptual framework suggests potential progressions that might occur, in theory, in *transit-centric* and *car-centric cities*, but which have not been found directly in the case studies[317]. The following section discusses this issue, together with other defences that support the generalisability of the new framework.

[314] For example, the Advocacy Coalition Framework (ACF)(discussed briefly in Section 3.3.4) includes "relatively stable parameters", "long-term coalition opportunity structures", "external (system) events", "short-term constraints and resources of subsystem actors" as inputs into the "policy subsystem" in which decisions are made. These or similar categories might be thought of as providing inputs into how much transit priority is legitimate. For example, shifts in public opinion, a change in the transport system itself, or external events might alter what is *accepted* or *proper* in terms of road space or intersection time allocation.

[315] For example, many of the progressions shown in the framework have similarities to the 'muddling through' of *incrementalism* (e.g. Progressions N to S), or *disjointed incrementalism* or *strategic analysis* (i.e. the gradual success over time of Q3), while delegitimation and compromise (Progression N and R) perhaps echo the competing Advocacy Coalitions and policy brokers of the ACF. Likewise, Pulichino (2003); Pulichino and Coughlin (2005) used the Cobb et al. (1976) agenda setting models (mobilization, inside access and outside initiative) to categorise cases of transit prioritisation, which may link to the legitimacy framework presented here as relating to the mechanism through which a certain amount of transit priority becomes legitimate[316]. More connections might be made to other existing public policy analysis frameworks, models and theory, but this might perhaps be an avenue for future research.

[316] In the *outside initiative model* it is a group external to the decision-makers that succeeds in getting an issue to be considered. Pulichino and Coughlin (2005) identify Zürich as an example of transit priority implementation occurring through this model. This fits with the legitimacy framework presented here in that it was the outside initiative that legitimated the idea of putting the *Citizens' Transit Priority Initiative* to a vote, and the result of the vote itself (plus further external lobbying and mobilization through the 1979 City directive (see Section 7.3)) that legitimised the implementation itself.

In the *mobilization model* it is the decision-maker who puts the issue on the agenda. Of the cases studied here it is Curitiba that Pulichino and Coughlin (2005) identified as having implemented transit priority through this model, with the focus being on the actions of Jamie Lerner as, first, a member of the IPPUC team, and then the mayor (Pulichino 2003, pp. 61-3). The connection to the legitimacy framework is that Lerner's *normative legitimacy* and power as the mayor appears to be the manner through which he "…imposed his vision in order to build the transit system: "Fast and cheap are still the best solutions for Curitiba"…"(ibid p.62).

This might also be connected to the Multiple Streams Framework (problems, policies, and politics) and policy windows (Kingdon 1995). For instance, the window of opportunity to legitimise the busways existed because the need for better transit had been identified as a problem, the IPPUC had formulated busways as a viable policy, and the political situation (stream) was such that, as mayor, Lerner had an opportunity to select and implement them.

In the *inside access model* it is a privileged group who have special access to decision-makers who place an issue on the agenda. There might be connections to be made between the legitimacy framework developed here. For example, insider access to key decision-makers within a road authority might help to not only put the idea of transit priority implementation on an agenda, but also to legitimise its implementation (or removal). Examples from the cases might include:

- how a collection of sample feedback from residents by the federal member of parliament (Tudge 2010) might have helped to put the issue of removing the *Stud Road bus lanes* on the agenda, or legitimised their actual removal by the state government; and
- the direct access that the South Melbourne Business Association appeared to have to the Mayor of the City of Port Phillip in the forming of the Clarendon Street Charter (City of Port Phillip & South Melbourne Business Association 2005), which appears to have helped to delegitimise the far side stops in Clarendon Street.

[317] This relates in part to the "duality criterion" (Ketokivi & Choi 2014) problem that is faced in case study research, where there is a need to consider how the findings might relate or apply beyond cases that have been examined in detail.

9.5 Assessing the generalisability of the framework

Denscombe (2007) discusses the issue of generalising from a single or small number of cases, and highlights that researchers using case study methodology should provide “an explicit defence against the allegation that you cannot generalize from case study findings” (p.36). This has already been discussed in Chapter 4, but it is appropriate to return to this topic here now that the general conceptual framework has been presented above in Figure 9.19.

The problem of the “duality criterion” (Ketokivi & Choi 2014) has been widely discussed in the case research methodology literature. It is the need for case study research to be grounded in the empirical context of the studied cases yet at the same time seeking to make generalisable findings. This study’s methodology specifically addressed this challenge by including multiple cases so as to examine a range of transit priority implementation efforts and contexts. The selection of cases and implementations also included *theoretical sampling* for *polar extremes*, *replication* and for other criteria to allow transit prioritisation to be examined across a range of governance structures and systems, outcomes and other factors relevant to legitimacy.

Key defences to the generalisability of the new *conceptual framework for transit priority implementation* are discussed in detail in the following sections.

9.5.1 Based on cases, but extending into theoretical possibilities

An explicit defence in support of the generalisability of the conceptual framework presented in Figure 9.19 is that it is based on progressions that occurred across the four case cities, but also **includes progressions that did <u>not</u> actually occur** in Melbourne, Toronto, Zürich or Curitiba. The theoretical development of the structure and framework that were described in Sections 9.2 and 9.4 shows how the framework extends on the empirical context to consider more than just the cases that were studied.

For example, the progressions involving delegitimation and compromise occurred in Melbourne (*Think Tram*) and Toronto (*Transit City*). However, the progression involving the building of additional legitimacy (beyond what was built through an initial techno-rational process) for *total priority in ROW A* and the successful implementation of (full) grade-separation to eliminate impacts on traffic did not occur in Toronto. While Mayor Ford’s efforts to move **all** of the *Eglinton Crosstown LRT* underground in pursuit of ‘ending the war on cars’ almost succeeded, the LRT is currently being implemented as per the original scheme. <u>Progression P</u> showing how additional legitimacy building may lead to the in implementation of *total priority in ROW A*, therefore, is an example of a theoretical deduction and generalisation from the cases, rather than something that has directly occurred in the empirical context studied in detail in this research.

9.5.2 Describes general trends qualitatively

A second explicit defence of the generalisability of the conceptual framework is that it describes general trends, progressions and Propositions, rather than being definitive in setting boundaries.

For example, the difference between *car-centric cities* and *transit-centric cities*, which underpins the entire framework, is intentionally left as a qualitative distinction, rather than being precisely and quantitatively defined (such as by a specific transit mode share cut-off value[318]). Similarly, the progressions shown in the *conceptual framework for transit priority and legitimacy* are intended to be general and indicative, rather than exactly describing all of the steps that might occur in any particular implementation effort. This is a result of the process in this chapter of undertaking the cross-case comparisons in Section 9.3, but then subsequently generalising these into progressions and the conceptual framework in Section 9.4. As such the Propositions in this chapter are intended to help explain the development of the conceptual framework rather than definite theorems or hypothesises that are intended to apply generally and universally to all situations.

There remain some unknowns and uncertainties about the positions and ideas in the *conceptual framework for transit priority and legitimacy*, and areas where it is intentionally imprecise[319]. Hence, the intention in Figure 9.19 is not to state that in a *car-centric city* a *full-time exclusive transit lane* will always face delegitimation, whereas implementation of a *peak-only transit lane* will always succeed. Rather, the intention is to indicatively show, at a high and conceptual level, the general ranges of priority levels for which different progressions and outcomes might be more likely and the amounts of transit priority that might generate significant opposition and legitimacy challenges. Also, this is because the cases and implementations included in this study do not provide a large enough sample to fully examine the differences between (for example) *subservient* and *peak-only priority* implementation efforts, or between implementation efforts for *high priority* (in ROW C) versus for *total priority in ROW B*.

Many of the terms used in this research describe binary or categorical variables (e.g. *car*- or *transit-centric*, *subservient* or *high* or *total priority*, etc.). However, in reality many of these variables are likely to be continuous along a spectrum. In particular, any transit priority implementation is likely to have some impacts on other traffic, but the level at which impacts are low enough for a priority measure to be considered *subservient* is likely to vary with local conditions. This links to the third and final explicit defence of the generalisability of the framework, which is discussed below.

9.5.3 A conceptual framework, rather than rigid theories

The result of this case study research is a <u>*conceptua*</u>*l framework for transit priority and legitimacy*, rather than a rigid theory or prescriptive postulates. This research has aimed to develop **outputs**

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[318] The different values for transit mode share in Melbourne and Toronto versus Zürich and Curitiba were highlighted in Section 9.3.3 in the discussion of *car*- versus *transit-centric cities*. However, the discussion in that section remained in general terms and focusing on the broad trends, while the characterisation of each of the case cities as being *car*- and *transit-centric* in Chapter 4 is similarly discussed in general terms. See also footnote 1.

[319] For example, the extent of overlapping for the different levels of transit priority on the axes in Figure 9.19 are shown using double-headed arrows to indicate that the boundaries are soft and blurred, not hard and sharply delineated. This is in part because of the qualitative nature of the *car*- and *transit-centric cities* definitions discussed above. It is also consistent with the approach adopted by Currie (2016a) in describing the three types of city transport policy (social transit, transit for congestion relief, and transit instead of private vehicles) in the 'state of the art' conceptual model, and reflective of the way that various conditions that reflect each type of policy, or car- or transit-centric-ness, might occur in different places across a single city. For example, various parts of the Toronto streetcar network and the Melbourne tram network already operate with *high* or *total priority in ROW B* conditions, despite these cities having been qualitatively defined as *car-centric cities*.

that aid understanding of how legitimacy can influence transit priority implementation, not to precisely define universally-applicable causal relationships, as discussed in Chapters 1 and 4.

Public policy analysis and related fields has a very large number of models, frameworks and other structures through which researchers seek to understand and interrogate policy- and decision-making, as discussed in Chapter 3. The *conceptual framework for transit priority and legitimacy* is of a similar type. It provides a structure through which researchers and practitioners might seek to conceptualise, simplify and interrogate the complex interactions involved in transit priority implementation in the real world. This contrasts to quantitative statistical analysis, modelling or other technical approaches that are more typical in transit priority and broader transportation research and practice.

Therefore, the value in this research is not just the conceptual framework presented in Figure 9.19. Rather, all of the various structures and figures that have been presented in Sections 9.2 and 9.4 might be generalised and adapted to help interrogate and understand other instances of priority implementation and transit priority legitimacy more generally. For example, the simple structure that was presented in Figure 9.2 might be used by researchers or practitioners as a basic graphical tool to help conceptualise other implementation efforts.

In this manner this research provides a structure and framework through which future research might undertake cross-case comparison of other transit priority implementations (as per Figure 9.9). This might allow further refinement of the generic implementation progressions described in Section 9.4.1, 9.4.2, and 9.4.3, or the identification of additional progressions from other implementations, beyond those studied here.

In summary, this section on assessing the generalisability of the framework has provided three explicit defences to the challenge of the duality criterion of case study research. The three defences are that:

1. The conceptual framework includes implementation progressions **beyond <u>just</u> what occurred in the cases studied**, which logic and deduction suggest as being additional outcomes that might be possible in *car-* or *transit-centric cities*;
2. The conceptual framework describes trends, progressions, types of cities and other relevant factors **in general terms**, and retains a qualitative approach when describing boundaries; and that finally,
3. The conceptual framework and other structures presented in this chapter are designed as **aids to simplifying, interrogating and understanding** the complexities of real-world transit priority implementation, rather than as a precise and prescriptive theory or proof of direct casual relationships.

All of these defences support the position that the research outcomes, and the *conceptual framework for transit priority and legitimacy*, apply more generally than to just the specific empirical context of the cases that have been examined in this research. However, these defences, and the 'shades of grey' nature of this research alluded to in the second defence, raises the questions about the nature of the boundaries that have been delineated so far.

Table 9.1 showed six generic progressions in *car-* and *transit-centric cities*, and how they may lead to various outcomes of: no priority; *subservient*, *peak-only* or *high priority* in ROW C; or to *total priority* in ROW B or C. The discussion above about how in reality there may be no clear boundaries between different types of cities and priority outcomes suggests that there is a need to revisit Table 9.1, and highlight where there might be unknowns.

9.5.4 Stretching the framework boundaries

Table 9.2 revisits the generic progressions that were described in Section 9.4.3 (Table 9.1) by showing where the boundaries are unclear and where possible outcomes might extend beyond the priority levels that have been observed in the cases. It shows a bold '**?**' symbol where the boundaries are unclear. Similarly, a bold '**✓**' symbol is shown where, despite a lack of evidence from the cases, particular outcomes could be reasonably assumed to be possible, although perhaps less likely.

Table 9.2 Revisiting the generic progressions: stretching the boundaries of city type and priority outcome

Progression	Progression outcome	City Type		Priority outcome & ROW: C				B	A.2	A.1	Notes:
		Car-centric	Transit-centric	No priority	Subservient	Peak-only	High priority	Total priority	Total priority	Total priority	
L	Uncontested success (in a *car-centric city*)	✓			✓	?					• Uncontested success for *peak-only transit priority* may be possible in a *car-centric city*, particularly if it is a city where the purpose of transit is to provide mobility during periods of peak traffic congestion.
M	Uncontested success (in a transit centric)		✓		✔	✔	✓	✓	?	?	• Uncontested success for *peak-only* and *subservient priority* appears likely in *transit-centric cities*, as this will likely have less opposition than *high* or *total priority.* • However, it is unclear whether *total priority in ROW A.2* or IA.1 can be an uncontested success, given the likely high costs and impacts on a city or road reserve conditions.
N	Partial removal	✓	✔		✓	✔					• A compromise partial removal of implemented priority measures so that they are only present or active during peak periods appears a possible outcome. • A partial removal might also be a possible outcome in *transit-centric cities*.
O	Full removal	✓	✔	✓							• Failure and full removal of transit priority may be less likely in a *transit-centric city*, but appears a possible outcome.
P	Full grade-separation	✓	✔						?	✓	• Political pressure leading to a full grade-separation may be a possible outcome in *transit-centric cities* (as per the *Tiefbahn* and *U-Bahn / S-Bahn* plans in Zürich) • Implementing railway crossing style priority for on-road transit might be a possible outcome to save on the costs of full grade-separation, but may not be supported politically due to impacts on other road users.
Q	Gradual success over time	✔	✓			✔	✓	✓	✔	✓	• Gradual implementation and success over time may be possible in *car-centric cities*. • Eventually implementing *peak-only priority* or *total priority in ROW A.2* (railway crossing style priority) appears likely to be possible.
R	Partial implementation	✓	✔		✓						• Compromise and partial implementation appear likely to be possible outcomes of delegitimation in *transit-centric cities*.
S	Abandonment	✓	✔	✓							• Abandonment appears likely to be a possible outcome of delegitimation in *transit-centric cities*.

Source: Author's concept

Table 9.2 shows question marks in Progression L for whether it is possible to have *uncontested implementation* and success for *peak-only priority* in a *car-centric city*. This would seem to be within the realms of possibility, assuming that a techno-rational analysis shows justification for costs and impacts. However, success would clearly depend on local conditions and individual context, and the extent to which the *peak-only priority* measures worsened congestion for other road users.

For Progression M there would appear to be support for the idea that *subservient* or *peak-only priority* might be immediately implementable without delegitimation in *transit-centric cities*. If *high* or *total priority in ROW B* can be implemented in a city without delegitimation, then *peak-only* or *subservient priority* would appear to be also acceptable. However, it is unclear whether technically-justified implementation of *total priority in ROW A.1* or *A.2* can have an *uncontested* implementation in a *transit-centric city*. The experiences in Zürich suggest that cost and impact on the city may be significant issues that might lead to delegitimation of plans for fully-separated transit.

Table 9.2 suggests that Progressions N, O, P, R and S might also be possible outcomes in *transit-centric cities*. This appears reasonable, as just because an implementation is in a *transit-centric city* does not mean that local opposition, delegitimation and failure is impossible. Rather, these sorts of responses just appear to be less likely in a city where more people ride transit. Question marks are also shown for some of the surrounding priority levels in these progressions, as it is unclear exactly where the outcome boundaries might lie. Again, these boundaries might vary significantly with local context. For example, it might be possible to *compromise* on a transit lane only being provided during peak periods instead of it being removed entirely.

Where Table 9.2 has more direct relevance to the overall research aim of this thesis is perhaps in Progression Q. Here it is suggested that 'gradual success over time' might be possible in *car-centric cities*, not just in *transit-centric cities*. This thesis seeks to understand how to improve implementation in *car-centric cities*. The possible extension of the boundaries of the *conceptual framework for transit priority implementation* therefore suggest that incrementally implementing transit priority might be a possible way to successfully implement *high* or *total* levels of transit priority in *car-centric cities*. This, and the potential of other such *pragmatic strategies* for transit priority implementation in *car-centric cities*, are discussed in the next chapter.

9.6 Conclusions

This chapter has drawn together the empirical context described in Chapters 5 to 8 into a new *conceptual framework for transit priority and legitimacy,* built through generalisation and cross-case comparison. A wide range of mechanisms relating legitimacy to transit priority have been discussed including: delegitimation, compromise and the pressure for grade-separation. All of these might impact the level of priority that is ultimately delivered when implementation is attempted. Regardless of the level of priority identified as being 'rational' through a technical planning or decision-making process, once proposals have entered general public and political policy arenas it appears likely that outcomes will be impacted by delegitimation and politics.

The *conceptual framework for transit priority and legitimacy* suggests that transit priority implementation is inherently more difficult in *car-centric cities* than in *transit-centric cities*. This is due to the (greater legitimacy of) opposition to measures that negatively impact on general traffic in cities where more people (and voters) travel by private vehicles. In a *transit-centric city* these negative impacts are more likely to be considered acceptable and *reasonable*, and may be more directly supported through demonstrations of *public consent*. However, in a *car-centric city* the making conditions worse for driving is unlikely to have political or public support, even if prioritisation is justified through technical analysis or as part of wider transportation plans.

This might lead to an almost nihilistic view that it is impossible to implement meaningful transit priority in *car-centric cities*. However, the *conceptual framework for transit priority and legitimacy* may provide a surprising and counter-intuitive message of hope. This is that:

> ***Even** in transit-centric cities where transit priority implemenation has been highly successful, it has **not** always been easy to implement priority measures.*

The experiences in Zürich, where transit priority succeeded through gradual and incremental implementation despite initial reluctance, suggest one possible way forward. Curitiba's success, likewise, appears to have followed periods of inaction and delegitimation, and required a gradual building of priority and legitimacy for the city to become the 'cradle of BRT'. While success might seem hard in *car-centric cities*, it was also hard in more *transit-centric cities* that have succeeded. This suggests that success is **not** impossible in *car-centric cities.*

> *So, what are practitioners in car-centric cities to do?*

The *conceptual framework for transit priority implementation* suggests that there are many different routes to successful transit priority implementation. However, success appears to be highly dependent on local context. Attempts in *car-centric cities* to directly copy the technology and measures from successful, and more *transit-centric cities*, appear likely to end in delegitimation, compromise and/or failure. Therefore, there is a clear role for ***pragmatic strategies*** that are **sensitive to the context of car-dominance** that is part of the prevailing narrative in many cities. These are discussed in the next chapter.

Chapter 10: Pragmatic strategies for *car-centric cities*

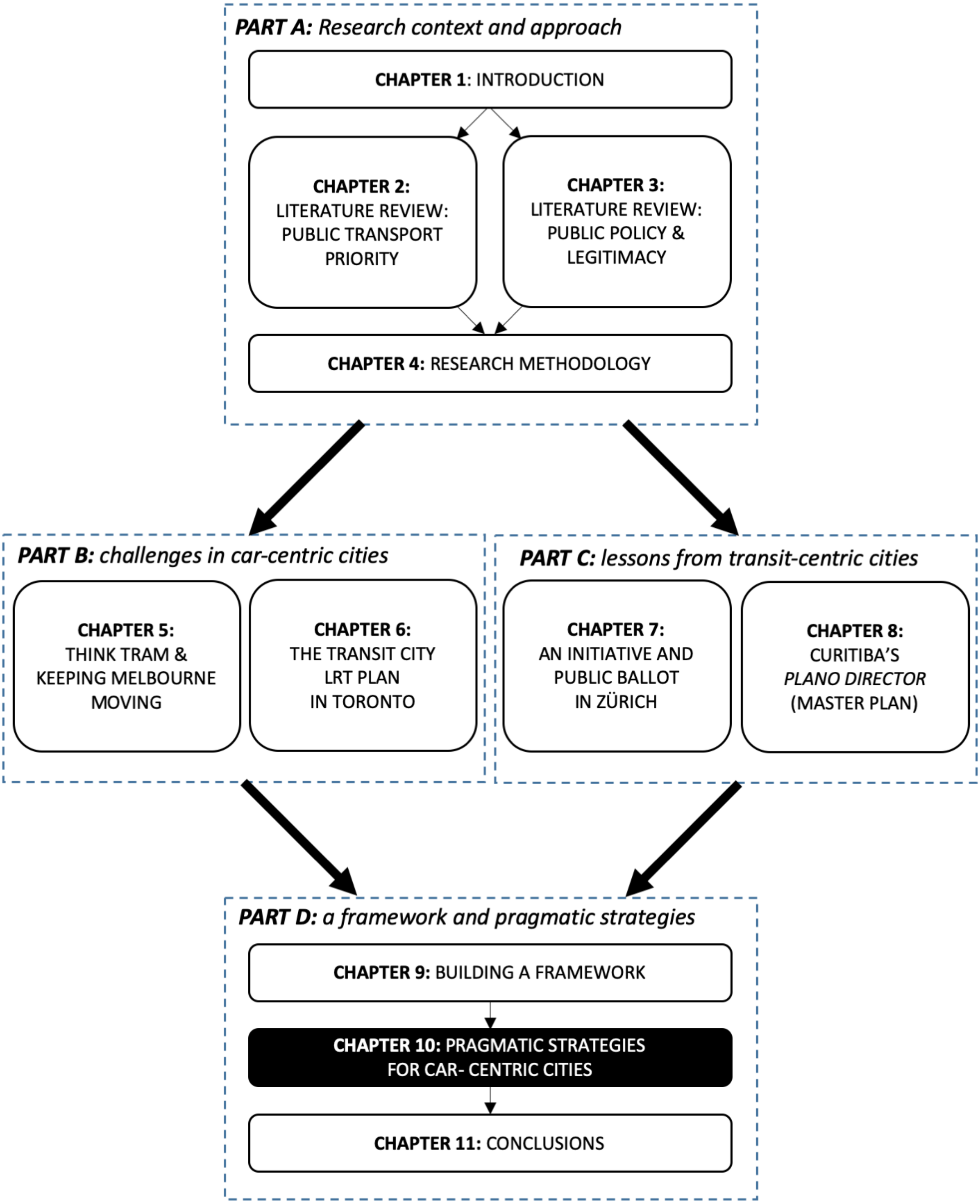

Figure 10.1 Position of Chapter 10 in thesis structure

10.1 Introduction

The *new conceptual framework for transit priority and legitimacy* presented in Chapter 9 provides a structure for understanding why transit priority implementation has been successful in some cities, but has faced challenges or failed in others. However, it does not immediately explain **how to succeed** at transit priority implementation. Understanding how to legitimise transit priority may be of particular importance for practitioners in *car-centric cities*, where opposition and delegitimation appears more likely.

Narratives in *car-centric cities* tend to emphasise minimising vehicle delay, maintaining traffic flow, and the importance of on-street parking. These might be a significant obstacle to transit priority implementation in *car-centric cities*. This suggests a need for approaches and implementation strategies that are sensitive to the context of car-dominance, and that limit the chances of transit priority being delegitimated due to opposition from private motorists or car-centric thinking.

This chapter presents **three approaches** for transit priority implementation in *car-centric cities*. These have emerged from the case study research and the new conceptual framework. Each of the approaches encompass **three *pragmatic strategies*,** as shown in Figure 10.2 and as follows:

Approach A: Building **legitimacy before** implementation:
- *Pragmatic strategy A1: technical enquiry*,
- Pragmatic strategy *A2: transport planning*, and
- *Pragmatic strategy A3: public processes and/or hearings*;

Approach B: **Avoiding impacts** on other road users:
- *Pragmatic strategy B1: grade-separation*,
- *Pragmatic strategy B2: building new capacity*, and
- *Pragmatic strategy B3: subservient priority*; and

Approach C: Building **legitimacy through** implementation:
- *Pragmatic strategy C1: bottom-up and incremental implementation*,
- *Pragmatic strategy C2: pop-ups*, and
- *Pragmatic strategy C3: trials*.

These strategies are referred to as being 'pragmatic' because they remain sensitive to the context of car-dominance. Using these strategies might not be the 'best' option from a technical perspective. Instead the *pragmatic strategies* describe transit priority implementation approaches that might be more likely to succeed politically in *car-centric cities*.

This chapter is structured as follows: Section 10.2 discusses the legitimacy challenge in *car-centric cites* and why *building legitimacy* ***before*** *implementation*, ***avoiding impacts*** *on other road users*, or *building legitimacy* ***through*** *implementation* may be necessary. The *pragmatic strategies* associated with each of these approaches are then discussed in Sections 10.3, 10.4 and 10.5 respectively. Section 10.6 provides a conclusion to this chapter.

Figure 10.2 Summary of approaches and *pragmatic strategies* for transit priority implementation in car-centric cities

Source: Author's concept, with selected images (see footnote 320, next page)

10.2 The legitimacy challenge in *car-centric cities*

Chapter 9 suggested that there are legitimacy limits in *car-centric cities* for transit priority. In *car-centric cities* there:

- tends to be legitimacy for s*ubservient priority* in ROW C because it does not significantly impact on other traffic, and so will not be opposed or delegitimated by private motorists;
- may be legitimacy for *peak-only priority* to provide mobility during periods of traffic congestion; and
- may be legitimacy for *full grade-separation* with *total priority in ROW A.1* because it has no impacts on other road users, and may even be supported by private motorists as a way of moving transit out of general traffic lanes.

The challenge in *car-centric cities* is the lack of legitimacy for transit priority implementation that negatively impacts private motorists. It may prove politically challenging, or even impossible, to implement transit priority measures that have negative impacts on other road users, regardless of whether such implementation is technically appropriate. As shown in Figure 10.3, delegitimation is therefore likely to occur when implementing:

- *high priority* (in ROW C);
- *total priority in ROW B* (*longitudinal separation*); or
- *total priority in ROW A.2* (*full separation*, but with *at-grade crossings*).

[320] Images in Figure 10.2:
Pragmatic Strategy: A1: Technical enquiry image is the first page of the *Executive summary, St Clair Avenue West transit improvements, class environmental assessment* (City of Toronto et al. 2004).
Pragmatic Strategy: A2: Transport planning images are the title pages from *Building a Transit City* (City of Toronto & Toronto Transit Commission 2005) and *Melbourne 2030: a planning update; Melbourne @ 5 million* (VicPCD 2008).
Pragmatic Strategy: A3: Public process and hearings images are an excerpt from the *Strategy and Policy Review Committee Minutes, 6 June 2005* (City of Port Phillip 2005) and a photo of a workshop from South Australian Active Living Coalition (2012)
Pragmatic Strategy: B1: Grade-separation image is a photo of the *Queens Quay LRT* tunnel portal by the author.
Pragmatic Strategy: B2: Building new capacity images are during construction and after photos of the *York University Busway* in Toronto from Wikipedia user Reaperexpress (2009, 2010).
Pragmatic Strategy: B3: Subservient priority image is a photo of the Curitiba *bus boarding tubes* from Wikipedia user Morio (2006).
Pragmatic Strategy: C1: Bottom-up and incremental shows the same section of tram track in Fitzroy Street, St Kilda, Melbourne with a single yellow line dividing the *exclusive tram lane* from adjacent traffic lanes (top), with a painted traffic island (middle), and after the installation of a kerbed traffic island (bottom). These Images are sourced from Google maps streetview (Google 2020b).
Pragmatic Strategy: C2: Pop-ups image is as photo of a "cone pilot" *bus lane* in Arlington, MA, USA, included in *Best Practices in Implementing Tactical Transit Lanes* (UCLA Institute of Transportation Studies 2019)
Pragmatic Strategy: C3: Trials image is a photo of signage during the *King Street Transit Pilot* in Toronto, ON, Canada by the author.

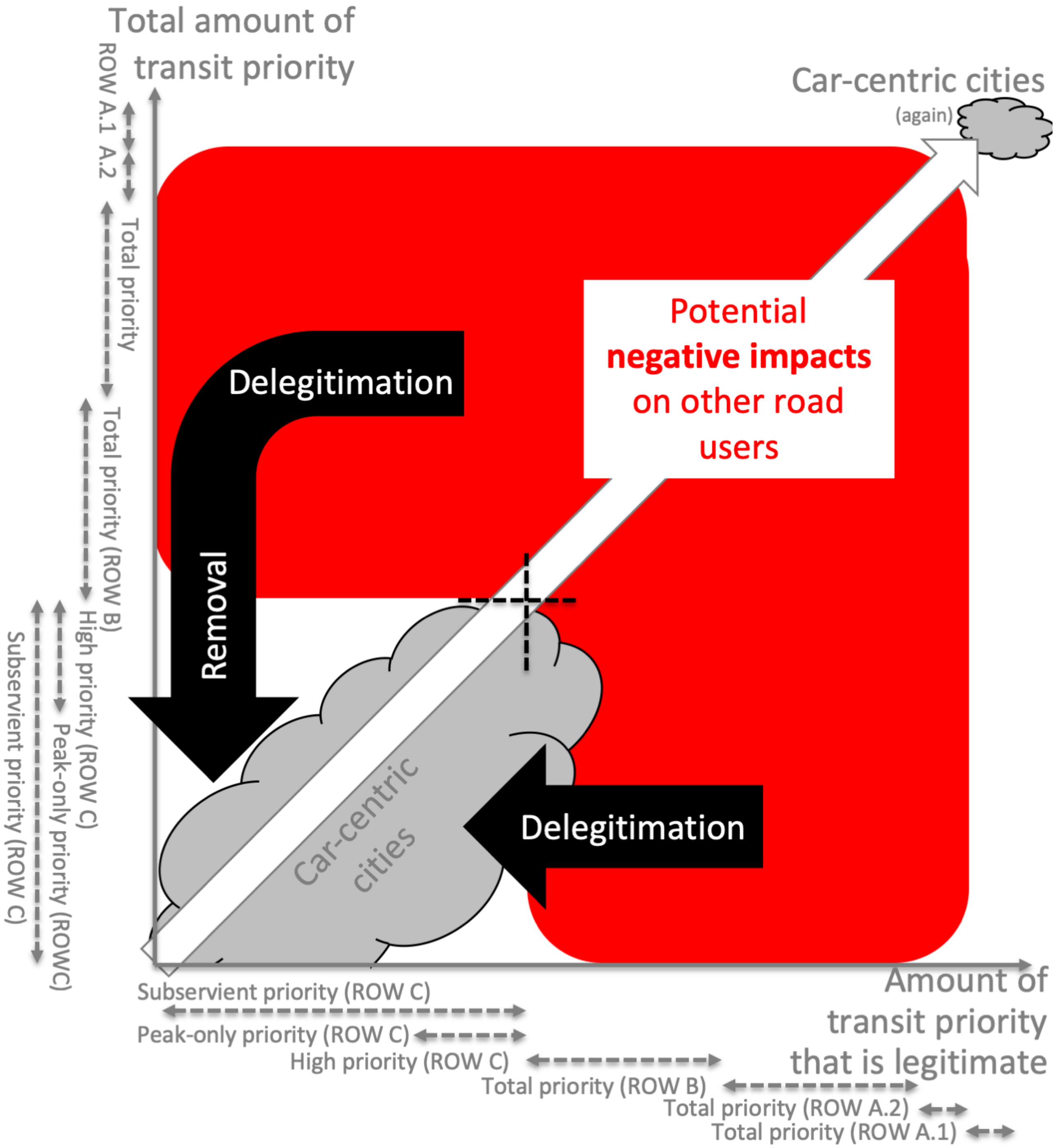

Figure 10.3 Delegitimation of *high priority* (in ROW C) or *total priority in ROW B* or *ROW A.2*

Source: Author's concept

Figure 10.3 shows how for *car-centric cities* there is a large area of the *conceptual framework for transit priority and legitimacy* where there is the potential for negative impacts on other road users. These negative impacts are likely to lead to opposition from motorists, delegitimation, removal or cancelation of transit priority implementation[321]. However, this does not mean that implementing *high* or *total priority* in *car-centric cities* is impossible, or that practitioners should give up on prioritising transit altogether.

[321] See Progressions N and O in Figure 9.15 and Progressions R and S in Figure 9.18.

An important learning from the successes in Zürich and Curitiba is that, at least initially, transit priority implementation **also** struggled to gain legitimacy due to its potential for negative impacts on traffic[322]. In these cities the transition from being anti-transit-priority to pro-transit-priority does not appear to have been a sudden or sharp one. Instead, it occurred gradually over time as attitudes changed, delegitimation and inaction was overcome, initial implementations succeeded, and legitimacy was built for further implementation. Zürich and Curitiba may now be *transit-centric*, but prior to their successful programs of transit priority implementation they both appear to have been a lot closer to being *car-centric* than they are now[323].

There is hope, therefore, for cities that are currently at the *car-centric* end of the spectrum. One day they might too become, at least somewhat, more *transit-centric*. If and as this occurs it may gradually become easier to gain and retain legitimacy for implementing *high* or *total priority* measures, and for prioritising transit in ways that have negative impacts on other road users. However, it appears unlikely this occur through a sudden change of policy[324]. Instead, what are needed are approaches that recognise the political realities in *car-centric cities* and find ways to work within these constraints to deliver increasing levels of transit priority gradually over time.

Figure 10.4 shows three approaches for transit priority implementation in *car-centric cities* that have been developed in this research, and which are based on the case studies and on the *conceptual framework for transit priority and legitimacy*. *Approach A* focuses on addressing the potential negative impacts on other roads users directly, by building legitimacy **before** implementation. In contrast, *Approach B* involves **avoiding impacts** on other road users entirely, so as to reduce the chance of the opposition from private motorists that might lead to delegitimation. *Approach C* is perhaps more confrontational and involves demonstrating the *reasonableness* and legitimacy of transit priority directly **through implementation**.

[322] In Zürich the legitimacy for transit prioritisation built gradually over time, until there was eventually a transition to the *Waiting Time Zero* policy. Even within Curitiba, the "Cradle of BRT", implementation of the *busways* occurred after the abandonment of the traffic-focused *Agache Plan* and the building of *legitimacy* for the *Plano Diretor*, and then the *busways* themselves were made possible by the accommodation of high capacity for general traffic on the one way streets within the structural axes system.

[323] As discussed in Footnote 1 and elsewhere, in reality *car-centric*-ness versus *transit-centric*-ness is likely a spectrum, rather than a dichotomy with a sharp distinction between categories. In the context of this discussion, it does not appear that Zürich and Curitiba made sharp city-wide shifts, but rather incremental progress.

[324] Refer back to *incrementalism,* as discussed in Chapter 3. Policy change is unlikely to shift a *car-centric city* into a *transit-centric city* quickly. Instead, such a shift might occur incrementally through a series of small steps, implementations and policy changes that gradually make a city less car-centric.

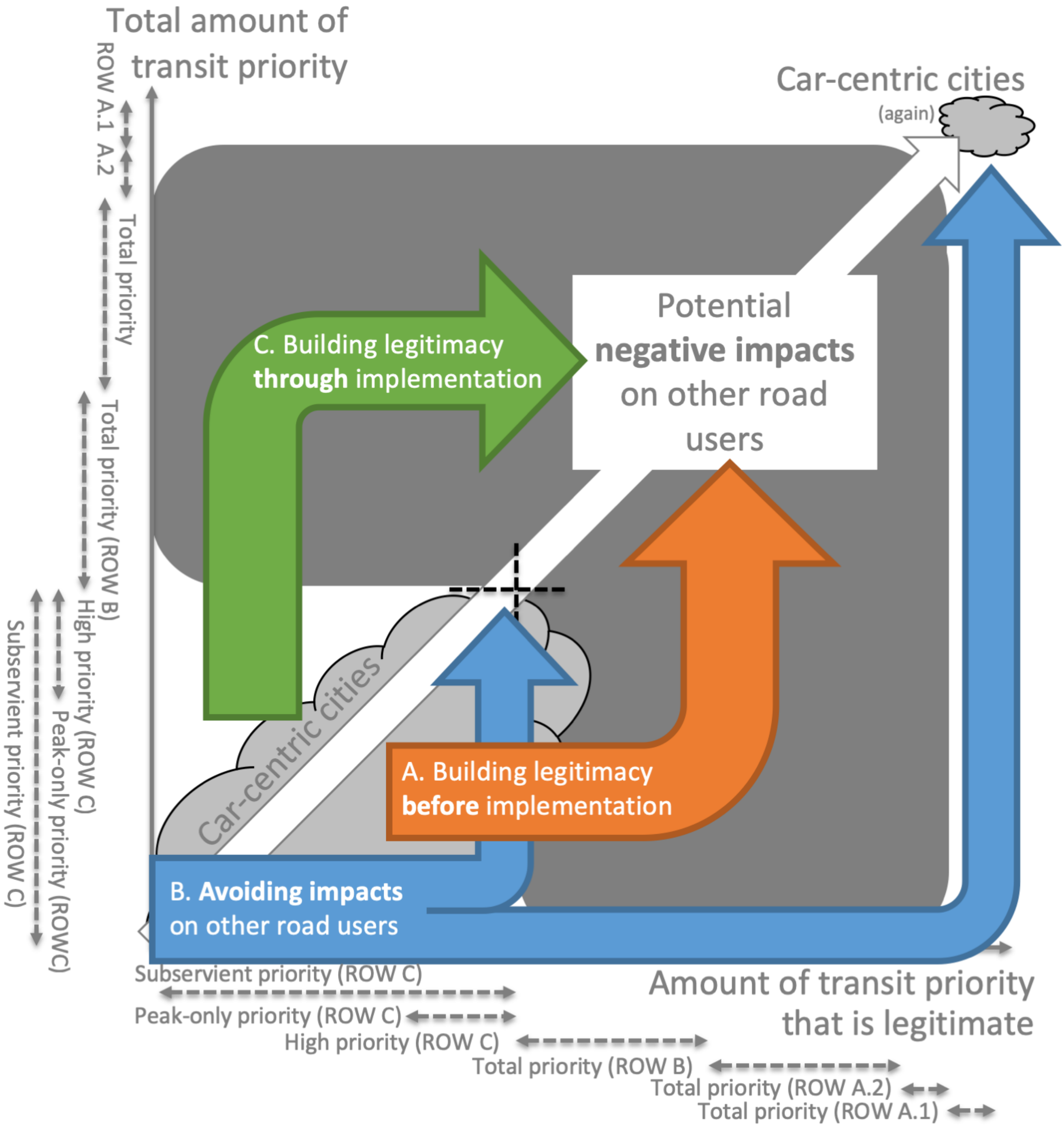

Figure 10.4 Three approaches for transit priority implementation in *car-centric cities*

Source: Author's concept

As indicated in Figure 10.4, *Approach A: building legitimacy **before** implementation* for transit priority involves more than just the normal engineering processes that are typically undertaken prior to implementation. Instead, here it refers to building legitimacy in the **broader *public and political policy arenas*** for the implementation of *high* or *total priority* for transit. Section 10.3 discusses this approach in more detail, which includes the *pragmatic strategies* of *A1: technical enquiry*, *A2: transport planning*, and *A3: public processes and/or hearings*.

*Approach B: **avoiding impacts** on other road users* is based on the idea of preventing delegitimation by only implementing transit priority in ways that do not negatively affect private motorists. This would involve adopting the *pragmatic strategies* of *B1: grade-separation*, *B2: building new capacity*, or *B3: subservient priority*, as discussed further in Section 10.4.

Approach C: building legitimacy ***through*** *implementation* is in part inspired by Mayor Lerner's confident statement that "if they had a chance to actually see it, everyone would love it" (McKibben 2007, p. 65). Existing research understanding relating to *tactical urbanism*, *bottom-up implementation theory* and *incrementalism* also help to prompt this approach, which includes the *pragmatic strategies* of *C1: bottom-up and incremental* implementation, *C2: pop-ups*, and *C3: trials*, as discussed further in Section 10.5.

10.3 Approach A: building legitimacy before implementation

The *conceptual framework for transit priority and legitimacy* shows that techno-rational legitimacy for transit priority implementation is typically built before new measures are installed[325]. However, this engineering-focused activity is **not** the focus of this section. Rather, this section discusses **building legitimacy in the broader *public and political policy arenas*** for transit priority implementation, prior to actually commencing the implementation itself.

There is a distinction between using technical enquiries, transport planning or hearings:

- to **aid** decision-making**,** and using them
- to ***legitimise*** decision-making.

The *Clarendon Street Tram Priority Pilot* provides contrasting examples demonstrating this distinction, as illustrated in Figure 10.5 and Figure 10.6[326], and as discussed in the following.

Figure 10.5 shows an engineering design plan for the Clarendon Street project. The purpose of this document is to aid decision-making and implementation in the *engineering policy arena*. It is a technical design plan, which is the result of engineering activities. This type of plan is used both to demonstrate the technical *reasonableness* of a proposal and to guide the actual implementation. However, it is not something that is likely to build legitimacy for transit priority amongst non-engineers, in contrast to the drawing shown in Figure 10.6.

Figure 10.6 is an artist's impression of the *Clarendon Street Tram Priority Pilot,* which was included in a brochure sent out to the public (VicRoads et al. 2004). This is also an output of the technically-led process that preceded the implementation. However, the purpose of this image is informing[327] the public so as *to legitimise* the decision-making to install transit priority measures. It is this second type of legitimacy building that is the focus of this section.

[325] See Progressions L to S and Figure 10.19 in Section 10.4 of Chapter 10. The initial techno-rational legitimacy building might take the form of planning, designing or other engineering tasks related to implementation of transit priority measures such as technical evaluation, benefit cost assessment and ratio calculation, the preparation of traffic / transport impact studies, calculation of signal timing plans, and the preparation of detailed design drawings.

[326] Figure 10.5 and Figure 10.6 images are reproduced with permission from the Victoria Department of Transport (as author) under the Creative Commons Attribution 4.0 Licence http://creativecommons.org/licenses/by/4.0/.

[327] Refer to discussion about the Arnstein (1969) ladder in Section 3.4 of Chapter 3. This brochure may have sought to demonstrate the *reasonableness* of the implementation in the broader *general public and political policy arenas*, but does not appear to provide any way for members of the public to become involved in the decision-making. It appears to be an example of *informing*, which is the third of eight rungs on the ladder and which is the lowest form of *tokenism*.

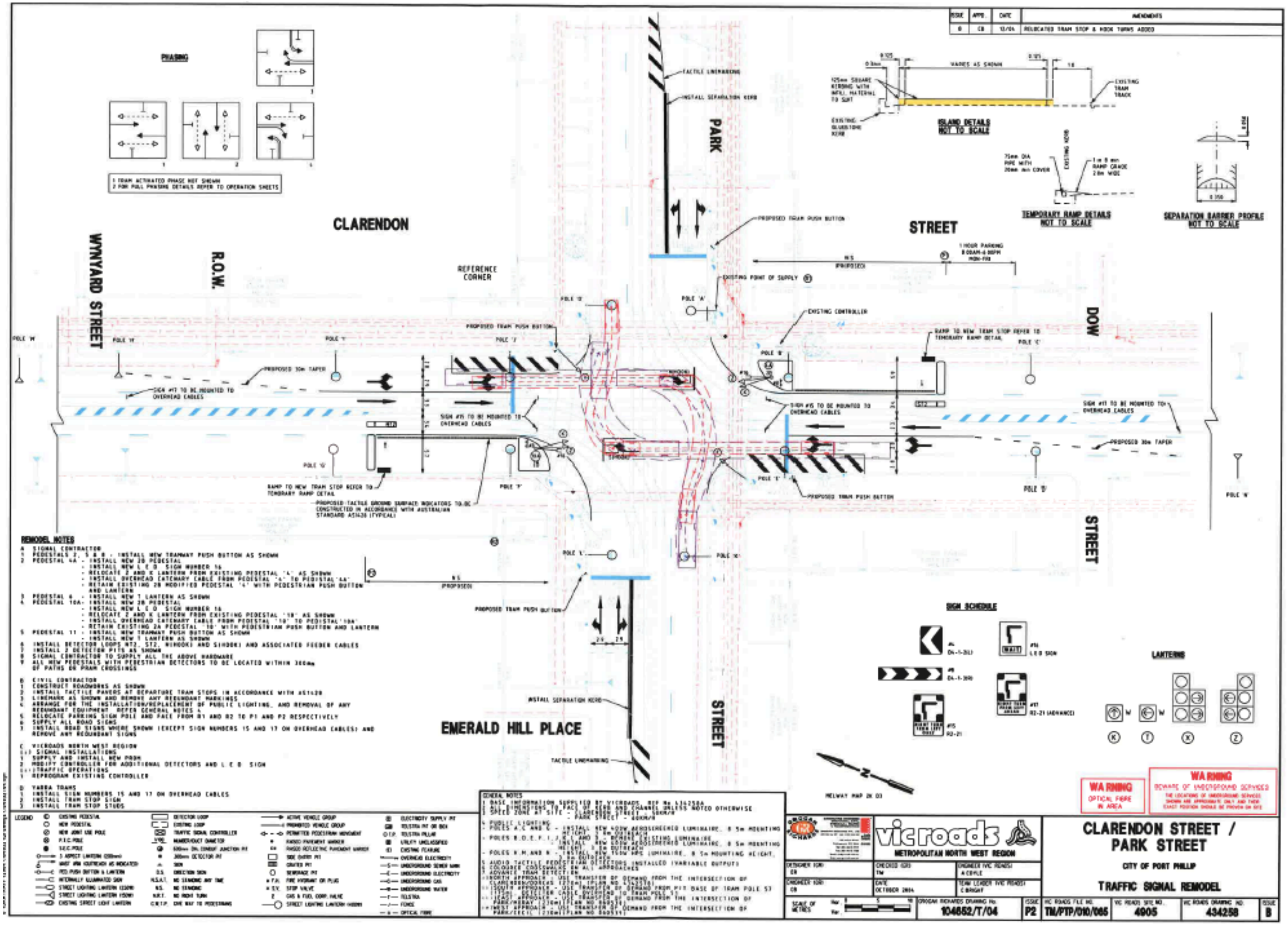

Figure 10.5 Clarendon Street / Park Street traffic signal design plans

Source: VicRoads (2004)

Figure 10.6 *Clarendon Street Tram Priority Pilot* artists impression
Source: VicRoads et al. (2004)

What might sometimes be forgotten when implementing transit priority measures is that in democracies virtually **all decision-making** in the *general public and political policy arenas* is **ultimately made through *citizen control***, albeit with the *delegation* of power to representatives at elections[328]. Decision-making in the *engineering policy arena* is not definitive or permanent when transit priority implementation is ultimately under the control of political decision-makers (and indirectly the general public). Hence, it is whether the outputs of the *engineering policy arena* legitimise a decision to implement transit priority in the *general public and political policy arenas* that will matter to whether transit priority measures are successfully retained long term[329].

Therefore, the *pragmatic strategies* of *A1: technical enquiry*, *A2: transport planning* and *A3: public processes and/or hearings* are aimed at building *legitimacy by reasonableness* in the *general public and political policy arenas*. For example, an independent, high profile and trusted transportation expert might be engaged to undertake an *A1: technical enquiry* and make recommendations as to where transit priority implementation is technically appropriate. While the recommendations themselves may help to aid decision-making, it is the reputation and experience of the expert that *legitimises* their conclusions due to *legitimacy through trust*[330].

Likewise, overall *A2: transport plans* calling for transit priority implementation seek to build *legitimacy through trust* in the technical experts that developed the plan, and *sociological legitimacy* amongst the broader community for decisions made based on those overall plans to be accepted as *legitimate*[331].

The *A3: public processes and hearings pragmatic strategy* encompasses both the typically planning permit and environmental approvals processes that control some types of priority implementation in many jurisdictions. However, it also suggests an expansion into citizen's juries, independent-expert-led public hearings, royal commissions or other such established public enquiry and decision-making formats, which could help to build broader support for preferencing transit over private vehicles where it is technically appropriate.

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[328] See the Arnstein (1969) ladder, rung seven of eight.

[329] This might be conceptualised through the *'garbage can' model*, which was discussed in Section 3.3.5, as two separate decision-making rounds: the first in the *engineering policy arena* and the second in the *general public and political policy arena*. The first decision-making round involves engineers (*people*) solving an issue of poor transit speed and reliability (*problem*) with the implementation of transit priority measures (*solution*). However, the people, problem and (importantly) the *reasonableness* of the selected solution might be lost from the process if there is a subsequent decision-making round in the public and political policy. This second round might follow opposition from the public (*problem*) and involve politicians (*people*) choosing whether to retain or remove, or implement or cancel, transit priority measures (*solutions*). Without some evidence from the first decision-making round ***legitimising a decision*** to implement transit priority (i.e. evidence of *reasonableness*) the second decision-making round might be made on other grounds (e.g. political expediency, desires of special interests etc.).

[330] Although it is not related directly to transit priority implementation, see the Eddington (2008) report for an example of this type of process being used in a strategic planning context in Melbourne.

[331] *Melbourne 2030* as described by Mees (2011) provides an example of a techno-rationally developed plan failing to gain or maintain legitimacy in the broader *public and political policy arenas*. The partial compromise that eventuated out of the *Clarendon Street tram priority pilot* and subsequent the scaling back of the *Think Tram* program discussed in Chapter 5 provide an example of how transit priority implementation led by broad-scale transport plans might not fully succeed if the plans themselves do not have sufficient legitimacy or acceptance in the community. Similarly, the cancelation of *Transit City* in Toronto shows an example of how a transport plan might lose legitimacy, thereby resulting in the cancelation of transit priority implementation.

10.3.1 Pragmatic Strategy A1: technical enquiry

Figure 10.7 shows how *Pragmatic Strategy A1: technical enquiry* might fit within a generic progression of transit priority implementation in a *car-centric city*.

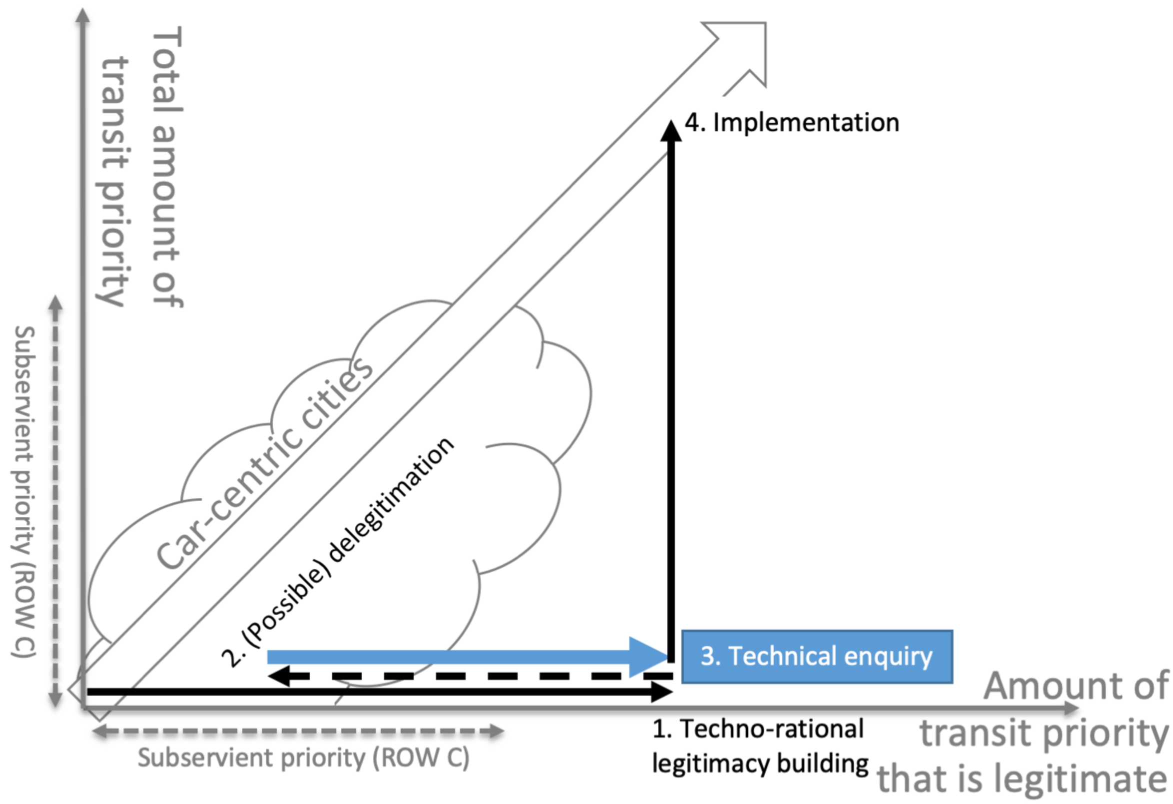

Figure 10.7 *Pragmatic Strategy A1:* technical enquiry, as part of a transit priority implementation progression in a *car-centric city*
Source: Author's concept

The progression shown in Figure 10.7 involves an initial (*1) techno-rational legitimacy building* for transit prioritisation being (*2)(possibly) delegitimated* by public, political or institutional opposition to transit priority measures that negatively impact on other traffic[332]. The *pragmatic strategy* in this instance involves using a (*3) technical enquiry* process to counter-act any delegitimation or the potential for delegitimation, by building legitimacy for transit priority implementation in the broader *public and political policy arenas*. Such a *technical enquiry* would seek to demonstrate the *reasonableness* of the proposed transit priority measures to the wider public and political decision-makers, and perhaps also build *legitimacy through trust* in the technical experts and analysis that supported the initial techno-rational decision-making to implement transit priority. This may therefore help to develop acceptance of the proposed (*4) Implementation*, and so prevent delegitimation after implementation.

[332] This is similar to Progressions R and S, shown in Figure 10.8 in Section 10.4.3 of Chapter 10. However, Progression R ends in compromise partial implementation, while Progression S ends in abandonment of the priority implementation proposal.

There are many examples of *technical enquiry* processes evident in the cases included in this study[333]. However, the Metrolinx et al. (2010) report for the *Eglinton Crosstown LRT* may provide an illustrative example of how such a process might build legitimacy in a **public** manner, and this particularly instance appears to have helped to influence decision-making once it had moved firmly into the *public and political policy arenas*[334]. This report is the result of the larger framework of environmental assessment and reporting that is used in Toronto, and which is required by provincial government legislation for major transportation, transit and municipal infrastructure projects across Ontario[335].

Figure 10.8 shows this environmental assessment process. It includes public consultation, the publication of notices to the public, and a period of time during which the public or other interested parties can lodge formal objections. Similar types of formal environmental assessment are common in many other institutional and governance systems. However, the Ontario version is highlighted here because of the way in which it is a highly standardised, formalised and consistent approach to technical enquiry. Transit Project Assessments occur in an open manner, which is clearly visible to the general public. It is perhaps more than just a process through which a transit agency might decide between options. Instead it appears to be a process that can help to *legitimise* the selected option in the *general public and political policy arenas* before it is implemented.

[333] Examples from the cases of *technical enquiry* processes that aimed to legitimise transit priority implementation in the broader *public and political policy arenas* include:

- the study of how to improve tram route 10 (Nash 2001, p. 65), which helped to legitimise this initial implementation of transit priority measures in Zürich, prior to the development and passing of the Citizens' Transit Priority Initiative;
- the Citizens' Transit Priority Initiative itself appears likely to have had the support of technical analysis and enquiry, given that it was developed by a group of transportation professionals and students (Nash 2001, pp. 61-4);
- the initial directions for the Plano Diretor in Curitiba were developed through a competition amongst urban planning firms, and then further developed through technical enquiry by the IPPUC that resulted in the selection of the bus-based solution and the development of the trinary road system;
- the Smith (2005) report on the Clarendon Street Tram Priority Pilot undertook technical analysis of the performance of the trialled measures, public attitudes, and other factors, and so helped to legitimise the compromise to retain part of the scheme permanently;
- the Eglinton Crosstown LRT Environment Project Report provides a highly detailed technical assessment that helps to explain and legitimise the decision-making behind the project and includes:
  - comparison of the selected LRT option to alternatives such as bus lanes, BRT and a subway, and
  - review of the project's impacts on surrounding properties, cultural heritage, traffic and transit, air quality, noise, and the natural environment (Metrolinx et al. 2010, pp. 14-7, 236-66); and
  - technical enquiry involved in the redesign of the Eglinton Crosstown LRT so that it was entirely underground, as per Mayor Ford's desired alternative, showed that this would add up to $1.9 billion in construction costs, which led to a "council rebellion" and a return to the originally partially-underground, partially-at-grade scheme that had been put forward in the Transit City plan (Bow 2018).

Other examples of formal technical enquires being required by the Environmental Assessment legislation, but also being used to build legitimacy include the East Bayfront Transit Project, the Toronto Waterfront West Streetcar Extension, and the St Clair Avenue West transit improvements (City of Toronto et al. 2004; OntarioMECP 2017). These types of environmental assessments, Traffic / Transport Impact Statements, or similar technical enquiry and reporting processes are common in many other jurisdictions, such as the Environmental Effect Statements used in Victoria, Australia (VicDELWP 2018).

[334] This relates to the events surrounding the "Council Rebellion" (Bow 2018), well after Rob Ford had been elected mayor and cancelled the broader *Transit City* plan. The report is relevant because it effectively was the approved and signed off original plan. When Mayor Ford's the all-underground option was rejected *Metrolinx* returned to this plan and started to implement it. It appears that this report had sufficient legitimacy that it could be the 'default' cost-effective option, rather than seeking further alternatives for the *Eglinton Crosstown LRT* project.

[335] While some minor works are exempt, a Transit Project Assessment is required for the construction of LRT and reserved *bus lanes*. The legislation has strict requirements for how an Environmental Project Report is undertaken, and the process through which a project is assessed, evaluated, reviewed, and approved by the responsible Provincial Minister (OntarioMECP 2012, 2014).

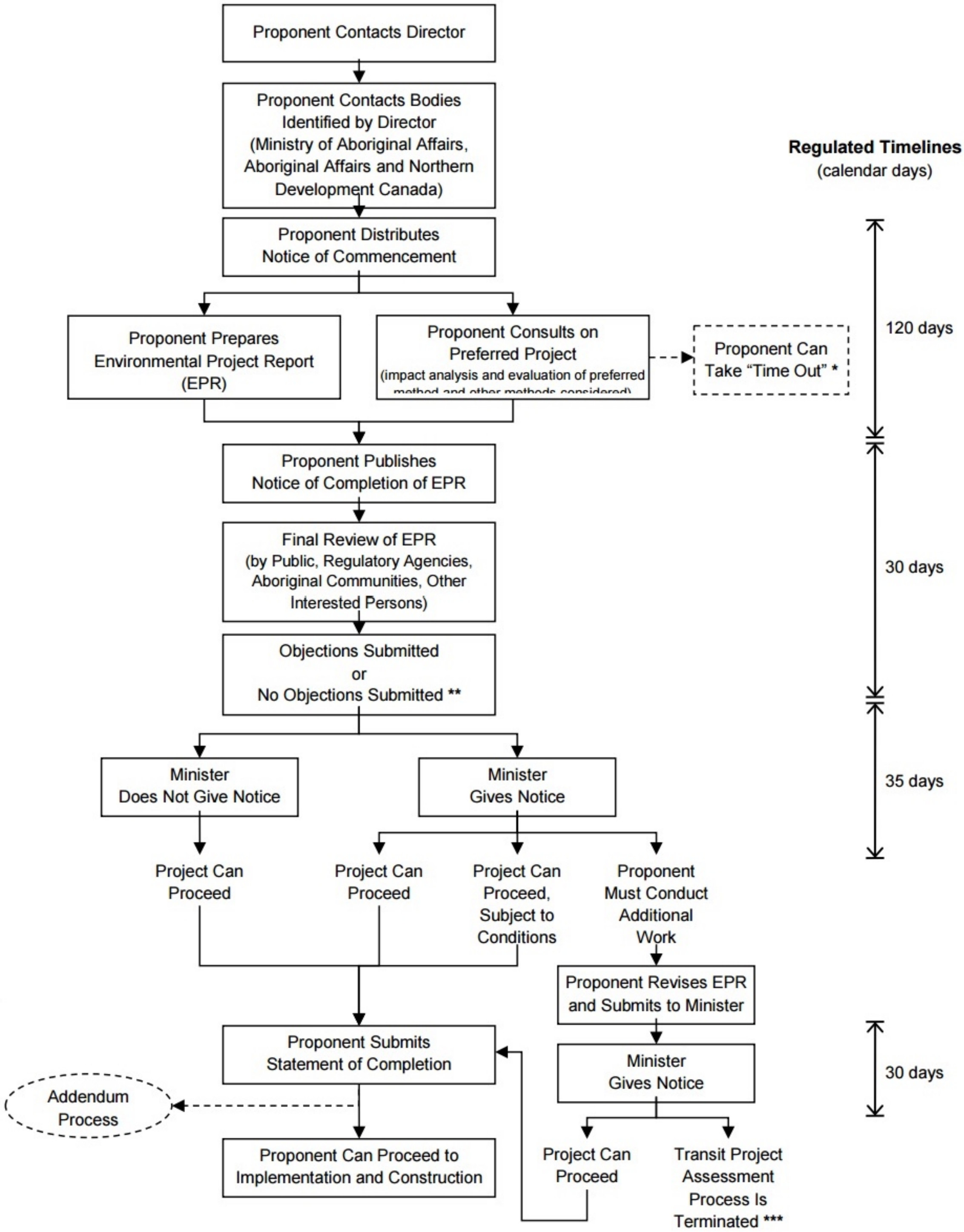

Figure 10.8 Outline of Transit Project Assessment process for Environmental Assessments in Ontario

Source: OntarioMECP (2012), © Queen's Printer for Ontario, 2012, image reproduced as per non-commercial use permissions at https://www.ontario.ca/page/copyright-information-c-queens-printer-ontario

Of course, a formal technical enquire **does not guarantee** that transit priority implementation will be immediate, smooth or successful[336]. However, undertaking a technical enquiry provides a way to

[336] For example, the St Clair Avenue West project involved converting a *mixed-traffic* (ROW C.11) streetcar to run in a kerb-separated right-of-way (ROW B.3). Despite going through the environmental assessment process, this project was subject to protests, litigation and extensive delays due to court orders temporarily halting construction (Bow 2016).

demonstrate the *reasonableness* of implementing transit priority and to provide *normative legitimacy* where these processes are required by law. The important issue, however, is the extent to which such a technical enquiry is open and accessible to the broader public[337], and how much (*sociological*) *legitimacy* it builds within the *general public and political policy arenas* for a proposed transit priority implementation.

10.3.2 Pragmatic Strategy A2: transport planning

Strategic transport planning has a long history and is widely used in many cities to guide the development of transportation networks, as discussed in Chapter 3 (Section 3.2). Transportation plans have sometimes helped to build support for the prioritisation of on-road transit in the cases examined in this study[338]. However, part of the problem in *car-centric cities*, as discussed in Chapters 5 and 6, has been the failure of the transport plans to provide enough legitimacy to support transit priority implementation[339]. In both Zürich and Curitiba, the legitimacy provided by broad-scale transport plans appears to have been vital to the success of transit priority implementation[340], in processes that appears to be similar to *disjointed incrementalism*[341].

Figure 10.9 illustrates how *Pragmatic strategy A2: transport planning* might be used to deliver transit priority using such a *disjointed incremental* approach.

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[337] Research by Lidskog and Soneryd (2000) examines the extent to which environmental impact and assessment processes either involve or exclude the public. This appears to be an important factor in whether these types of technical enquiries help to build sufficient legitimacy. Many reports include extensive details on community and stakeholder engagement activities that have occurred as part of the assessment process, but it is not always clear whether this is enough to build and maintain sufficient legitimacy for a particular proposal.

[338] Examples from the cases include:

- in Zürich, the *Citizens' Transit Priority Initiative* and later city directives were effectively a transportation plan;
- in Curitiba, the *Plano Diretor* was a transport and land use plan;
- in Melbourne, *Melbourne 2030* was a transport and land use plan that led to *Think Tram*;
- also in Melbourne, the Victorian Transport Plan (VicDoT 2008) and the *Keeping Melbourne Moving Strategy* included a proposal for the implementation of bus lanes on Stud Road (Whittaker 2009; VicRoads 2010, pp. 12-3); and
- in Toronto, *Transit City* was a transportation plan.

[339] Mees (2011) suggests that *Melbourne 2030* lacked sufficient public support, while in Toronto the election of Mayor Ford with a mandate to 'end the war on cars' clearly demonstrated a lack of *public consent* for *Transit City*. This is not to say that *Melbourne 2030* or *Transit City* provided no legitimacy at all for transit priority implementation. Rather, it appears that the legitimacy each plan provided was **not enough** to overcome the delegitimation of individual implementation efforts.

[340] The *Citizens' Transit Priority Initiative* provided clear direction that the public desired a move towards a vision of on-street transit moving as fast as possible and without delay from other traffic. In Curitiba, the *Plano Diretor* set broad policy visions of linear and then radial corridors with transport links and higher-density development. For both these two cities the transportation plans provided the overall goals and hence underlying *legitimacy* to support the implementation of each individual transit priority project.

[341] Refer to Chapter 3, Section 3.3.3 for discussion of the different types of *incrementalism*. *Disjointed incrementalism* would involve the amount of transit priority implementation increasing by small amounts and gradually over time, in accordance with overall goals and vision.

Use of *disjointed incrementalism* types of approaches might help explain the successes in Zürich and Curitiba, but failure of transportation planning led transit priority implementation in Melbourne and Toronto. *Think Tram*, *Keeping Melbourne Moving* and *Transit City* all appear to have targeted specific objectives or projects[342] and so therefore have involved either a *strategic analysis* style of *incrementalism* or non-incremental change. Having a defined end state, rather than a simpler goal of improvement, may in part increase the likelihood of opposition and delegitimation of the underlying transport plan[343]. Likewise, non-incremental change may be more likely to lead to opposition and political support for returning to the previous status quo.

[342] *Think Tram* initially aimed at an objective of reducing tram journey times by 25%, Keeping Melbourne Moving had a top-down list of specific measures to be implemented (e.g. the plan called for *bus lanes* on Stud Road, rather than just a more general vision of improvements for buses), and Transit City called for LRT lines (Bow 2017a), although perhaps keeping the door open for BRT by using the terminology of Surface Rapid Transit Corridors (City of Toronto & Toronto Transit Commission 2005).

[343] See also the comments from interviewees reported in the Jones (2018) case study of Melbourne's *SmartRoads* framework that "getting agreement around road network objectives could in turn help assess proposals against objectives for different modes…(which) removes the 'politics out of the decision…'(Participant 26)."(p252). However, the Network Operations Planning approach described there appears to adopt, at least in part, a *strategic analysis* approach where proposals are measured against specific objectives for performance, rather than the continuous improvement towards more general goals or visions of improvement. Network Operations Planning, *SmartRoads* and related approaches were briefly discussed in Section 3.2.2.

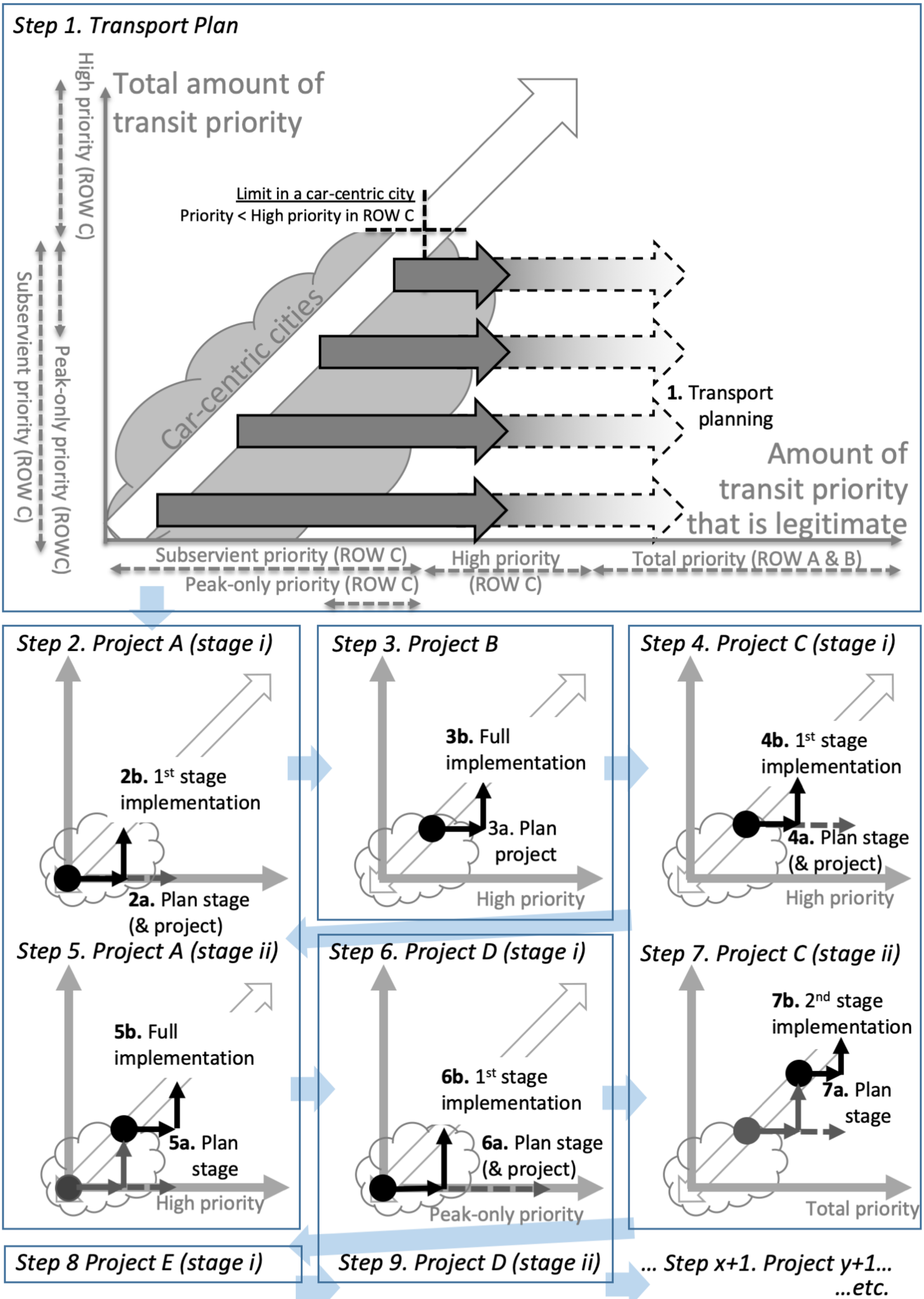

Figure 10.9 *Pragmatic strategy A2: transport planning*

Source: Author's concept

The upper box in Figure 10.9 shows the initial development of a transportation plan. This would provide a high-level overall goal of increasing the level of transit priority. The lower boxes in Figure 10.9 show implementation on a project-by-project and stage-by-stage basis[344]. Part of this being a *pragmatic strategy* may be to **leave the details** of what measures are implemented, where they are implemented, and when they are implemented **to the 'street-level bureaucrats'**.

Implementation theory suggests that it is the 'street-level bureaucrats' who are closest to the community that are more likely to understand what is and what is not politically practical[345]. **Funding** and a **strategic-level direction** towards a general goal or vision of prioritising on-road transit may allow engineers, planners and others working at a tactical level more **flexibility** to **incrementally deliver** transit priority improvements. This might provide implementers opportunities to prioritise transit in ways that are sensitive to local context and the political realities at each site, and which only gradually shift the status quo to reduce the risk of delegitimation[346].

10.3.3 Pragmatic Strategy A3: public processes and/or hearings

Pragmatic Strategy A3 involves holding a public decision-making process, which might involve formal public hearings[347]. Competing pro- and anti-transit priority groups would then have the opportunity to present their arguments. The matter can then be resolved through mediation, arbitration, voting or a formal judgement. Further types of *public processes and hearings* relevant

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[344] Further notes to Figure 10.9: Light blue arrows indicate the order of steps in this indicative and hypothetical example of how such a *disjointedly incremental* and strategic plan-led implementation might progress. It is assumed that the existing amount of transit priority at various sites in the city ranges from *no priority*, *subservient priority* to *peak-only* priority. Step 1 indicates the development of a transport plan that sets a strategic goal of increasing the level of transit priority in the city, perhaps into the range of *high* or *total priority*. Switching to the tactical and project level each subsequent step would involve an increase in priority that is reasonably acceptable given the corridor, local or site context (e.g. the local political factors, the site or budget constraints, etc.). This might involve planning to change a site from having *no priority* to having *high priority* via an intermediate stage of *peak-only* priority (Steps 2 and 5, respectively). Alternatively, it might involve a site where there is already *peak-only priority* that is increased to be *high priority* (e.g. peak bus lanes made full-time) in a single implementation effort (as in Step 3, Project B).
Figure 10.9, of course, only shows an indicative example. However, it seeks to make the point that staging and an incremental approach might be used to reduce the risk of delegitimation. For instance, by the time there has been some successful implementation of *high priority* in Steps 3 and 4 (Project B and C) it might be possible (i.e. *sociologically legitimate*) to return to Project A and implement *high priority* there as well. In this hypothetical example it is suggested that *high priority* is as much as will ever be possible at the Project A site. However, the Project C and D sites might be different, allowing 'street-level' implementers to find a way to eventually implement some form of *total priority* when conditions allow.
It is the overall strategic level plan developed in Step 1 that might provide the goals and visions to help to legitimise transit priority implementation for each project and during each stage. Yet, the order of projects and stages, and 'how much' priority to try to implement in one go at a particular site, might be made at a tactical level and with a willingness to make incremental progress.

[345] See discussion of implementation theory and incrementalism in Chapter 3, Section 3.3.4. Figure 10.9 shows an indicative example of sequential implementation across multiple projects and stages. Project 1 is shown as involving two stages, with the (*2) Transport plan* first helping to legitimise a (*3) Stage 1 implementation* of *peak-only priority*. The object of making only incremental improvements is that, hopefully, by the time the project team is ready to return to the site of Project 1 there has been sufficient successes elsewhere so the (*8) Transport plan* can legitimise a further increase in the (9*) Stage 2 implementation* from *peak-only* to *high priority*.

[346] See also *Experiential Incrementalism: On the Theory and Technique to Implement Transport Plans and Policies* (Talvitie 2006).

[347] Examples of *public processes and/or hearings* from the cases include:

- the *Citizens' Transit Priority Initiative*, which provided an opportunity for pro- and anti-transit priority coalitions to present their cases through campaigning, with judgement passed by the people through direct *citizen control* via voting in a ballot;
- the series of seminars held by Mayor Arzua to examine the competing plans for the development of Curitiba, from which emerged the plan that became the *Plano Diretor*;
- the abandonment of *Transit City* in Toronto resulted from the public election of Mayor Ford, and hence demonstrated that cancelling *Transit City* had *legitimacy by public consent*;
- later in Toronto the 'councillor's revolt' involved a public process of decision-making within City of Toronto council meetings, in which the elected representatives selected the cheaper alternative to build the *Eglinton Crosstown LRT* as per the original plan; and
- the compromise to partially remove the *Clarendon Street Tram Priority Pilot* was legitimised by a council committee meeting moving to adopt the Smith (2005) report recommendations.

to transit priority may include: planning permission approvals hearings, and quasi-judicial hearings[348]; the courts themselves[349]; and investigative public processes such as parliamentary enquiries and Royal Commissions. In general, legitimacy is built through the neutrality of the decision-makers and through the process itself, with both sides having an opportunity to present evidence as to the *reasonableness* of their position.

Sometimes the proponent of a transit priority implementation is forced into these processes, for example through litigation or planning objections. Other times it is the proponent who launches the process as a way of legitimising transit priority implementation proposals, as was the case with the *Citizens' Transit Priority Initiative* in Zürich and the launch of the seminars in Curitiba by Mayor Arzua. Implementers might be more likely to have successful outcomes by launching a public process in the venue of their own choosing and with favourable terms of reference.

However, such public processes might result in an adversarial competition between pro- and anti-transit priority implementation coalitions[350], which may increase the risk of failure to win support. The identity of the final decision-maker and their basis for decision-making might also have a significant impact on the outcome[351].

Existing planning permit processes may provide one venue for building legitimacy on a project-by-project basis, and one that is compulsory in many jurisdictions. Broader scale or special purpose hearings might also be considered to bring technical *reasonableness* to debates over priority implementation. However, setting up a framework in which such *public processes and/or hearings* might take place may be a challenge, particularly in gaining legitimacy and limiting political factors.

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348 Such as through the Ontario Municipal Board (OMB) (Government of Ontario 2009), the Victorian Civil and Administrative Tribunal (VCAT) (Victoria State Government 2017), or similar appeals bodies in other jurisdictions.

349 Such as was ultimately used to resolve disputes over the St Clair Avenue West streetcar improvement project in Toronto (Bow 2016).

350 The Advocacy Coalition Framework (ACF) was briefly discussed in Chapter 3 as part of the review of implementation theories, and provides one perspective through which contests between pro- and anti-transit priority implementation groups might be examined and understood. In the ACF actors are aggregated within the subsystem into a number of 'advocacy coalitions' who "share a set of normative and causal beliefs and who often act in concert" (Sabatier 1988, p. 133). Conflicting coalitions and their strategies are normally mediated by 'policy brokers' who are seeking to find a reasonable compromise and reduce conflict in the formation of government policy. Pro- and anti-transit priority groups are evident in:

- the *Citizens' Transit Priority Initiative* was supported by the transportation professionals and students who submitted it, pro-tram and anti-U-Bahn groups, and the Social Democrats; but was opposed by the City of Zürich (Cervero 1998, pp. 305-6; Nash 2001, pp. 60-70),
- the seminars in Curitiba involved choosing between plans submitted by the Wilhelm group and the UFPR team. The UFPR proposal was withdrawn after a member of the UFPR strongly criticised the Wilhelm plan, failing to understand "the political importance of the hearings, which were not so much to analyse a technical plan but to legitimize it in political terms (Ardila-Gomez 2004, p. 74),
- the abandonment of *Transit City* in Toronto resulted directly from Mayor Ford's electoral victory, while the return to the original plan for the *Eglinton Crosstown LRT* involved a 'councillor's revolt' against the Mayor and his preferred all underground plan (Bow 2018) perhaps representing elements of the pro- and anti-LRT groups, and
- for the *Clarendon Street tram priority pilot,* the *Think Tram* program agencies (VicRoads, Yarra Trams and the State Government) were for the long-term retention of all the measures; but were opposed by those who wanted the scheme removed entirely.

351 For example:

- in Zürich the *Citizens' Transit Priority Initiative* was voted on by the citizens of the City of Zürich who were more likely to ride transit, but not commuters from the surrounding suburban areas who tended to be more likely to use private vehicles (Nash 2001, pp. 51-64),
- 80% of Mayor Ford's votes came from suburban areas, and there is a sharp divide in the City of Toronto between voters from the inner city, who may be more likely to ride transit, and voters who live in the suburban areas who may be more likely to drive (Taylor 2013),
- for the *Clarendon Street tram priority pilot* the decision of the City of Port Phillip's Strategy and Policy Review Committee (City of Port Phillip 2005) led to the partial removal of the scheme, despite the program being implemented by the Victorian State Government who has direct authority over the road and transport network. Hence, the decision may have reflected the views of local constituents within the City of Port Phillip, rather than people across the Greater Melbourne area, and
- Curnow (2006) describes an example where transit priority implementation in Melbourne was appealed to VCAT on heritage grounds. It involved installation of a yellow plastic separation kerb and "is just one of many examples where an apparently straightforward road space management treatment has met opposition, which has hindered implementation of improvements" (Curnow 2006).

10.4 Approach B: avoiding impacts on other road users

The cases indicate that opposition to transit priority implementation generally centres around the negative impacts that the measures may have on other road users[352]. This is not just a problem for *car-centric* cities, as opposition because of impacts on traffic also had to be overcome or addressed in Zürich and Curitiba[353]. In general, it appears that it is not making transit services better that leads to protests from motorists. Instead, opposition tends to occur because traffic conditions have become worse. Therefore, a simple and pragmatic approach for *car-centric cities* is to avoid implementing transit priority in ways that negatively impact other road users.

10.4.1 Pragmatic Strategy B1: grade-separation

Grade-separation has been discussed in Chapter 9 as a potential progression for transit priority implementation in *car-centric cities*[354]. As a *pragmatic strategy* grade-separation neatly sidesteps much of the likely opposition to on-road transit priority **and** provides *total priority* for transit. However, the high cost of *grade-separation* may cause legitimacy problems due to a potential lack of *reasonableness*.

Grade-separation might be often thought of as involving an entire line, or at least large portions of a route. However, various examples from Toronto suggest the use of *grade-separation* over relatively short sections[355] as a *pragmatic strategy* to get on-road transit past a challenging area or where other forms of priority are politically or institutionally impossible. The high costs of *grade-separation* might be (politically) justifiable for short sections of a route, or to get a transit route through a difficult section where there are no other options likely to gain legitimacy. Support might also be found amongst other road users, in that motorists might also be in favour of *grade-separation* to remove transit from general traffic lanes at bust locations.

Figure 10.10 shows selected images from one example of a relatively short grade-separation in Toronto: the Queen Quay tunnel in the Harbourfront area.

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[352] In Clarendon Street opposition was focused around loss of on-street parking, in Stud Road there was objection to the loss of traffic lanes, and in Toronto the *Transit City* plan was branded as a ‘war on cars’.

[353] Prior to the *Waiting Time Zero* policy becoming accepted, impacts on traffic appears to have been a major constraint on transit prioritisation in Zürich. For Curitiba, the *Rua des Flores* pedestrian mall was directly protested by motorists. In contrast, the later development of Curitiba’s structural axes system appears to have pre-empted problems associated with traffic impacts by providing road capacity for general traffic on the outer one-way streets of the trinary road system. Likewise, the *bus boarding tubes and direct bus services* increased transit capacity, but appear to have largely avoided having negative impacts on motorists.

[354] The *Eglinton Crosstown LRT* in Toronto, and the original *Tiefbahn Plan* to move streetcars underground and the current *Rosengatenstrasse* project to move traffic underground in Zürich provide examples of using *grade-separation* to provide both transit priority and traffic capacity.

[355] *Grade-separation* is widely used across Toronto to allow streetcars and buses to directly access the mezzanine levels of many subway stations. This is a legacy of the City of Toronto’s pay-on-entry fare system with streetcars and buses directly entering the ‘fare-paid’ zone at subway stations so that transfers did not require passengers show a ticket (Cervero 1998, p. 80). However, having streetcars and buses directly enter stations also means that there is preferential access or skipped traffic signals for transit vehicles, shorter walking distances for transfers, no exposure to passing traffic, and better protection from the ice, snow and below freezing temperatures that are typical during Toronto’s winters.

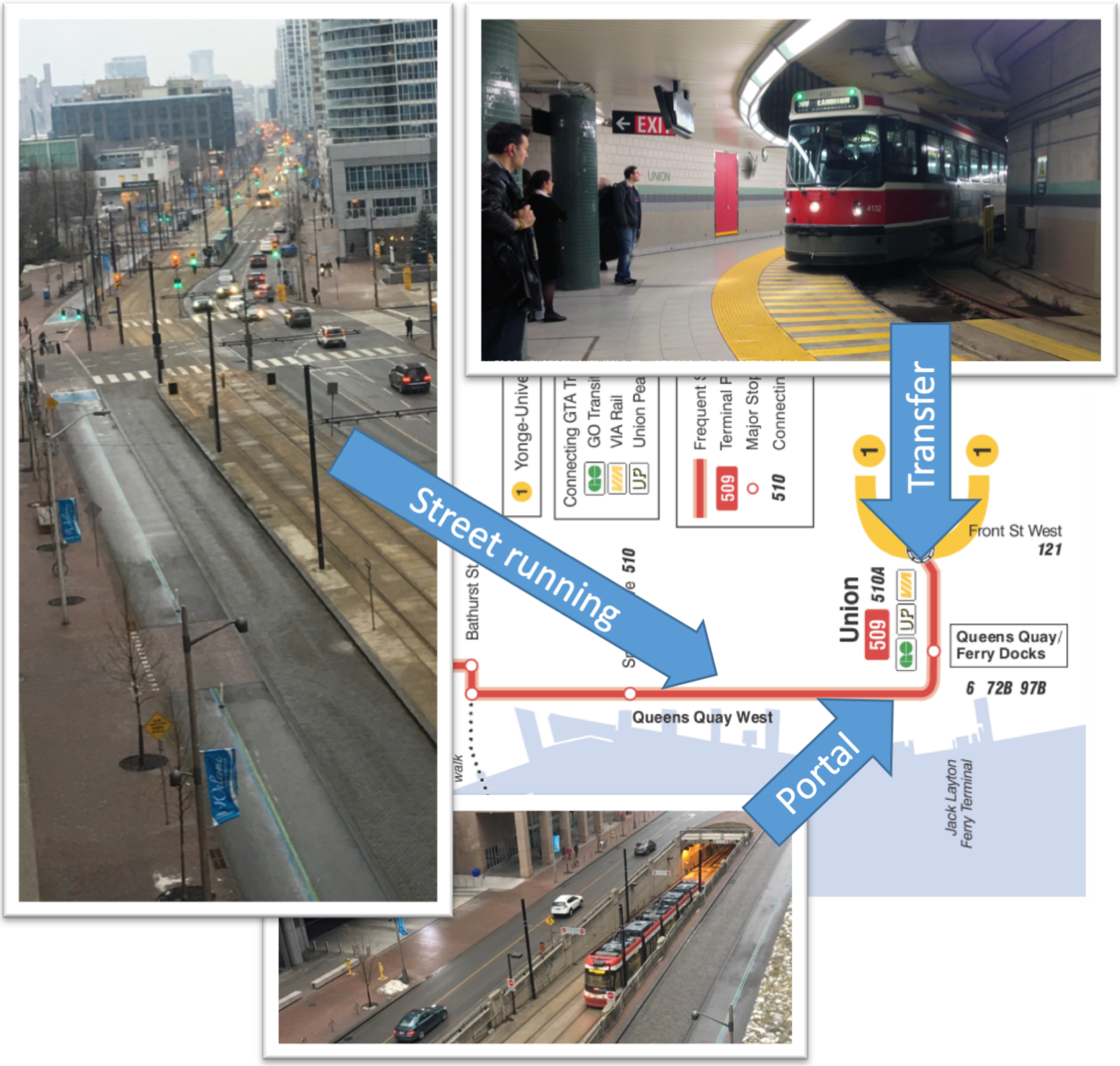

Figure 10.10 Queen's Quay to Union Station tunnel in Toronto
Sources (clockwise from top left): author, including images from Bow (2014), Toronto Transit Commission (2019a)

Figure 10.10 shows how a 500-metre underground tunnel connects from Queens Quay West to Union Station. Passengers transferring to/from the streetcar at Union Station are already within the 'fare-paid' zone. This allows direct transfer to/from the Yonge-University-Spadina subway line (Line 1) without passing through fare-control gates.

More importantly for transit operations, the tunnel provides the 509 streetcar with ROW A.1 grade-separated operating environment for this short section[356], but also passes beneath three street intersections. The tunnel means that total priority is provided for transit, while the intersections and

[356] When at street-level, west of the portal, the streetcar operates in ROW B.3 (non-mountable kerb separation).

are avoided entirely. Providing similar levels of priority if the streetcar line was at-grade would require the use of *full-priority TSP* (i.e ROW A.2)and so have negative impacts on traffic.

10.4.2 Pragmatic Strategy B2: building new road capacity

Pragmatic Strategy B2: building new road capacity is another way to prioritise transit while avoiding negative impacts on other road users. Road widening to accommodate *bus* lanes is a common example of this *pragmatic strategy*. This, and other forms of expanding road capacity, are evident in the cases[357]. Such a strategy may provide a way to implement *high or total priority* for transit in *car-centric cities*, but with reduced risk of political opposition from private motorists[358].

This *pragmatic strategy* is largely similar to the *grade-separation* strategy, but includes a broader range of possible transit priority measures. Extra lanes might be added to a road to provide a new *bus lane* or *longitudinal-separation*. Similarly, short *queue jump lanes* might be built alongside an existing intersection approach or freeway entrance to allow transit vehicles to pass around traffic congestion, but without adding delays to other traffic.

A challenge when using this *pragmatic strategy* is that road capacity expansion may be costly. Narrow road reserve widths may also limit the practicality of widening roads to prioritise transit without costly or politically challenging land acquisition. However, this may be the only option in a *car-centric city* for providing *high* or *total priority* without *grade-separation*, because worsening conditions for private motorists may be politically unpopular or even impossible.

10.4.3 Pragmatic Strategy B3: subservient priority

Pragmatic strategy B3: subservient priority involves only implementing transit priority measures that do not significantly impact other users. It comes from Currie (2016a, p. 492), who defines *subservient priority* as "giving lane space and traffic signal time to buses, but also being sympathetic to the dominant transport provider – car traffic".

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[357] Examples of this *pragmatic strategy* from the cases include:

- in Curitiba, the high capacity one-way traffic links in the structural axes trinary road systems provided capacity to offset the road space used by the *busways*;
- in Melbourne, the original plan for the *Stud Road Bus Lanes* involved widening the road along the entire length so that the existing general traffic lanes would remain largely unchanged, with the *bus lanes* to be provided as entirely <u>new and additional capacity</u>; and
- again in Melbourne, the local council added new parking spaces on the streets surrounding Clarendon Street to provide replacements for the on-street parking spaces lost due to the installation of the *far-side stops.* However, this was done after the initial installation and does not appear to have provided sufficient legitimacy to overcome the complaints about lack of parking due to the scheme. It is impossible to tell with any certainty, but it may be that if the new parking spaces had been added at the same time as the *far-side stops* were implemented there may have been more legitimacy for the pilot, as there would not have been any period when the parking supply was reduced. Instead, the addition of the new parking spaces after complaints had already arisen suggests that the scheme was already in the process of being delegitimated and this was an attempt to limit or respond to the opposition.

[358] There are many other examples of this *pragmatic strategy,* beyond the implementations included this study. Some examples from the case study cities include:

- the *York University Busway* in Toronto was a new road constructed within an existing electricity corridor (Bow 2017b);
- the implementation of the *SmartBus* network in Melbourne involved the addition of *TSP*, *bus lanes* and *queue jump lanes*, and other priority measures as an expansion of road capacity in many locations; and
- Melbourne's Eastern Freeway has *shoulder running bus* operations during peak periods.

However, from the perspective of legitimacy *subservient priority* might be more about having **no obvious** impacts on other traffic. For example, highly visible transit priority systems, such as *special transit phases*, might produce problems by giving a sense to other road users that they are being negatively impacted. In contrast, *green extensions*, *red truncations* or other such TSP measures that do not require special transit signals may be less obvious to other road users.

There are various examples evident in the cases[359], while s*houlder-running bus lanes* (ROW C.5) provide an obvious example of this sort of *subservient prioritisation* based on facilitation or “transit-supportive roadway strategies”(Ryus et al. 2016) rather than ‘prioritisation’ of transit over other traffic (discussed in Section 2.2). The perspective perhaps provided by viewing *subservient priority* through a lens of legitimacy, and for thinking about transit prioritisation more generally, is that technical efficiency and performance might be **less important than a lack of visibility**[360].

[359] Examples from the cases include:

- the initial efforts in Zürich, which appear to have aimed to improve conditions for on-street transit without significantly impacting other traffic;
- the remaining measures in Clarendon Street after the compromise, in that the *hook turns*, *turn bans* and *separation kerb* were retained because that did not make conditions significantly worse for other road users; and
- the *bus boarding tubes* in Curitiba were *subservient* as they decreased bus dwell times, but did not significantly impact on other traffic.

[360] See also Chapter 3, Section 3.5.5 for discussion of the *Dunning-Kruger effect* (Dunning 2011) and its relevance to the ‘empty *bus lane*’ problem (Vuchic et al. 1994, p. 33). In this context, the point is that a bus lane might provide excellent technical performance as far as allowing high speeds, but the bus lane itself and the space in between the buses is often highly visible to drivers in adjacent lanes.

10.5 Approach C: building legitimacy through implementation

The sudden implementation of the *Rua das Flores* pedestrian mall in Curitiba was based around the idea that "if they had a chance to actually see it, everyone would love it" (Mayor Lerner quoted in McKibben (2007, p. 65)). This is an example of *Approach C: building legitimacy through implementation*. When applied to transit priority implementation this approach involves demonstrating the *reasonableness* of prioritising transit practically and in the real world.

Building legitimacy through implementation also suggests an approach of experimenting and refining transit priority measures after they have been installed to respond to both technical and non-technical challenges. Measures may not necessarily have to be perfect immediately after implementation. Instead small incremental changes, pilots and trials may allow implementers some flexibility to respond to objections and problems before delegitimation occurs. Adopting an experimental approach may also mean that transit priority measures can be withdrawn or altered with minimal political consequences if significant opposition develops.

10.5.1 Pragmatic Strategy C1: bottom-up and incremental

Pragmatic Strategy C1: bottom-up and incremental implementation is based on *disjointed incrementalism* and *bottom-up implementation theory*, which were discussed in Chapter 3 in Sections 3.3.3 and 3.3.4. *Disjointed incrementalism* implies having an overall goal of increasing transit priority levels, but implementing this gradually through successive small changes to the status quo. The 'bottom-up' part of the *pragmatic strategy* suggests empowering 'street-level implementers' to use their knowledge of the local context to target efforts: to where there is lower potential for delegitimation or opposition; and to where transit priority measures can be of greatest benefit. This *pragmatic strategy* is also based on Progression Q: gradual implementation and success over time, which was identified in Chapter 9 as a way in which transit priority implementation succeeded despite initial delegitimation or inaction[361].

Pragmatic Strategy C1: bottom-up and incremental implementation may not need an official transport plan. Instead, engineers, planners and operational managers may only need sufficient funding and authority to identify and implement small improvements over time. Figure 10.11 shows an indicative example of how this *pragmatic strategy* might occur in a hypothetical *car-centric city*.

[361] Examples from the cases are:

- in Zürich, the incremental implementation of transit priority and a gradual shift from the initial reluctance to implement measures that would negatively impact on other traffic to the *Waiting Time Zero policy*;
- In Curitiba the incremental expansion of the *Plano Diretor* from one to three *busways* as additional structural axes where added to the plan; and
- Also, in Curitiba the incremental introduction of *bus boarding tubes*, which:
  - started as a concept developed by Jamie Lerner while working as a transport planner in a different city,
  - were initially implemented with new *direct bus services* on the north-south axes,
  - were then included with new *direct bus services* on the other structural axes,
  - were then adopted together with bi-articulated buses on the north-south *busway*, instead of a proposed LRT to replace the *busway*, and
  - were then introduced across the rest of the *busways* and bus network.

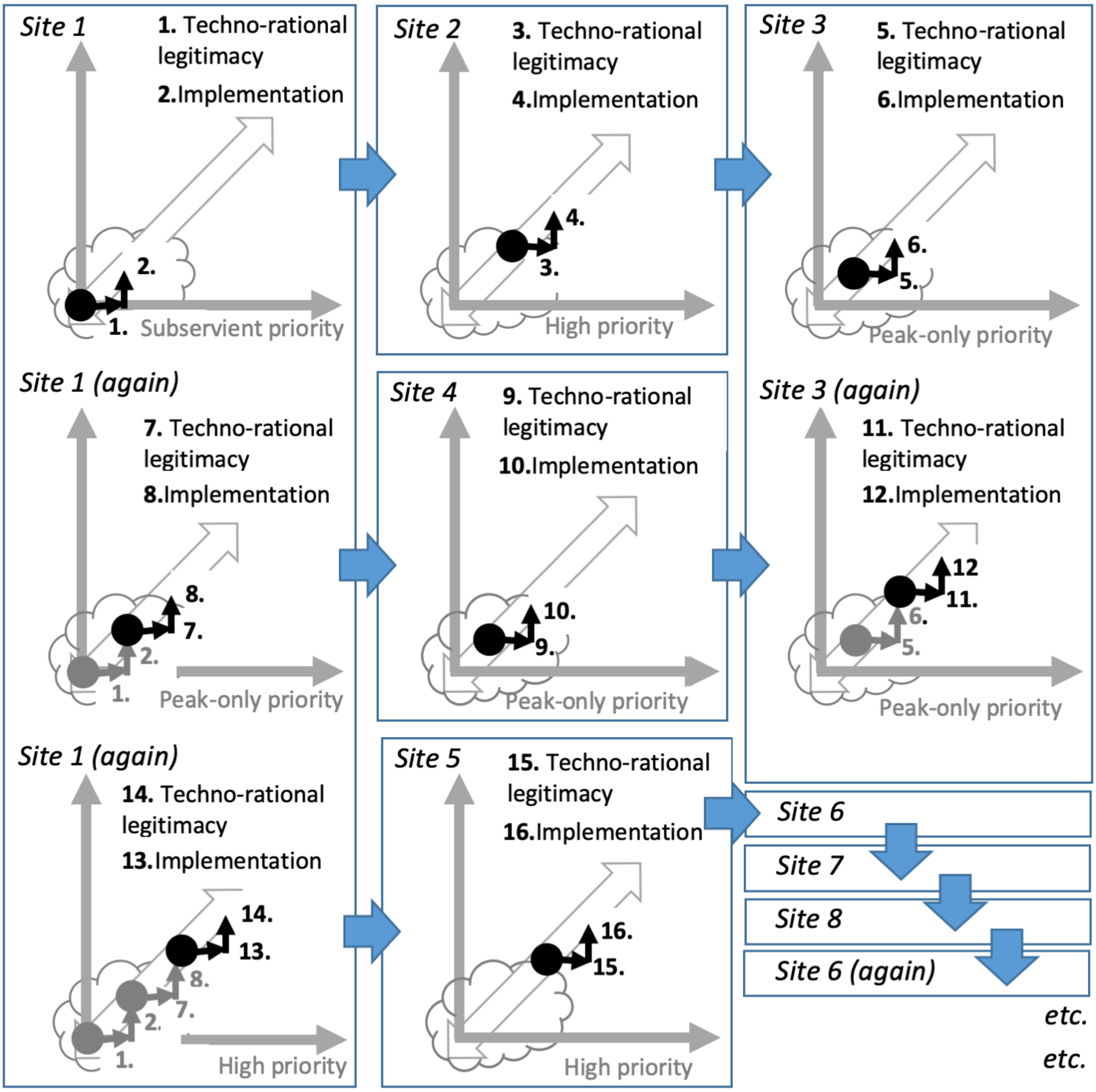


Figure 10.11 Indicative example of successive *bottom-up and incremental* transit priority implementations

Source: Author's concept

Figure 10.11 show incremental increases to transit priority occurring sequentially at various sites across a hypothetical city. Firstly (*1) techno-rational legitimacy* and (*2) implementation* occurs at Site 1, then at Sites 2 & 3, then at Site 1 again as a Stage 2, and so on. For each site the 'street-level' bureaucrats might assess whether there is techno-rational legitimacy for an increase in priority level, but also whether such an increase is politically feasible at that current time. Some sites might require more than one implementation to deliver the amount of transit priority that is technically legitimate.

Melbourne's tram network provides various examples of *Pragmatic Strategy C1: bottom-up and incremental* transit priority implementation. Early exploratory research for this study examined transit priority implementation strategies on the Melbourne tram network, as reported in Reynolds et al. (2018). Many instances of bottom-up implementation efforts were identified across the network, and an example is shown in Figure 10.12.

a) before b) after

Figure 10.12 Traffic island installation, Fitzroy Street, St Kilda, Melbourne

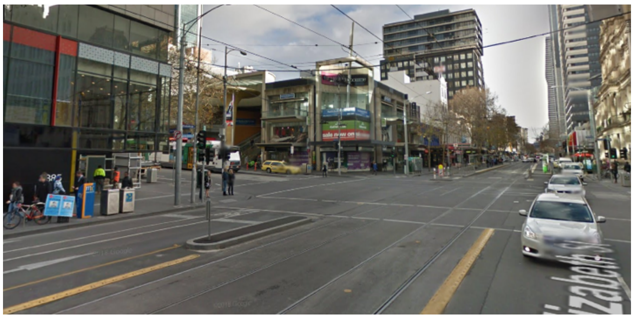
Source: Reynolds et al. (2018), from Google (2020b)[362]

Figure 10.12 shows minor improvements works in Fitzroy Street, St Kilda, where a new traffic island was added to prevent vehicles performing U-turns across the tracks. These works were independent of other improvements, and appear to have been initiated from the bottom-up as a minor change to improve the network. Other examples have involved slightly larger changes, such as recent improvements along Lygon Street (Nine News Melbourne 2018). However, in general these transit priority implementations appear to have been driven from the bottom-up, rather than as part of larger top-down governmental programs.

Sometimes an increase in priority level might be incorporated into other projects such as recurrent maintenance or capital improvements. Recently there have been many changes across the Melbourne tram network to comply with the (top-down) requirements of the Federal Government's Disability Discrimination Act 1992 (DDA)(Australian Government 2016). This involves building raised platforms to provide level-boarding access to low-floor trams. However, further transit priority measures have been included into these works through bottom-up action by designers, project managers and the tram operator, and selected examples are shown in Figure 10.13.

[362] Google Street View images reproduced as per guidelines at https://www.google.com/permissions/geoguidelines/.

a) Elizabeth Street before



b) Elizabeth Street after

c) Acland Street, St Kilda, before

d) Acland Street, St Kilda, after

e) Swanston Street, Melbourne CBD, before

f) Swanston Street, Melbourne CBD, after

Figure 10.13 Selected examples of priority implementation as part of DDA-compliance works on the Melbourne tram network

Sources: Reynolds et al. (2018) and Google (2020a)[363]

Figure 10.13 shows:

- (a) before and (b) after the installation of *platform stops* in Elizabeth Street, Melbourne CBD, which included relocation of the northbound stop to the far side of the Bourke Street and the installation of *fully-mountable kerb* to create a ROW C.3 operating environment;
- (c) before and (d) after the conversion of Acland Street from a *mixed traffic* environment (ROW C.11) to a *pedestrian and transit mall* (ROW C.1); and
- (e) before and (f) after the replacement of a *safety zone stop* in Swanston Street with a *platform stop*, which also involved the creation of a *transit mall* environment (ROW B.4) for a short section south of Franklin Street.

All of these examples involve upgrading tram stops to be DDA-compliant and provide level boarding access to low-floor trams. However, the works have also included improvements to tram priority,

[363] Google Street View images reproduced as per guidelines at https://www.google.com/permissions/geoguidelines/.

which are not necessarily required to provide DDA-compliance. Rather, designers and project managers have taken advantage of the legitimacy provided by the top-down DDA project to include minor priority upgrades as part of the improvements. These projects have not been without controversy and opposition[364], but the DDA requirements and compliance deadlines provide a compelling reason for the works to go ahead. This combination of *bottom-up* transit priority into a *top-down* capital improvement project was labelled *hybrid implementation* in Reynolds et al. (2018). It might also be thought of as ***opportunistic** implementation* due to implementers taking the opportunity to add transit priority measures into another project, which has its own sources of *normative, sociological* and other types of *legitimacy* that are possibly unrelated to the prioritisation of transit vehicles.

These examples from Melbourne suggest that *bottom-up and incremental* implementation may be an effective way to increase transit priority levels gradually, while limiting the risk of delegitimation and removal. For 'street-level bureaucrats' *the bottom-up and incremental* strategy suggests:

- doing the easy implementations first, and leaving the more politically challenging locations until after there have already been some successes; and
- adding transit priority improvements whenever possible to recurrent maintenance works and capital improvements, or as other opportunities arise.

10.5.2 Pragmatic Strategy C2: pop-ups

Pragmatic Strategy C2 involves using *pop-ups* to legitimise the implementation of transit priority measures. *Pop-ups*[365] are a concept from *tactical urbanism*, but are also evident in the example of the sudden implementation of the *Rua des Flores* pedestrian mall In Curitiba. In the context of transit priority implementation, a *pop-up* might involve the sudden implementation of a transit priority measure using temporary materials and an experimental approach as a way of demonstrating that prioritising transit is *reasonable*.

Figure 10.14 shows how *Pragmatic Strategy C2: pop-ups* might occur in the context of the *conceptual framework for transit priority and legitimacy*.

[364] Initial consolidation of tram stops along Collins Street in the Central Business District (CBD) provoked a protest march by the Public Transport Users Association (2005). Traders in Acland Street, St Kilda similarly protested proposed works to install *platform stops* because of the potential for negative impacts on business (Carey 2013). This stalled the project by two years (Diemer et al. 2018) and led to significant changes to the proposal and a larger scale streetscape renewal project led by the local council (City of Port Phillip et al. 2015). More recently, works to upgrade tram stops along Nicholson Street (Transport for Victoria 2018) were delayed because a planning permit application was rejected by the local council due to on-road bicycle facilities not being included as part of the project (Jacks 2018a). Notably, however, it appears that it is not the inclusion of additional minor transit priority improvements that has led to opposition and delays. Rather, the opposition appears to have centred around the impact of *platform stops* themselves. This is despite the compelling reason for the works, which are to provide disabled and mobility-impaired access to trams, and the *normative legitimacy* provided by the DDA legislation.

[365] As discussed in Chapter 3, *pop-ups* can be a way of "protesting, proto-typing, or visually demonstrating the possibility of change" (Lydon & Garcia 2015, p. 12). A *pop-up* involves a small-scale implementation, sometimes with and sometimes without official permission, that may be temporary in nature and may be used as an experiment or test-bed, and which might be used as a tactic to shortcut the complex planning application and permission processes that are typically required before changing the street environment.

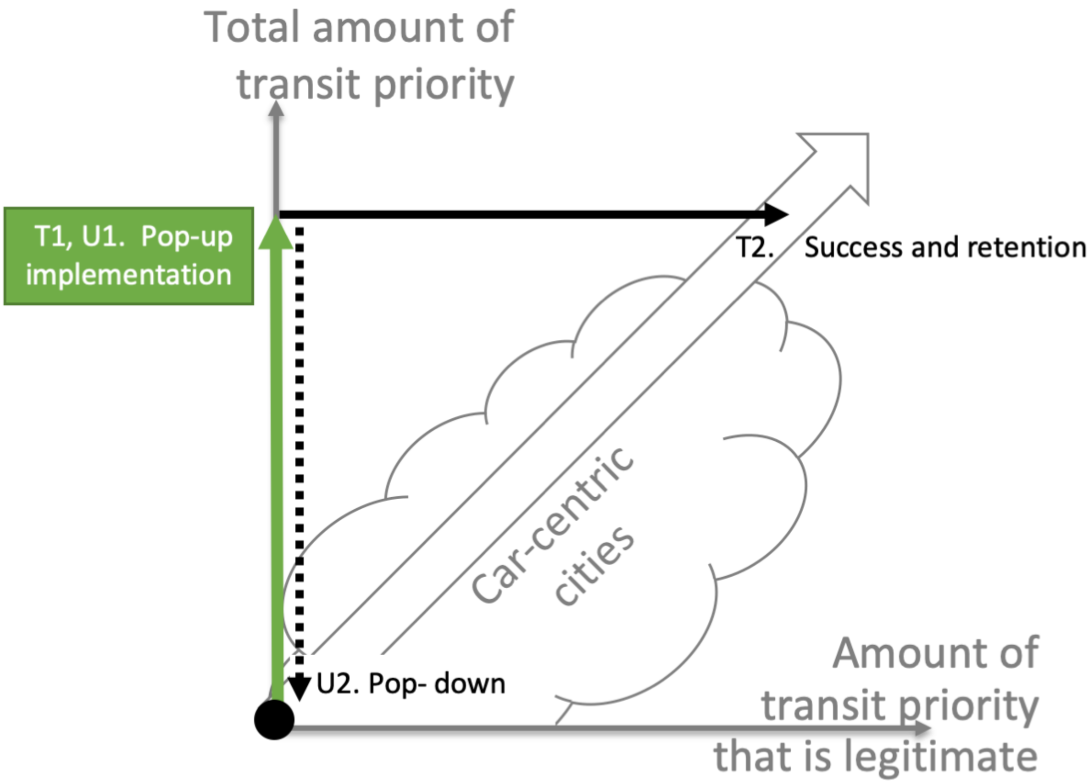


Figure 10.14 *Pragmatic Strategy C2. pop-ups* interpreted as Progression T: successful and Progression U: unsuccessful

Source: Author's concept

Figure 10.14 shows two possible outcomes of a pop-up implementation of transit priority as Progressions U and T. Both progressions start with a sudden *(T1, U1) pop-up implementation*. This would result in there being more transit priority than the amount that is legitimate[366]. However, if the transit priority measures prove to be *reasonable,* they may gain legitimacy, leading to (*T2) success and retention*. Alternatively, the pop-up may not gain sufficient legitimacy for long-term retention and therefore be removed in a *(U2) pop-down*.

The only clear example of *Pragmatic Strategy C2: pop-ups* from the cases is the *Rua des Flores* pedestrian mall implementation in Curitiba, which did not involve transit prioritisation[367]. There are, however, notable examples of *pop-ups* being used to implement transit priority measures in other locations, beyond the cases studied here[368]. In general, *Pragmatic Strategy C2: pop-ups* suggest

[366] Refer back to discussion of under-legitimised transit priority in Chapter 9.

[367] However, it is notable and included as an example here for three reasons:

1. The Rua des Flores was temporarily closed to traffic during the earlier visit of International Architect Union (IAU). This appears be an earlier pop-up that was intended to pop-down, but was also a way to build legitimacy for the idea of closing the street permanently later on. See Section 8.1 in Chapter 8. There were effectively two pop-ups. The first was a temporary demonstration during the IAU meeting that Lerner's team used as an opportunity to lobby the visiting IAU members to make favourable statements to the press (Ardila-Gomez 2004, p. 105), thereby building legitimacy through trust (in an idea endorsed by world experts in architecture). This therefore helped to legitimise the second pop-up, when 100 metres of the mall was suddenly constructed over a weekend.
2. Despite initial opposition from motorists and a planned protest drive, the *Rua des Flores* pedestrian mall proved to be highly successful and was retained and expanded, in part due to some political manoeuvring by the Lerner team and their use of a children's art festival to further build legitimacy for the idea of the street being for people rather than cars.
3. The success of the pop-up pedestrian mall not only legitimised the mall itself, but also helped to legitimise the underlying *Plano Diretor* and its call for transit priority implementation.

[368] These include:

- a morning *peak-period bus lane* that was implemented on Broadway in the City of Everett, Boston, with only limited forewarning for the public and other stakeholders. The Broadway *pop-up* involved creating a *bus lane* each morning between 4am and 9am using only traffic relatively small-scale changes to the road environment such as the installation of *peak-only priority* in the form of *bus lanes*. The use of temporary materials, such as cones and construction-style signage, also suggests a very temporary type of implementation that might be installed and then removed on a daily basis. This appears to help lower the political risk of opposition or failure, as the *pop-up* can easily be abandoned if there is a significant negative response by simply not installing it again the following day.

10.5.3 Pragmatic Strategy C3: trials

Although similar to *pop-ups*, *Pragmatic Strategy C3: trials* has been identified as a separate and distinct strategy for transit priority implementation in *car-centric cities.* This is because it explicitly involves two stages: (1) building *legitimacy* for a limited period trial; and then (2) using evidence from the trial to build *legitimacy through reasonableness* for the long-term retention of the transit priority measures.

This pragmatic strategy has been developed based on formal trials from the cases, and further examples reported elsewhere[369].

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cones and roadworks construction signage. The *bus lane* used space that was normally allocated to 130 parking spaces. However, parking was already banned overnight once or twice a week for street sweeping and the *bus lane* was removed each day before most businesses opened. There was some coordination with the bus operator, but this project was run as a *pop-up* public process by City of Everett staff, with support from the pro-transit mayor. Public feedback from a survey of bus riders was quickly placed online, and the mayor was supportive of the project in front of the media during the first week. This led to the pilot being extended beyond the initial one week *pop-up* for 6 months, at which time the *bus lane* was linemarked and made permanent (Hovenkotter & Monty 2018; TransitCenter 2018). ;

- a *bus and bike lane* on Washington Street, also in Boston, which ran as a *pop-up* experiment for one month, but was then made permanent when its removal “frustrat(ed) bus riders and advocates who expected the test run to transition seamlessly to a permanent improvement”(Schmitt 2017, 2018b);
- “Cone Pilots” on Massachusetts Avenue, Arlington MA (1 month), and Hennepln Avenue, Minneapolis MN (3 days)(UCLA Institute of Transportation Studies 2019); and
- “Quick-Build” and “Tactical Transit” projects (Garcia & Wall 2019). These are interrelated new terms for *pop-up* style transit priority implementation, which may also have elements of the *bottom-up and incremental pragmatic strategy*. These terms appear to be coming out of North America and are based on the *tactical urbanism* approach, Garcia and Wall (2019) define a “Tactical Transit” implementation as being one that:
    - “is implemented on a much faster timeline than typical capital projects (within 1 to 2 years);
    - uses impermanent or low-cost materials;
    - is executed with a much smaller budget than a typical capital project (usually less than $100,000);
    - seeks to build upon the design of infrastructure;
    - is short in duration but part of a larger or longer-term effort;
    - is used to accelerate implementation of transportation infrastructure; or
    - all of the above.”

369 Although the word ‘trial’ is evident in descriptions of the Route 10 tram prioritisation in Zürich and offered by Mayor Lerner to opponents of the *Rua des Flores pedestrian mall*, these may not be clear examples of formal trial processes.

The *Clarendon Street Tram Priority Pilot* in Melbourne does appear to be a trial. However, may not provide a clear example of *(V1, W1) legitimacy building for a trial* as there was a “lack of initial consultation” (Smith 2005, p. 11) with the local community prior to the implementation of the pilot. Together with a rapid design and implementation period, this appears to have led to a lack of trust, with those opposed to the measures believing that the scheme’s permanent retention was already “a done deal” (Quin 2005a) prior to the performance of the trial being formally evaluated. Regardless, the ultimate outcome was a compromise (*V4b) partial approval* of the trial measures, with adjustments made to remove the *far side stops* but retain other measures.

The ***King Street Transit Pilot*** in Toronto may provide a clearer example of *Pragmatic Strategy C3: trials*, with a year-long trial being used to successfully implement transit priority in a *car-centric city*. The King streetcar had been in need of greater levels of priority since the 1980-90s, when it was already operating at two-minute headways during peak periods. *Peak-only streetcar lanes* were installed in 1993, but had failed due to limited enforcement and problems with parked cars. However, there was insufficient political will and legitimacy to do anything further, despite proposals throughout the 2000s for *transit malls*, *road closures* and a Downtown Relief Line (subway) to improve transit accessibility along the King corridor (Levy 2015; Bow 2019b).

Before the *King Street Transit Pilot* was implemented a visioning study and an extensive technical report had been prepared to detailed the reasons for the proposal (Keesmaat 2016; City of Toronto et al. 2017). These *technical enquiry* and *transportation planning* documents appear to have

While both *pop-ups* and *trials* involve an experimental approach, *trials* suggest:

- a more rigorous process of gaining *legitimacy* and formal approval for the *trial*;
- a longer and fixed time frame for the pilot, which may run over a period of months or around a year; and
- the potential to test larger changes to the road environment and use more permanent materials.

A reason for undertaking a trial is to test whether there is sufficient *legitimacy* for permanent transit priority. What a trial appears to allow is to separate the priority implementation into two, potentially less controversial, stages where the questions are essentially: (1) should a limited-period experiment be allowed? and (2) based on the result of the experiment should the measures be retained long term?

Figure 10.15 shows *Pragmatic Strategy C3: trials* in the context of the *conceptual framework for transit priority and legitimacy* during the (a) trial period itself, and (b) over the longer-term for transit priority implementation or retention after the trial.

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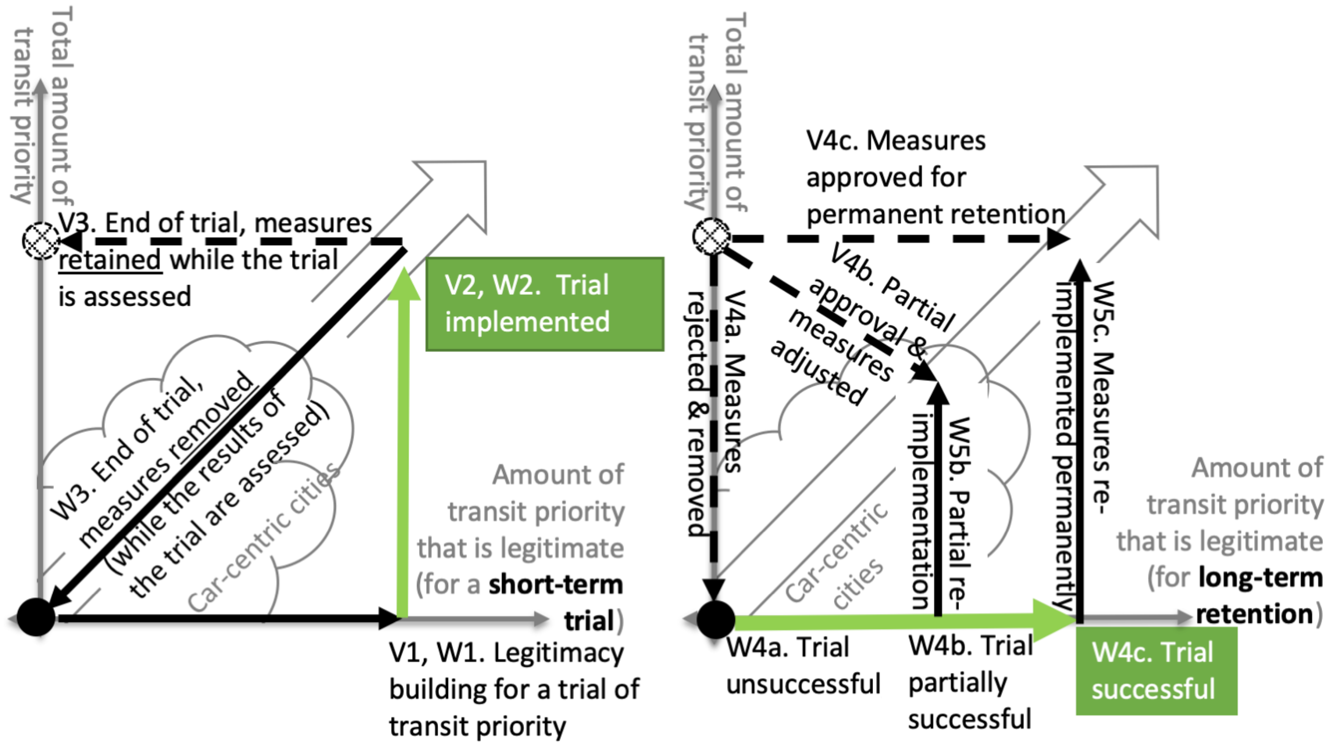
helped to provide legitimacy for the trial, and the City of Toronto Council provided formal approval and the *normative legitimacy* that allowed the one year pilot to go ahead (City of Toronto 2017). The pilot involved the installation of far-side stops and the banning of through-movements by private vehicles. General traffic was still allowed to travel along King Street to access businesses and adjoining properties, but only for a maximum of one city block. This created a ROW C.9 operating environment, with transit operating in *mixed traffic*, but with general traffic through movements (along the corridor) restricted so as to advantage transit (see Table 2.5, Chapter 2).

Despite the pilot having legitimacy, it was opposed by some members of the public. Dunn (2016) highlights the conflicting views of an urban planning expert who noted that the King streetcar carried 65,000 passengers per day, versus a professor of urban economics and planning who was concerned about the impact of traffic restrictions in King Street on businesses and families. Cheung (2016) likewise shows how the needs of businesses on King Street may have reduced the legitimacy of transit priority in the minds of City councillors. More direct opposition to the *King Street Transit Pilot* occurred, after the measures were installed, in the form of ice sculptures and protests involving street hockey (Harris 2018; O'Neil 2018).

However, the benefit of having a two stage process is that by the time the one-year pilot was drawing to a close and a decision about whether to implement transit priority measures needed to be made "…the topic ha(d) near disappeared from the collective consciousness" (Mok 2018) and "nobody (was) complaining about King Street anymore"(blogTO 2018a). It appears that the technical findings of a review into the pilot's performance (City of Toronto et al. 2019), which demonstrated the *reasonableness* of the scheme, could therefore be viewed in a less politically-charged environment. Ultimately in Toronto the trial was successful and the City Council decided to implement the measures on a permanent basis (CBC News 2019).



a) trial: Progression V: retention and Progression W: removal

b) long-term: Progression X: success, Progression Y: partial success, and Progression Z: failure

Figure 10.15 ***Pragmatic Strategy C3. Trials***

Source: Author's concept

Figure 10.15a)(left) shows the short-term trial legitimacy associated with the implementation of transit priority measures as a trial, in and of itself. This involves (*V1, W1*) *legitimacy building for a trial of transit priority* and the (*V2, W2*) *implementation of the trial* itself. However, the trialled measures do not have any long-term legitimacy; they are only legitimate for as long as the trial lasts.

At the end of the trial the *(V3) measures might be retained* while the results of the trial are assessed. Alternatively, the arrangements under which the trial was run might be that the (*W3*) *measures are removed immediately at the end of the trial*. Either way, at the end of the trial the measures have lost the legitimacy that they have for being there because they are being trialled. However, by then they may have gained legitimacy for longer-term retention.

Figure 10.15b)(right) shows the long-term legitimacy associated with the trialled measures, where decision-making would revolve around what level of transit priority is legitimate for **permanent retention**. Three alternative outcomes might be:

- a return to the previous status, with none of the trialled measures gaining sufficient legitimacy for retention (*V4a*) or reinstatement (*W4a*);

- a compromise or partial implementation where only some of the scheme is retained (*V4b*[370]) or re-instated (*W4b*); or
- success of the trial and permanent retention (*V4c*[371]) or reinstatement (*W4c*) of all of the measures that were trialled.

An important point, however, is that while the trialled measures might still be present, any *legitimacy* that they had by virtue of 'being an experiment to see if transit priority works' is lost at the end of the trial (*V3*), and perhaps especially if the measures themselves have also been removed (W3). Hopefully, however, legitimacy (e.g. *sociological, reasonableness*) to support their long-term retention has by then started to build.

This suggests that there is likely to be at least some overlap between stages 3 and 4 in Progressions V and W. There is likely to already be some underlying legitimacy for the long-term retention of the measures prior to the trial actually starting, given that there was enough legitimacy to even be contemplating transit prioritisation in the first place[372]. If the trial has lasted all the way to the end,

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[370] The *Clarendon Street tram priority pilot* provides an example of this Progression, albeit that it is not entirely clear when the trial officially ended. Regardless, the measures were retained as per the trial (*V3*) until the evaluation reporting was completed and the (Smith 2005) recommendations with accepted by the Council (City of Port Phillip 2005), leading to the partial removal of the measures (*V4b*).

Not shown in Figure 10.15b)(right) is a further possibility, where in the post-trial decision-making it turns out that there is sufficient legitimacy to implement <u>more</u> transit priority than was trialled. However, there is a limit to how many possibilities can be shown in this generalised figure, and this seems to be a less likely outcome.

[371] The *King Street Transit Pilot* in Toronto provides an example of this Progression. Towards the end of the one-year pilot period there was some uncertainty about what would happen next (Mok 2018). A report to City Council put the cost of removing the pilot at approximately $CA500,000, and recommended the retention of the measures for up to six months while the results of pilot were evaluated (Murray 2018). This extension was passed by Council (19 to 3 with 4 absent)(BlogTO 2018b; City of Toronto 2018)(*V3*). The final (technical)recommendations and council decision to retain the trialled measures occurred four months later (CBC News 2019; City of Toronto 2019a; City of Toronto et al. 2019)(*V4a*).

This example perhaps shows the amount of legitimacy-building activity, in particular through the processes in reporting recommendations to Council and then awaiting the outcome of Council votes, to first run and then extend the trial, and then to retain the measures. There were multiple amendments proposed to the scheme during the final Executive Committee meeting that approved the measures permanently. These included a proposal to exempt motorcyclists and scooters from the traffic restrictions (rejected 9 to 16, which is only 4 votes short of the required majority)(City of Toronto 2019a). This might suggest that <u>**even** after the year-long trial, extensive technical reporting and legitimacy-building, the details of the final implementation was **still somewhat politically** contested.</u>

[372] This is the reason that Figure 10.15 is split into two diagrams. Figure 10.15a)(left) shows the situation only in terms of short-term legitimacy for the trial itself. At the conclusion of the trial this legitimacy returns to zero, regardless of whether the measures are still on the road (V3) or removed (W3). Figure 10.15b)(right), in contrast, shows the legitimacy for long-term retention, which is separate from the legitimacy of the trial itself, and will involve the second stage of decision-making about whether the measures are to be kept long term.

Clearly, there is a lot of overlap and the potential for there to be challenges relating to the end of a trial. For example, at the end of the trial period for the *King Street Transit Pilot* a Council item had to be passed to allow the measures to remain in place for up to six more months while the results were evaluated (BlogTO 2018b; City of Toronto 2018; Murray 2018). Boston provides a contrasting example in which the Washington Street bus lane was trialled for one month in 2018 (using cones and temporary measures), but at the end of the trial conditions returned to the previous status quo (Schmitt 2018a)(i.e. step W3). This resulted in the street conditions returning "back to its usual gridlock" (Gaffin 2018), and calls for the bus lane to be reinstated from "bus riders and advocates who expected the test run to transition seamlessly to a permanent improvement" (Schmitt 2018b). The city "quickly came around" (ibid) and returned the bus lane, again using cones, but this time as a way to implement it quickly without having to wait for linemarking (i.e. step W4c).

These examples might show that the technical reporting and formal approvals side might be less of a factor if the trialled measures have already proven successful and gained legitimacy in the public and political policy arenas. Under such circumstances there might be potential <u>political danger might related to **not** reinstating the measures (or **not** doing so quickly enough)</u>.

At the other end of the spectrum might be the potential for concerns, as in the Clarendon Street tram priority pilot, that a 'trial' is not really a trial and that the meaningful decisions about maintaining the measures permanently had already been made. Garcia and Wall (2019); UCLA Institute of Transportation Studies (2019) are amongst researchers who have provided insights into what might help make tactical and trial transit priority implementation more likely to succeed. However, it appears that there may be opportunities to undertake further research into trials, and in particular the decision-making and legitimacy the occurs post-trial, so as to build a greater understanding of:

- why some trials result in success, legitimisation and long-term retention, while others do not;
- whether trials that use Progression V or Progression W are more likely to result in legitimation of prioritisation; or
- other related issues.

hopefully the measures will by then have proven themselves *reasonable* within broader public and political policy arenas.

A primary reason for having a trial is to **build legitimacy** for the **long-term** implementation of transit priority. Prior technical work has likely already built confidence amongst the engineers and planners that the proposed measures will improve transit performance, albeit that there may be room for refinement. An objective of a trial is therefore to demonstrate this to the wider public, politicians and others with evidence of real-world operation. Figure 10.16 shows an example of one of the approaches that was used in the *King Street Transit Pilot* towards that end.

Figure 10.16 May & June 2018 dashboard report for the King Street Transit Pilot

Source: City of Toronto and Toronto Transit Commission (2018)[373]

Figure 10.16 is a 'dashboard' performance report[374] that reported on the results of the *King Street Transit Pilot* as it was happening. This appears to have been part of an effort to provide detailed data about the progress of the trial, which could be *trusted* as a source of truth, so as to inform public debate during the trial and later decision-making[375].

Other cities have recently been adopting similar limited-period transit priority trials[376]. These may have similarly provided a window in which to implement priority measures, experiment and collect

[373] Image reproduced with permission of the City of Toronto.

[374] Dashboards are an effective method of displaying data in a manner that can assist decision-making, and are already widely used in city and project management (Thompson 2016a; Stehle & Kitchin 2020). The *King Street Transit Pilot* dashboard reported transit ridership, reliability and travel times; car travel times and volumes, pedestrian and cycling volumes; and data on the impact of the pilot on retail **sales and spending** at restaurants along the corridor.

[375] Again, there appears to be ample opportunity for future research to investigate the extent to which this dashboard, similar sources of data about the trial, or other efforts during trials to communicate results and build *trust* in the results. Comparison between the effectiveness of such data, based on actual conditions during a real-world trial, versus results from a pre-implementation model for legitimising transit priority in public and political policy arenas might also be a worthwhile avenue for future research.

[376] Examples include:

- First Street, Miami FL (*red-painted bus lanes* for 12 months)(UCLA Institute of Transportation Studies 2019, pp. 18-9);
- Liberty Avenue, Pittsburgh PA (*red-painted bus lanes* for 18 months) (ibid.);
- Broadway/Lincoln corridor, Denver CO (*red painted bus lanes* for 12 months) (ibid.);
- Main Street, Cincinnati, OH (*bus lanes*, 6 months) (ibid.);

data, and build legitimacy for their long-term retention. However, there does not yet appear to be 'standardised' tools for reporting on such trials, although clearly what and how to report to the public and political decision-makers is likely to be highly contextual.

In general, it appears that opposition and protest during a trial may lead to opponents being cast as 'against trying to make things better' or 'against giving the trial a chance to prove itself'. Rather than protest leading to delegitimation and removal, *trials* might offer an opportunity to test transit priority measures under real-world conditions, prove *reasonableness*, and build legitimacy in the *general public and political policy arenas*. This, therefore, highlights the potential of trials and the approach of *building legitimacy* ***through*** *implementation* more generally to prove prioritisation works, and to lower the risk of backlash through the adoption of more flexible, tactical and/or experimental approaches to prioritisation.

- the 14th Street *busway* pilot in New York, NY (18 months), which involves *bus lanes*, traffic signal changes, automated camera enforcement, and the limiting of through movement by private vehicles along 14th Street. Busses, trucks and emergency vehicles continue to be able to drive along 14th Street, but private cars are restricted to driving along only one to two blocks for pick-up and drop-off and site access only (New York City 2020). The 18 month pilot was planned to start at the same time as subway construction works reduced service quality on the parallel L train, but was delayed by legal challenges (Plitt 2019a; Spivack 2019). The pilot has resulted in 30-40% faster trip times for bus riders (New York City 2019; Sam Schwartz 2019) and has been highly successful, but is not entirely popular with local stakeholders living along the corridor (Barone 2019; Plitt 2019b; Colon 2019); and
- the West Portal transit delay reduction pilot in San Francisco, CA (6 months). This targets the location where the San Francisco Municipal rail networks K, L and M lines shift from street running into the Market Street subway. The works include *stop relocations*, a new *shared transit and taxi lane*, and *turning restrictions for general traffic*, mostly during the morning peak period to reduce congestion and delays in the vicinity of the subway portal (San Francisco Municipal Transportation Agency 2019).

10.6 Conclusions

This thesis has been focused on building an understanding of how transit priority implementation is influenced by legitimacy and other factors that are typically in the domain of public policy analysis, political science and similar fields. Chapters 7 and 8 showed how the success of transit priority implementation in *transit-centric cities* is to a large part because of the legitimacy of prioritising transit in cities were many people already ride buses, streetcars and trams. Meanwhile the challenges in *car-centric cities* appear to often be more to do with opposition from private motorists than the transit priority measures themselves. This exploration culminated in Chapter 9 with the development of a new *conceptual framework for understanding transit priority and legitimacy*, which helps to show how otherwise technically appropriate transit priority measures might be delegitimated, cancelled or removed in *car-centric cities*.

This theoretical understanding of transit priority and legitimacy may point towards new directions for research. However, on its own it is unlikely to be of assistance to transit priority implementers in practice. Hence, the focus of this Chapter has been on **using the new conceptual framework** and other components of this research, to understand how to deliver successful outcomes and the long-term retention of priority measures.

The output of this Chapter is **three approaches** for transit priority implementation. These are *A: building legitimacy **before** implementation*; *B: **avoiding impacts** on other road users;* and *C: building legitimacy **through** implementation*. They encompass **nine *pragmatic strategies for transit priority implementation in car-centric cities***. Guidance as to the applicability of each of these approaches and *pragmatic strategies* to specific transit priority measures is discussed in Appendix D.

Engineers and planners are used to building technical legitimacy before implementation. Developing options, testing whether a proposal is *reasonable*, undertaking evaluation to help inform decision-makers as to which is the best option, and ensuring designs and construction comply with (*normative*) standards, guidelines and legislation are all part of the typical, and rational, processes of engineering. However, the three *pragmatic strategies* for *A: building legitimacy **before** implementation* that have been presented in this chapter imply going beyond this techno-rationalism. There is a need to build legitimacy for transit priority implementation in the broader *public and political policy arenas*, where the rationality of a proposed course of action is not necessarily the only consideration. This chapter has suggested that practitioners might consider using *A1: technical enquiry*, *A2: transportation planning* and/or *A3: public processes and/or hearings* to: inform the public and political debate over transit priority implementation; provide outputs meant for consumption by a broader audience than solely their fellow technologists; and work towards ***legitimising decision-making*** rather than just aiding it. The 'dashboard' approaches used in the *King Street Transit Pilot*, the development of the *Plano Diretor* in part through a seminar series in Curitiba, and the use of formal public ballots in Zürich show some examples of how legitimacy can be built for the permanent implementation of transit priority measures. An important learning from these, and other, examples is that the object is to use these *pragmatic strategies* to ***legitimise* the**

implementation of transit priority amongst the public and politicians in *car-centric cities*, well after transit priority has been found to be technically *reasonable* amongst transportation professionals.

The problem of delegitimation of transit priority implementation in *car-centric cities* due to opposition by private motorist provides the motivation for the second approach of *B: **avoiding impacts** on other road users*. There are often high costs involved in *Pragmatic Strategy B1: grade-separation* or *Pragmatic Strategy B2: building new capacity*. Cost is particularly noticeable when making a direct comparison to much cheaper options, such as converting existing traffic lanes to exclusive use by transit using only some linemarking and new signage. However, these cheaper options may be politically impossible in some *car-centric cities*, and so be a techno-rational illusion. Despite there already being a clear understanding of how increasing road capacity tends to simply induce more traffic (Hills 1996; Litman 2019a) the prevailing narrative in many cities is that **road building must continue**. The removal of any on-street parking or traffic lanes might be **effectively forbidden!** Therefore, *B1: grade-separation* or *B2: building new capacity* to accommodate priority for transit may be the only way to avoid delegitimation in some *car-centric cities*. Alternatively, *Pragmatic Strategy B3: subservient priority* suggests practitioners seek to do everything that can be done to make conditions better for on-road transit up to, but not including, having a significant negative impact on other traffic. This *pragmatic strategy* may be of particular benefit for many cities as there appears to be much that can be done to improve speeds and reliability through *TSP* systems that are highly responsive and only provide priority when absolutely necessary (e.g. *conditional priority*). Moving to *off-board ticketing*, *level-access boarding* and other internal improvements may also provide avenues for significant improvement, yet without doing anything that will be noticed by or impact on other road users. This might the real underlying lesson that needs to be learnt from Curitiba's famous bus boarding tubes.

Finally, the three *pragmatic strategies* that involve *C: building legitimacy* ***through*** *implementation* suggest ways that practitioners can demonstrate the benefits of improving conditions for transit practically and under real-world conditions. *Pragmatic Strategy C1: bottom-up and incremental* implementation involves making improvements at a small scale, through multiple steps, and taking advantage of opportunities to prioritise transit as part of other works. This may best be driven by providing local engineers with sufficient funding and the authority to make improvements, because **'street-level bureaucrats'** are likely to be **better able to judge what will** both make a real difference and **be possible within the local political context**. *Pragmatic Strategy C2: pop-ups* suggests a short-term experimental approach where "the pilot is the study" (Garcia & Wall 2019, p. 16). The concepts of "Cone Pilots", "Quick-Build" and "Tactical Transit" projects all draw on ideas from *tactical urbanism* (Garcia & Wall 2019; UCLA Institute of Transportation Studies 2019) and suggest practitioners might seek to get out into the field and see what is actually legitimate. Directly involving the community in dialogue and evaluation through low-risk temporary implementations may provide an avenue to find out how much prioritisation is politically possible. *Pragmatic Strategy C3: trials* is similar, but suggests a longer-term pilot where the object is to separate debates over whether or not to try something from debates over whether or not to keep transit priority measures over the long-term. Knowing that a final decision about whether priority measures will be permanent is yet to be made, and is dependent on whether a pilot actually works for the community, may help to *legitimise* the idea of at least trying transit priority implementation.

The *pragmatic strategies* that have been categorised and discussed in this chapter is that they all appear to have already been used in practice in one form or another. This chapter has generally been about identifying, describing and otherwise outlining how these strategies might legitimise transit prioritisation, rather than devising completely new ways to legitimise priority implementation that are as yet completely unknown. This distinction is discussed in the next chapter (specifically in Section 11.2.2, which outlines this study's contribution to research knowledge). However, it is noted here that the list of *pragmatic strategies* identified in this chapter may not be exhaustive. There may be other strategies already in use that might also help to legitimise transit priority implementation. Further *pragmatic strategies* might also be devised, either as variations or as completely new techniques.

This chapter has, however, focused on describing and categorising those evident in the cases studied in this research. It may, therefore, help to provide a structure through which practitioners might select which *pragmatic strategies* might be applicable to or useful for prioritising on-road transit in their circumstances.

Chapter 11: Conclusions

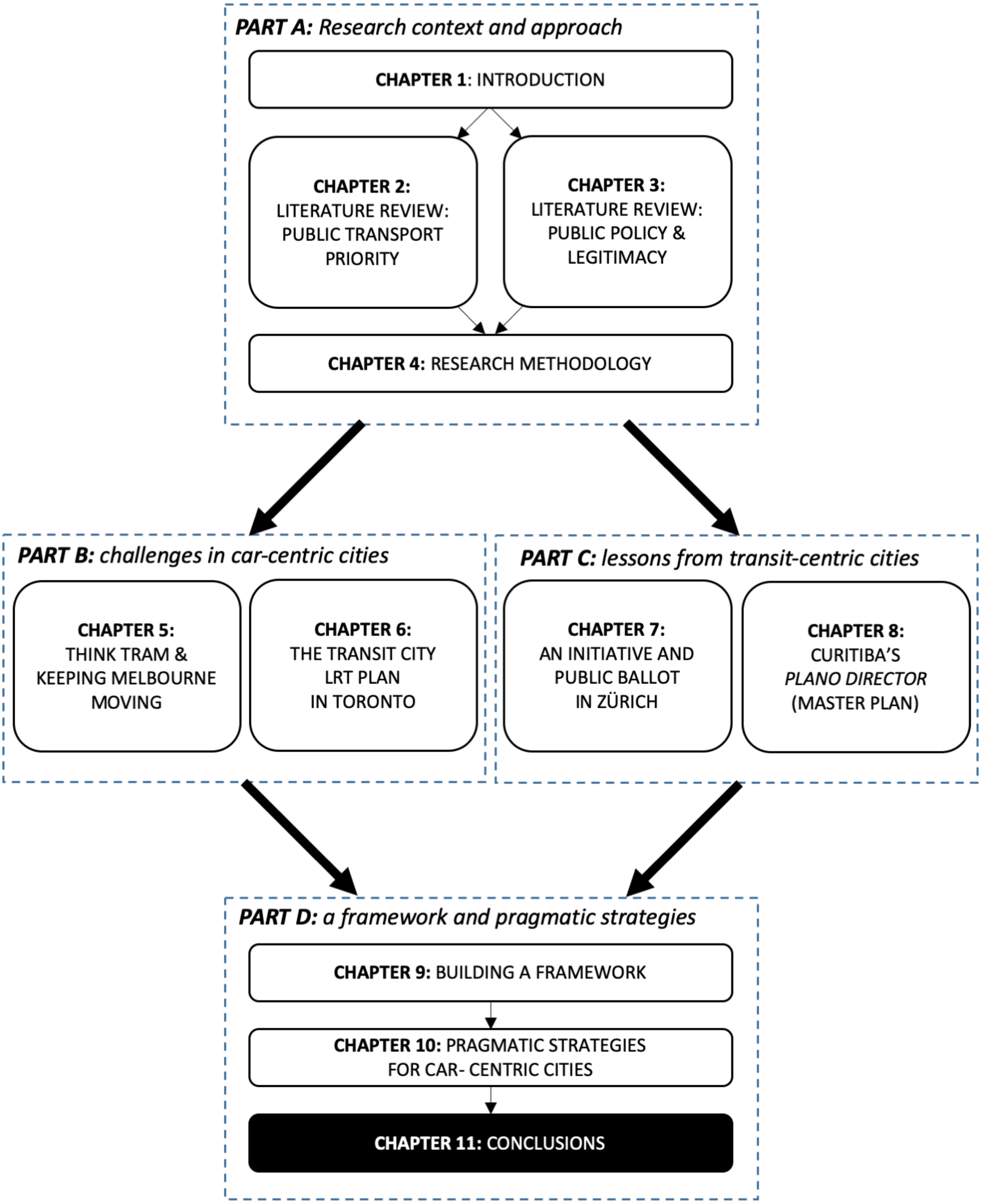

Figure 11.1 Position of Chapter 11 in thesis structure

11.1 Introduction

This is the eleventh and final chapter of this thesis. It provides a conclusion to the study by outlining key findings and critiquing the research. The chapter also discusses the implications of this study for theory and practice, and areas for future research.

The previous chapters, the new *framework*, and the *pragmatic strategies* have generally responded to the Research Questions that have guided this study[377]. This chapter, however, aims to summarise the main findings and contributions of this study by providing direct answers to the four Research Questions. The chapter also includes a critique of the research itself to review how well the study has responded to each of the Research Questions. It also explores what the findings of this research mean within the context of transit priority implementation, transport policy research and broader engineering research and practice[378].

This thesis has demonstrated how insights from *public policy analysis* and *legitimacy theory* can aid in understand the non-technical issues surrounding transit prioritisation. However, this suggests that there are many opportunities for future research about how policy, legitimacy and other related issues impact on transit priority and transport policy more generally. This chapter, therefore, identifies and discusses some of the directions for future research suggested by the findings of this study.

This chapter is structured as follows: the next section presents a summary of the key findings and contributions of this research. Section 11.3 critiques the study, particularly with respect to the case study approach adopted and the study's focus on strategic-planning-backed efforts to prioritise transit. This section also discusses whether challenges in transit prioritisation relate to the failure of these plans, or instead to a problem with using strategic plans more generally[379]. The implications of this for theory and practice are discussed in Section 11.4. Section 11.5 then identifies future research directions suggested by this study, including using legitimacy as lens in risk management, further exploration of priority implementation, and opportunities to examine the influence of non-technical factors on transport policy and engineering more broadly. The chapter finishes with some concluding remarks in Section 11.6 for both this chapter and the thesis itself.

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[377] As discussed in Chapter 4, Yin (2018) identifies five different levels of questions in case study research. These range from Level 1 questions that are asked during interviews through to Level 5 questions relating to what the research outcomes might mean for policy and practices. The four Research Questions are Level 4 questions.

[378] Which is essentially a Level 5 question.

[379] There being a problem with using strategic plans to lead implementation might suggest that even with the very best of strategic plans significant challenges would be likely to occur.

11.2 Key findings and contributions

11.2.1 Findings

In many cities there have been public and political concerns about the economic, social and environmental impacts of car-dependency and never-ending road building. The problem of induced traffic means that it is not possible to build our way out of road congestion, even if funds were unlimited. As such, many jurisdictions are currently engaging in a 'Big Shift' towards Network Operations Planning approaches that emphasise making better use of what road infrastructure already exists (Hills 1996; Wall 2017c; Litman 2019a). Many strategic transport plans have therefore sought to improve mobility and reduce traffic congestion through the provision of improved transit infrastructure. In the context of a *car-centric city* this often takes the form of metro or subway construction, or similarly expensive transit infrastructure projects. The logic is that high-quality services will be necessary to induce habituated drivers to switch to riding transit. This, together with a need to maintain the existing level of service for those drivers who do not switch (being the majority), might almost necessitate the inclusion of new ROW A *fully-separated* transit services in such strategic plans.

Grand plans are all very well, but in the real world there are limits on what taxpayers are willing to fund. A 'subways, subways, subways' policy can be too expensive, as was clearly demonstrated by the failure of Mayor Rob Ford's plans for fully underground transit to gain technical or political support in Toronto[380]. Therefore, many strategic plans have instead called for the prioritisation of existing on-road transit services by reallocating road space away from private motorists. This may provide a way, within the confines of a strategic planning document, to satisfy the competing goals of a high mode shift towards transit, but only limited expenditure.

Longitudinal-separation and high levels of transit priority within *mixed traffic* environments are very <u>cost-efficient</u> ways of providing a higher-quality transit service. However, they only appear to be <u>easy</u> ways of achieving these goals within the techno-rational worlds of transport planning, where abstract lines on a map might be divorced from (or ignore) real-world issues of politics and maintenance of the status quo. While plans for transit prioritisation have worked in some cities, in others they have not been as successful. This study has sought to address this through Research Question 1, which was:

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[380] A related problem, however, is that Mayor Rob Ford's election on that same 'subways, subways, subways' plan, together with a pro-car platform based on right-wing populism and a wave of suburban support (see Silver et al. (2020), and further discussion and references in footnote 180 on page 135) <u>was enough to **end** the *Transit City LRT Plan*</u>. This perhaps speaks to a larger problem for practitioners, in that there is <u>**no** requirement for an alternative plan to **actually be viable**</u> for it to be proposed and help to delegitimate the current scheme.

It is perhaps only later, after Mayor Ford was in office, that the cost implications of his subways-only requirements became clearer to the general public and "suburban constituencies that voted Rob Ford realized that they would not enjoy the improved services that were part of Transit City" (Filion 2011, p. 466). By then the damage was done, Transit City was effectively over and transportation policy debates moved on to yet more proposals.

These new proposals included the *OneCity* plan for 170km of new transit services (with a mix of modes). It was to be in part funded by land value capture, but <u>it only lasted for about a month</u> with "almost none of (it surviving) long enough to make it to the floor of council, much less to get approved after debate" (Dotan 2012a, 2012b). This in part echoes the larger theme of *Rapid transit in Toronto; a century of plans, projects, politics, and paralysis* (Levy 2015) in that it seems much easier to (delegitimate current plan and then) propose alternatives than to actually implement projects, at least in Toronto but perhaps also more generally.

RQ1: Why has strategic priority implementation had mixed results in *car-centric cities*?

Chapters 5 and 6 have responded to this question in depth through detailed examination of strategic planning efforts in Melbourne and Toronto. In summary, these chapters suggest that the primary reason that there have been mixed results for strategic priority implementation in *car-centric cities* is that for a typical voter in such a city there may be conflict between their desires for:

- increased mobility and lower taxes; and
- for everyone else to be the one who has to switch to riding transit.

For a habituated driver it might appear obvious that increased mobility should be provided by high expenditure on roads and the *grade-separation* of transit. All of this must also (somehow) be achieved without any increase in taxes. However, the City of Toronto "Council Rebellion" (Bow 2018) perhaps most obviously shows that there are political limits to how much a city might be willing to spend building highly-expensive underground transit lines through low-density suburban landscapes.

Strategic-led transit priority implementation in *car-centric cities* may therefore have tended to have mixed results primarily because it is too expensive to provide everyone with everything that they want[381]. A techno-rationalist response to this problem is to attempt to provide high quality transit without the expense of extensive *grade-separation*. Unfortunately, compromises in which transit is **prioritised over other road users** tend to be **politically unpopular** in many cities. This leads to the second research question for this study, which was:

RQ2: Why is the implementation of transit priority effective and *legitimate* in *transit-centric cities*?

In contrast to *car-centric cities*, in a *transit-centric* city **a typical voter is likely to use transit** for much of their travel. For them, the idea of converting existing road space to exclusive transit use might seem quite reasonable, especially when compared to spending much more on underground rail construction (only for most of the benefits to accrue to drivers through reduced traffic congestion, improved mobility during peak-periods, etc.[382]). Chapter 7 has explored this in the context of Zürich, where the initial rejection of the *Tiefbahn* and *U-Bahn / S-Bahn* plans appear to have been largely because of the large expenditure required but a lack of commensurate benefit for the transit-using voters living within the City of Zürich. Moving the streetcars underground was clearly going to be

[381] The expense of providing more road capacity, however, might seem to be more politically palatable, particularly in the context of pro-car populism. As has been touched on in this thesis, the issue of (the sometimes almost *unconditional*) *legitimacy* for car-dominated transportation systems, land use patterns etc. appears to be an ongoing challenge for the field.

[382] This again appears to tie into issues of populism and political platforms that might legitimise pro-car transportation policies, as discussed with respect to the example of Toronto's Mayor Rob Ford in footnote 380, and earlier in footnote 180 on page 135.

very expensive, but provide few benefits to transit riders[383]. A similar desire to limit expenditure appears to have driven the push in Curitiba for *at-grade busways* and, later, the use of *bus-boarding tubes* to increase capacity rather than a switch to LRT. Hence, for a *transit-centric city* the idea of **prioritising on-road transit, even at the expense of other road users** (and thereby obtaining high levels of priority in relatively cheap *longitudinally-separated* ROWs) may be politically attractive, or at least is likely to be more politically attractive than it would be in a *car-centric city*.

This reflects an important point made earlier in the thesis relating to how **even in *transit-centric cities*** where transit priority implementation has been highly successful, it has **not always been easy** to implement priority measures[384]. In the cases there are the examples of having to overcome initial reluctance to extensive prioritisation because of negative impacts on traffic (Zürich) and the outplaying of a protest movement seeking to drive cars through a new mall and get the mayor sacked (Curitiba). Further events, such as the development of the trinary road system (Curitiba) and the undergrounding of traffic (Zürich), likewise suggest that transit prioritisation has had to accommodate car-based travel to quite a large extent, even in these *transit-centric cities*. This perhaps relates again to issues of *conditional normative support* for transit prioritisation (e.g. only supported as long as cars are not too badly impacted) and decision-makers seeking to minimise the risk of any sort of populist, pro-car political reaction developing or *delegitimising* implementation.

The third research question for this study asked:

> **RQ3**: How can *public policy analysis*, *legitimacy theory* and related research knowledge be used to better understand transit priority implementation?

In general, this study has found that strategic transportation planning efforts might not always take the political realities of being in a *car-* or *transit-centric city* into account. If planning is progressing along techno-rational lines then reallocating road space to transit to reduce the amount of new infrastructure required might appear to be a *reasonable* response to budget limitations, at least within the bureaucracy. However, a habitual driver with little-to-no desire to actually shift to transit might only see a government making their life harder and **failing to deliver** on the **desired utopia of auto-based-mobility**-without-the-problems-of-traffic-congestion. Given the potentially high-popularity of pro-car agendas and the general *legitimacy* of providing for car-based mobility in modern society, opposition to transit prioritisation appears likely to have the potential to build significant levels of political support in many (if not most) cities.

Public policy analysis, *legitimacy theory* and related research knowledge therefore provide us with alternative lenses through which to consider strategic transportation planning and transit prioritisation. In some circumstances transit prioritisation may be sound from a *traffic*, *mobility* or

[383] In a similar manner, the large expenditure on railway level crossing removals that is currently underway in Melbourne appears likely to provide benefits mostly to motorists, not transit riders. De Gruyter and Currie (2016) find that rail delay reductions generally account for less than 6% of the total benefits of grade-separation, while road delays account for 72 to 94% of the costs associated with *at-grade crossings*.

[384] This was discussed in more detail in the conclusions to Chapter 9.

other techno-rational perspective. However, this might be revealed to be contested, improper or otherwise subject to opposition when taking non-technical matters (such as the legitimacy of automobile-based travel, pro-car policies or populism in politics, and other potential sources of *delegitimation*) into account.

Faced with political and public opposition it might be tempting to simply **give up** on priority implementation and accept the inevitable *path-dependence* of car-dominance in some *car-centric cities*. Sometimes, the reality may be that implementing transit priority is practically impossible under the present political circumstance. For example, the election of Mayor Ford on a platform of 'ending the war on the cars' suggests that transit priority implementation was likely to be impossible in Toronto, at least until a new mayor was elected and the political winds shifted to be more supportive towards transit[385]. Similarly, until the appointment of Lerner as mayor actual progress on implementing the *Plano Diretor* in Curitiba was limited to developing and refining plans for the future.

Acceptance of car-dominance as an unchangeable status quo is **not a realistic solution** to the problems that are currently facing many *car-centric cities*. It suggests an (almost nihilistic) admission by transport planners and engineers that political opposition and self-interest will defeat technical *reasonableness* when it comes to the allocation of road space and intersection time. Such preferencing of only private motorists does not fit with the responsibilities of engineers to address the larger challenges in transportation[386]. Traffic engineering research has focused on developing methods to minimise vehicle delay and optimise signal timings for general traffic. However, the profession has a larger responsibility to improve conditions for **all travellers**.

The line of reasoning that flows through this thesis is that it is not just having a high transit mode split that leads to successful transit priority implementation. Rather there are other lenses, beyond the techno-rational, that practitioners should be using when seeking to implement transit priority. In particular, **high transit mode split is just one factor** that might **increase the *legitimacy*** of transit priority implementation.

Tacit acceptance that transit priority **implementation is too hard or impossible** in *car-centric cities* should therefore be **firmly rejected** by practitioners and researchers[387]. The final research question

[385] Notably, the successful *King Street Transit Pilot* occurred during the first term of Mayor John Tory, after the end of Mayor Ford's term in 2014. This appears to relate back to agenda-setting models, policy windows and the Multiple Streams Framework (see Kingdon (1995); Pulichino (2003); Pulichino and Coughlin (2005) and discussion in footnote 316) in that the policy window for implementing transit priority in Toronto may have been firmly shut while Rob Ford was mayor given his mobilization of popular support from the suburbs for a generally pro-car agenda (see Taylor (2013); Silver et al. (2020)).

[386] For example, continuing to optimise for the movement of vehicles, rather than the movement and/or accessibility of people and goods, appears likely to do little to address the challenges of climate change, oil dependency, social inequity, road safety etc.

[387] This is similar to the way that the new Safe Systems approach to road safety and the Vision Zero / Towards Zero campaigns are rejecting previous narratives based around blaming driver error and tacit acceptance of road deaths as an inevitable outcome of road-based mobility. See discussions in Transport Accident Commission (TAC) (2016); Lyndon and Turner (2017); Transport Accident Commission (TAC) et al. (undated) amongst many other resources on the Safe Systems approach.

for this study, therefore, sought to understand what practitioners in *car-centric cities* can do. This question was to understand:

> **RQ4:** How transit priority can be successfully implemented in *car-centric cities* (where prioritising bus, streetcar or tram services generally lacks legitimacy)?

The negative impacts of transit priority on other traffic appear to be a significant political obstacle for implementation in *car-centric cities*. These political challenges appear likely to occur regardless of the benefits that prioritising transit might have when evaluated overall, and at most levels of prioritisation and scales of implementation. Currie (2016b) hints at this problem in the title *Melbourne Transport Problems & Progress – Ideas for **Bold** Politicians* (emphasis added), by suggesting there is a need for bold action to make meaningful improvements.

Implementing transit priority measures with **negative impacts on car drivers** in a *car-centric city* certainly sounds like a **bold idea**. Unfortunately, such an idea might be less likely to be a popular one[388]. It might even potentially be a career ending one, or at least it might result in a bold politician becoming instead a bold backbencher, a bold member of the opposition, or a bold but defeated candidate after the next election. This political problem likely filters down to become pressure on road authorities, engineers and bureaucrats to avoid unpopular changes to the road network. Hence, in many *car-centric* cities the prioritisation of transit, at least beyond the level of *subservient priority*, might be effectively forbidden and hence excluded from the list of acceptable solutions whenever a problem needs to be addressed[389].

Perhaps there may be an element of framing needed for messaging about transit prioritisation. Car-users might **also** stand to benefit if on-road public transport services become faster and more reliable, but this may not make it into the narratives surrounding public and political debates about transit priority. The impact or objectives of transit priority measures (see Table 2.8) can include reduction of traffic congestion (Currie 2016a; Litman 2016) through a model shift to transit, which stands to provide a benefit to those travellers who continue to travel by car. Not everyone can shift to transit, but one possible way to help to legitimise transit prioritisation might be to emphasise that there might be a potential for win-wins if prioritisation results in sufficient mode shift occurs, amongst those who can, and traffic congestion reduces. Those who do continue to drive can also receive other benefits from transit prioritisation[390], but these do not appear to be included in narratives and public debate about priority measures.

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[388] At least, a wave of support from (non-suburban) voters electing a pro-transit populist politician appears to be less likely than a repeat of the sort of success that Mayor Rob Ford had with his emphasis on being pro-car.

[389] Refer back to *the garbage can model* where only a select number of *solutions* are introduced into the process of decision-making.

[390] Note, for example, research highlighting road safety benefits accruing from transit priority measures that can benefit all road users, not just transit (Currie & Reynolds 2010; Goh et al. 2013; Naznin, Currie, Sarvi, et al. 2016; Currie et al. 2017).

The larger narrative needed may be that **maintaining the status quo** or business-as-usual approach of car-focused transport systems in many cities **could worsen conditions or result in poor outcomes for car-users**, not just for transit. However, this might be a difficult message to get across given the multiple steps and indirect links involved[391]. When compared to the direct proximity of a transit priority measure that reallocates road space or intersection time away from general traffic, using such an argument to legitimise transit priority in *public and political policy arenas* appears likely to be challenging.

Clearly there are some notable bold politicians who have supported, facilitated and even led bold transit priority implementation. In Curitiba much of the drive for change was led by Mayor Lerner[392], his team and the mayors who came after him, as discussed in Chapter 8. Mayor Ken Livingston in London perhaps provides a similar example of a politician undertaking and succeeding in a bold transport-related implementation. Calling for and then introducing a road congestion charge for inner London in 2003 was undeniably a bold political move (Hosken 2008, pp. 342-51)[393] given the typical widespread opposition to such schemes, and the risk of a pro-car, populist/reactionary or some other induced change in political circumstances (Santos & Fraser 2006; Georgakis & Nwagboso 2012, pp. 201-2; Hensher & Bliemer 2014; Ardıç et al. 2015; Keen 2016).

Lerner and Livingston may provide examples of politicians boldly prioritising transit. However, research by Pulichino and Coughlin (2005) suggests explicitly rejecting the hypothesis that "a political maverick is necessary for public transportation to innovate" through transit prioritisation[394]. Regardless, calling for bold action by politicians and implementers appears **unlikely to be of much practical assistance** to practitioners in *car-centric cities*. Even successes in *transit-centric cities* such as (central) London, Zürich and Curitiba that have been won, supported or even just pushed along by bold politicians may be the exception rather than the rule. Such top-down

[391] i.e. 1. faster and more reliable transit leading to 2. mode shift to transit leading to 3. improved traffic conditions or other benefits for car-users.

[392] Shutting down streets to make a pedestrian mall after the law courts have closed for the weekend is undeniably a bold move, even if you have been appointed by a state governor backed by the military dictatorship.

[393] Implementing the congestion charge resulted in Livingston being awarded the Politician of the Year by the Political Studies Association (2003) for having "pressed ahead with this policy despite protest marches and strong opposition from some of the tabloid press and various other politicians." However, given that he had already been elected and "the congestion charge had been Livingstone's most prominent and most radical manifesto commitment" (Hosken 2008, p. 343), it is arguable that actually delivering the congestion charge scheme was a political necessity. Regardless, 'Red' Ken's political boldness appears to have paid off for both London and his political legacy. The director of London's buses described the congestion charge as "…the best bus priority measure I've ever seen in my life" (Hosken 2008, p. 350) because of the positive impact that reducing traffic volumes, together with service improvements, had on bus reliability and speeds (Small 2004, pp. 147-50; Santos & Fraser 2006). The implementation success of the congestion charge also helped to deliver Ken Livingston electoral victory, against an opponent seeking to abolish the congestion charge entirely, for a second term as mayor starting in 2004 (Hosken 2008, p. 356).

[394] Instead, in case studies of 11 cities they find that a "policy entrepreneur" cannot always be identified, and in many instances a "body of decision makers agreed to support preferential treatment implementation with a consensus". Zürich provides a further counter-example where priority implementation is found to have resulted from an "outside initiative" (Pulichino & Coughlin 2005) (i.e. the *Citizens' Transit Priority Initiative*) instead of through inside access or the mobilization of government actors.

This aligns with the findings of this study (Chapter 7) relating to how there was opposition to transit priority implementation from within the Zürich governmental authorities, perhaps due to the expected political backlash from private motorists relating to negative impacts on traffic. Even after the passing of the *Citizens' Transit Priority Initiative* in 1977, which clearly called for and provided funds for extensive priority implementation, further lobbying was necessary to get planners and politicians to take action. These are presumably the same city planners and engineers who had been responsible for the report recommending priority for route 10 in 1971, who had sat on the multi-disciplinary staff working group formed in 1973, and who had been task to implement measures in response to 1975 city council directive to prioritise transit (Nash 2001). However, it was only "as older employees have retired and younger staffs have taken leadership roles, the departments are more fully committed to the transit priority program" (Nash 2001, pp. 65-7). Perhaps it is with youth, a changing of the guard, the passing of time and many smaller successes that implementation of transit priority became less of a bold, new-fangled, risky (and potentially career-ending) endeavour, and instead normalised as accepted practice.

successes might just as easily be undone by populists ‘ending the war on cars’ and shifting policy back in the other direction.

Tacitly giving up on transit priority implementation as being politically too hard, or trusting to bold top-down leadership to deliver successful outcomes appears unlikely to assist much in *car-centric cities*. Instead what are needed are **pragmatic, and lower-risk, strategies** for actually delivering transit priority in cities where negatively impacting cars is likely to be politically unpopular. The outcomes of this research suggest three approaches and nine *pragmatic strategies* for implementing transit priority in *car-centric cities*:

Approach A: Building **legitimacy before** implementation:
Pragmatic strategy A1: technical enquiry,
Pragmatic strategy A2: transport planning, and
Pragmatic strategy A3: public processes and/or hearings;

Approach B: **Avoiding impacts** on other road users:
Pragmatic strategy B1: grade-separation,
Pragmatic strategy B2: building new capacity, and
Pragmatic strategy B3: subservient priority; and

Approach C: Building **legitimacy through** implementation:
Pragmatic strategy C1: bottom-up and incremental implementation,
Pragmatic strategy C2: pop-ups, and
Pragmatic strategy C3: trials.

11.2.2 Contribution

This study’s contribution to research knowledge includes:

- a new language that practitioners and researchers might be able to use to address the various types of legitimacy that could impact the implementation of otherwise techno-rationally appropriate and *reasonable* transit priority measures;
- a categorisation of existing *pragmatic strategies* that have already been used by practitioners to legitimise or prevent the delegitimation of transit priority measures, together with connections to established understandings in *public policy analysis*; and
- a new connection of concepts from *legitimacy theory* to the field of transport policy, especially with respect to transit priority, and road management and allocation.

Engineering research already has a detailed understanding of the technical aspects of transit prioritisation. Much of this is well connected to established techniques and theory in traffic capacity analysis, transportation modelling, road design and related areas. Urban planning research, likewise, engages with transport systems, although it perhaps tends to be more connected to politics and policy. However, neither field appears to have previously discussed why some features of a road environment might be taken for granted, *accepted* (after being legitimised through a planning or technical process), *debated* or rejected entirely as being *illegitimate,* through the language of *legitimacy theory*. The contribution of this research, therefore, is to introduce this terminology and these concepts into transit prioritisation, and perhaps show how it might be expanded into or used to examine other areas of transport (and perhaps land use) planning that similarly involves politics, public decision-making and (sometimes) conflict. With the new *framework* practitioners may have a lens through which to qualitatively assess the current status of their projects and programmes. Researchers may be able to adapt the *framework* to other studies and further exploration of the non-technical influences on transit prioritisation.

The *pragmatic strategies* provide a list that practitioners might use to select options that are appropriate or relevant to the context that they face in their particular circumstances. However, it is important to note that the new *framework* and the *pragmatic strategies* are not intended to be *normative* pronouncements of what practitioners should do. Rather, the *pragmatic strategies* provide a menu of options. Every transit priority implementation effort is likely to have its own challenges that are particular to the local policy arenas in which it is rooted. The contribution of this research is to provide a categorisation and syntax of *strategies*, grounded on established *public policy analysis* understanding and theory, that might be used to discuss and determine how to address such non-technical challenges.

Similarly, the contribution of the new *framework* is to provide a **tool for understanding** how *legitimacy* and *transit priority* levels might interact. The actual amount of legitimacy (*proper*, *accepted*, *contested*, *illegitimate*) at any particular moment in time appears likely to be highly subjective, and may vary between the public, political and engineering policy arenas. The new *framework*, therefore, may only provide a lens (rather than a yard stick) through which implementers and researchers can interrogate the level of legitimacy and how it might impact implementation.

There is already a deep understanding of the technical aspects of transit priority implementation at the tactical and operational levels. Some of these *pragmatic strategies* may already be familiar to professionals working in transportation. This study's contribution, therefore, is to enumerate and categorise them and to provide a framework through which they, and the impact of legitimacy more generally, can be understood.

The call from Marsden and Reardon (2017), which helped to motivate this study, suggested a need for transport policy research to engage with legitimacy, power and other related topics. The contribution of this research has been to answer part of that call by integrating concepts from *legitimacy theory* into current research understandings about on-road transit. This study has shown that the various forms of legitimacy (*normative, sociological, reasonableness* etc.) are relevant to transit priority implementation. These findings therefore suggest that *legitimacy theory* is relevant to traffic systems, transport policy and engineering more generally. Thus, this study's contribution includes a demonstration that there is new research understanding to be gained by answering the call from Marsden and Reardon (2017).

This suggests further engagement with *legitimacy* theory, *public policy analysis* and related topics in future transport policy research. Technical research and gradual development through practice has provided us with a very long list of different transit priority measures. The challenge for researchers and practitioners going forward is not to develop yet more technical solutions, but to see which solutions can actually **be politically supported**, *legitimised* and successfully implemented.

These directions for future research are discussed further in Section 11.5. However, this is proceeded by a discussion of implications of this research in Section 11.4, and a critique of this study in the next section (Section 11.3).

11.3 Critique

The previous section outlined the original contributions to knowledge generated in this study. However, this study has limitations, and these may impact on the level of confidence in the findings of the research in some areas. These limitations are discussed in the following critique.

11.3.1 Case study approach

Limitations of case study methodologies and the research design adopted for this study were discussed previously in Chapters 4 and 9. However, it is worthwhile to briefly review and summarise these limitations here as part of this critique of the entire study. The notable absences and limitations related to the study design are:

- the lack of exploration of failures or mixed successes in a *transit-centric city* in this study;
- a lack of clear, precise and quantitative definitions of some of the terms used in this study, such as *car-centric, transit-centric*[395], *success* and *mixed success*, the *engineering policy arena* versus *public and political policy arenas*[396];
- the reliance on interpreting secondary sources instead of seeking primary data through interviews and field work; and that
- the output of the research is a framework and *pragmatic strategies*, rather than a testable theory[397].

These are all, to one extent or another, due to the limitations of what can be achieved using a qualitative approach, a case study methodology and within the resource constraints of a single PhD project. Despite this the research described in this thesis has, to a significant degree, pushed transit priority and transportation policy research understandings in new directions. Any lack of comprehensiveness in this study is, therefore, neither surprising given the resource constraints nor something that is of concern given the large gaps relating to the engagement of transportation policy research with *public policy analysis* and other non-techno-rationalist approaches.

11.3.2 Strategic plans

This study has focused on transit priority implementations that have been led or to a large part influenced by city-wide strategic-level transportation plans. *Melbourne 2030*, *Think Tram, Keeping Melbourne Moving*, *Transit City,* the *Citizens' Transit Priority Initiative* and the *Plano Diretor* are all

[395] Note also the issue of the framework developed in this research having split cities into being either *car*- or *transit-centric.* In reality all cities are somewhere on a spectrum and there is not a clear dividing line between one type of city and another. See previous discussion of this, including in Section 1.1 (footnote 1) and in Section 9.4.4.

[396] Like *car*- or *transit-centric cities*, the division of policy-making arenas into just two categories (technical versus non-technical) is a simplification made in this study for the purposes of generalisation. In reality, it appears likely that there many more distinct arenas in which policy-making occurs (e.g. different institutions, different governance jurisdictions etc.). However, it may often be difficult to precisely define their boundaries or the scale (and therefore number of arenas) at which divisions might be made.

[397] It may be possible for the framework and pragmatic strategies to also be tested or elaborated on in future research, as discussed further below. However, the point made here is that the outputs of this research do not appear to be at the stage of being a fully-fledged theory (as per a formal definition of the term as discussed by Household (2009)).

big, top-down, strategic initiatives. However, these represent only one possible approach to transit priority implementation.

While this study has recommended using *pragmatic strategies* instead of (just) these types of large-scale transport plans to legitimise transit priority implementation in *car-centric cities*, it has not explored such instances of implementation without the backing of a transport plan. This is, however, somewhat inevitable given that the current state of transportation planning practice appears to favour these types of 'big' projects and initiatives. *The Big Move* in Toronto (Metrolinx 2008), *Plan Melbourne* (VicDTPLI 2014), the *Level Crossing Removal Authority* (emphasis added)(Level Crossing Removal Authority & Victorian State Government 2018) and other such policy initiatives all appear to favour large-scale, techno-rationally-based approaches to improving urban environments and transportation systems. However, what seems to have worked in Zürich in the lead up to the (admittably 'big') *Citizens' Transit Priority Initiative* was the idea that "Small in Beautiful" (Nash 2001, p. 64) and that what was needed were simple, small-scale improvements to the existing on-road transit systems rather than a 'big-dig' effort to build an entirely new U-Bahn system.

It appears that it is tempting for engineers, city planners and political leaders to focus on creating large-scale transport plans and studies (see for example discussion in Levy (2015)). This thesis has instead suggested that emphasis might perhaps be better placed on smaller-scale, *bottom-up*, *incremental* efforts and through *pop-ups*, *trials* and other *tactical*-level-*approaches* to implementation. However, it may be that such smaller-scale approaches might, like large-scale strategic plans, suffer from challenges, and that these may not have been picked-up in this study due to its lack of focus on smaller instances of implementation.

11.3.3 Failed plans, not a failure of planning

An important critique of this study is that it has found reasons for the failure of techno-rational plans beyond the simplest explanation. Occam's Razor might suggest that challenges faced by some of the plans examined in this study were because these plans were not very good. Mees (2011), for example, provides a compelling narrative about flaws in the preparation of the *Melbourne 2030* plan. This might lend support to the argument that the challenges and failures of transit priority implementation during *Think Tram* were the result of poor planning in this instance, rather than being reflective of problems inherent to adopting techno-rational approaches more generally.

This critique therefore relates back to the challenge of the duality criterion for case study research. It is difficult to be both grounded in the context of the individual plans, yet at the same time be able to confidently seek generalisation when a broader range of plans, or the quality of the plans themselves, have not been assessed. However, more than one case each of *car-* and *transit-centric cities* have been examined in this study. Hence, this helps to guard against this study's findings being solely due to poor plans, specifically through the use of *replication* as part of the sample selection. It is also relevant that the failure of plans is likely to be expected some of the time whenever techno-rational and strategic planning approaches are used. Just because a comprehensive and rational planning approach is used to develop a strategic plan does not mean that the resultant plan will always be a good one. Rather, a whole range of good, bad and indifferent plans might be expected to result from strategic transport planning efforts[398].

The plans studied in depth in this research are not expected to be outliers from common practice. In general, a technically sound plan might be expected to result in better outcomes for transit priority implementation. However, the larger point suggested here is that challenges to a plan, or its possible failure, may not be solely related to a lack of quality in the plan itself. The main narrative of this thesis has instead been that it is not poor plans or the poor execution that really matters in *car-centric cities*. Rather, it is the *legitimacy* of the plan itself as well as the *legitimacy* of the very idea of prioritising transit over other road uses that might be of greater importance[399].

A recurring theme in this thesis is distinguishing between legitimisation in an *engineering policy arena* (i.e. focused on technical and planning activities), and legitimacy for transit priority implementation across broader *public* and *political policy arenas*. The focus has generally been on plans that have already gained sufficient legitimacy with the *engineering policy arena* to become policy, and which appear to have then lost legitimacy in the non-technical arenas. While sometimes there has been technical evidence used to *delegitimise* these implementations[400], none of these plans appear to have been abandoned because there was a (sudden) discovery of a huge error in the modelling or other technical parts of the process the led to it being adopted.

Of course, plans and planning might have been better[401]. However, in the instances examined in this thesis the strategic plans have each been the (*normatively legitimate*) 'Plan' that has helped to legitimise, at least initially, the implementation of transit priority. The general focus therefore has been on trying to understand what happens afterwards (e.g. when the 'Plan' itself has been *accepted* but its implementation then becomes *conditional* or fails). In general, the quality of the plans themselves appear to have been of lesser importance than other political and non-technical factors as far as determining outcomes.

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[398] Furthermore, strategic transport planning or other processes that result in transit priority implementation efforts are themselves likely influenced by the political and institutional context or other non-rational factors. These might only be produced because of a shift or need within policy-making systems etc. For example, a city-wide strategic plan might only be produced because of a need for a government to be seen to be doing something to address perceived problems. Similarly, what is included within a plan's study area or the solutions that are recommended might be influenced by political, institutional or other factors.

[399] For example, it might have better if the *Think Tram* program had avoided its initial focus on a 25% journey time reduction because, with hindsight, this may have been unlikely to be achievable in Melbourne. However, it appears that having a strategic-level plan that instead focused on a more achievable objective, such as improving tram reliability by a small amount, might have been unlikely to have *legitimised* the *far side* amongst stakeholders in Clarendon Street.

Similarly, footnote 267 in Section 9.2.4 explores how the initial justification for the *Stud Road bus lanes* (on a *strategic objectives* perspective and a likely increase in bus frequencies sometime in the future) does not appear to have had much importance compared to public and political objections. The *Keeping Melbourne Moving* strategy, which had led directly to the *Stud Road bus lanes* being implemented, may or may not have been a good plan. The larger issue is that it was likely a plan for the medium-term and perhaps even future-proofing for anticipated bus frequency increases. However, the bus lanes appear to have been delegitimated primarily because of their immediate impacts on traffic.

[400] For example, the use of comparison to typical requirements of bus per hour for bus lanes to be justified by Tudge (2010) as part of a submission again the *Stud Road bus lanes*.

[401] For example, Mees (2011) provides criticism of the development of the *Melbourne 2030* plan.

11.3.4 Legitimacy as dichotomous and combined

The conceptual structure and framework developed in Chapter 9 show the ‘amount of transit priority that is legitimate’ on the x-axis. This approach simplifies ‘legitimacy’ into a dichotomous variable, in which a certain amount of transit priority is either legitimate or illegitimate. However, this may exclude some nuance because legitimacy might not be as clearly divisible, but instead have various levels or be a continuous variable[402].

If the four categories of legitimacy described in Deephouse et al. (2017, p. 33)(*accepted*, *proper*, *debated* and *illegitimate*) were applied to this framework it might be possible to distinguish between situations where the implementation of transit priority is taken as given versus where it is only implemented after extensive technical reporting, policy-making or debate[403]. Likewise, a priority measure that is *debated* might be a lot closer to being implemented or retained compared to one that is already *illegitimate*. Unfortunately, such nuanced consideration of legitimacy appears difficult to incorporate into a two-dimensional structure or framework. The manner in which priority might be considered *proper* or be *debated* also appears likely to vary by context, and so may be difficult to incorporate into a more generalised understanding of transit priority legitimacy.

Similarly, the structure and framework treat whether something is or is not legitimate as an ‘overall’ concept. This contrasts to the many different types of legitimacy (*normative*, *sociological*, through *trust* or *public consent*) that are identified in Chapter 3 and used to interrogate the cases in Chapters 5 to 8. This, again, is due to the desire to generalise into a simple form of legitimate-versus-not-legitimate for the two-dimensional and conceptual structure and framework developed in Chapter 9. The amount and combination of each of the different types of legitimacy that might make a transit priority measure legitimate ‘overall’ appears likely to vary with context, and so be difficult to incorporate into a generalised framework. Within the cases there is much variation[404]. *Normative* and *sociological legitimacy* both appear to be quite important to ‘overall’ legitimacy. However, due to the qualitative nature of this study what threshold of each type of legitimacy might need to be met for transit priority to be (overall) legitimate has not been determined.

The concept of the ‘amount of transit priority that is legitimate’ also perhaps generalises out the issue of venue or arena for policy-making. Some of the cases show the importance of governance structure for transit priority legitimacy, such as whether more suburban areas are included within public decision-making activities or constituencies (see footnote 203 in Chapter 7). Similarly, whether decision-making occurs within an engineering department, through a local council

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[402] See discussion in Section 3.5 of different treatments of legitimacy as dichotomous (Deephouse & Suchman 2008), categorical or continuous (Deephouse et al. 2017, p. 33). See also Section 9.2.

[403] For example, the installation of TSP as part of a new set of traffic signals might be standard procedure in some jurisdictions, but not others. In those where it is standard procedure (i.e. “taken for granted” (Deephouse et al. 2017, p. 33)) TSP might be less likely to be delegitimised than in jurisdictions where TSP is only implemented after it has been ‘proven’ appropriate.

[404] For example, implementation in Curitiba during the first mayoral term of Jamie Lerner appears to have been legitimised by a lot of *normative* power, but perhaps not as much of a contribution from *legitimacy through public consent* as there was in Zürich after the passing of the Citizens’ Transit Priority Initiative. Even there the Initiative was only narrowly passed, which may be part of the reason that further lobbying was needed to bring other types of legitimacy to bear or (continuing the theme of the previous paragraph) push it from being (only just) *proper* to the sort of ‘assumed’ and *accepted* levels of legitimacy evidenced by the later ‘Waiting Time Zero’ policy.

meeting, through a city-wide vote, or through some other arena might also have a large impact on how transit priority might become 'overall' legitimate. However, these issues appear to be highly context specific. As such, the structure and framework developed in this research adopt a more general approach and consider transit prioritisation as either being legitimate or illegitimate.

In summary, the critique of this study provided in this section relates to four main issues. These are: the use of a case research methodology; the focus on larger-scale strategic planning-led implementation; the problems of distinguishing problems with implementation from problems with the plans themselves; and the definition of legitimacy as dichotomous and combined. Further research might seek to address some of these issues (as discussed in Section 11.5), but in the next section the discussion first turns to what the implications of this research may be for practitioners and researchers.

11.4 Implications

11.4.1 Implications for practice

Key implications of this research for practitioners are that:

- there is a need to use *pragmatic strategies* in *car-centric cities*, as strategic transport plans on their own appear unlikely to provide sufficient legitimacy to support transit priority implementation;
- legitimacy for transit priority implementation needs to be built within the *general public and political policy arenas*, and not just amongst institutions, engineers, planners and other technically-orientated stakeholders or actors; and
- it may help to use legitimacy as a lens through which to consider risk management, implementation, and program delivery, particularly for large-scale programs such as widespread transit prioritisation.

These implications are discussed in more detail in the following sections.

A need for pragmatic strategies, not just transport plans

A constant theme throughout this thesis has been the difference between **initial** techno-rational legitimacy building for transit priority implementation and **later** inaction, opposition, delegitimation, compromise, failure and other mechanisms that reduce the case for *peak-period priority*, *high priority* or *total priority in ROW B*. The introduction in Chapter 1 stated the simplest justification for transit priority:

> *Buses, streetcars and trams have more passenger capacity than private vehicles, and so prioritising transit can make more efficient use of limited road space and intersection time, which is particularly beneficial in congested urban conditions.*

However, this perspective may not last much beyond justifications in a strategic transport plan and the first steps of an implementation effort. *Delegitimation* might lead to compromise and partial removal, or complete elimination of priority measures, regardless of how efficient transit might be.

The cases suggest that transport plans on their own might often not be enough. Instead, what might be more effective is the combination of transport plans (to provide the strategic-level objectives of transit prioritisation) and more pragmatic approaches at the tactical level that are sensitive to local political considerations. The implication for practitioners then is perhaps that the challenges for implementation in *car-centric cities* are more to do with **discovering** how much transit priority will be legitimate[405], and adopting pragmatic and flexible approaches that might help to reduce political risks while doing so.

Practitioners already have tools and methodologies for assessing how much priority is legitimate from a technical perspective. What may be needed are similar resources for measuring or assessing legitimacy from a broader perspective. It may also be that there is a need for a similar appreciation by practitioners that non-technical legitimacy may be more important than the technical details during real-world implementation, although it appears likely that many experienced practitioners already do so informally.

Another related issue is that narrative appears to be particularly important in the non-*engineering policy arenas*. Regardless of what might be stated in transport plans and evaluations based on the cold, hard facts of engineering or cost estimates, it appears that public and political opinion might sometimes become the primary arena for decision-making about transit priority measures. The legitimacy and popularism of car-centric policies appears to be unlikely to change in many cities. This suggests a need for pragmatism when planning and implementing transit priority, and also for other areas.

Walking, cycling and many other road uses have tended to be overlooked or under-prioritised due to car-centric thinking and a focus on streets as being primary for the movement of vehicles[406]. In part this might be because of the legitimacy of the private car and its status (as a symbol of wealth, power, and having 'made it'[407]), which perhaps provides it with a greater allocation of street space and intersection time than might otherwise be justified. This also relates to the emphasis on traffic-focused evaluation perspectives in transport engineering[408], and the legitimacy and populism of private vehicles in broader public and political policy-making arenas. Progress towards more transit-oriented, walkable, cyclist-friendly or otherwise less car-focused cities appears likely to involve continued gradual and incremental efforts, rather than grand plans running counter to established narratives and political realities.

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[405] An alternative and more positive narrative of the *Clarendon Street Tram Priority Pilot* might be that the **trial successfully identified the maximum amount** of transit priority in Clarendon Street **that is considered legitimate** by the general public, politicians, and local stakeholders. This maximum amount appears to be equivalent to ROW C.10 (*mixed traffic*, but with general traffic *turn restrictions* to facilitate transit) but without the introduction of *far side stops*. For the remainder of the *Think Tram* program, therefore, the practitioners involved appear to have taken this on board and adopted a generally *subservient priority* approach (*Pragmatic strategy B3*), as well as adjusting the overall program to reflect the reality that the 25 percent strategic-level target was not achievable. The pilot itself is an example of *Pragmatic strategy C3: trials*, while the technical reporting by Smith (2005) might be interpreted as having been prepared in the context of calls from local stakeholders for the complete removal of the scheme. Under such an interpretation this could be seen as a successful use of *Pragmatic strategy A1: technical enquiry* to legitimise a compromise in which the *hook turns*, *turn restrictions* and *mountable separation kerb* might be retained, while being realistic about the fact that the *far side stops* were *illegitimate* in the *general public and political policy arenas* and so beyond saving.

[406] See discussion on Complete Streets, Movement & Place, tactical urbanism, direct action and protests, and related topics in Chapter 3. See also S*treetfight; handbook for an urban revolution* (Sadik-Khan & Solomonow 2017), *Right of way; race, class, and the silent epidemic of pedestrian deaths in America* (Schmitt 2020) and other similar literature on the broader topic of street allocation and the negatives of environments catering primarily to private vehicles etc.

[407] Claims that "Margaret Thatcher once said anyone on a bus over the age of 25 is a failure" appears to reflect a common misattribution of this sentiment as a direct quote (Panjawani 2019).

[408] See discussion in Section 2.3 around Table 2.9.

Legitimacy is needed in public and political spheres, as well as amongst engineers

The concept of there being distinct *engineering policy* and *general public and political policy arenas* may help to explain why public and political opposition to transit priority implementation is more likely in *car-centric cities*. This idea has been present throughout this thesis; efforts at transit prioritisation in each city generally being the output of *engineering policy arenas*, while their success or failure appears related to how well they perform in more *general public and political policy arenas*[409]. The critique in the previous section (see Section 11.3.3) discussed how challenges and setbacks in transit priority implementation are not because of bad strategic plans. Instead this thesis has suggested that it is a failure to **gain or retain legitimacy** in non-technical arenas that has led to the less-successful-than-desired outcomes.

Lack of legitimacy for prioritisation In the *engineering policy arena* does not appear to have been the primary issue in the cases studied here. Amongst the institutions, engineering and planning professionals, and other actors or stakeholders who tend towards technical perspectives there appears to have been general agreement that transit should be prioritised. In the cases included in this study this appears to have been generally because prioritisation had already been found to be technically *proper* through the transport planning process that led to the strategic plan or implementation itself, or sometimes might have simply been *accepted* as the correct course of action (with limited formal investigation)[410]. However, this appears likely to have been supported by the fact that, more generally, engineers and other practitioners tend to already be open to the idea that transit prioritisation might be an appropriate use of road space and intersection time in many circumstances.

Unfortunately, little of this engineering or technical support appears likely to matter much in *general public and political policy arenas*[411]. To obtain *acceptance* of transit priority implementation in such an arena it may be more important to have transit riders turning out to vote on election day than to have a benefit-cost ratio over one. However, this is where techno-rationalist bureaucrats seeking to be neutral policy brokers might tend to shy away from full engagement due to concerns about becoming an advocate. If implementers shift too far into a *political policy arena,* they may feel that they will lose their own legitimacy as the arbiters of fact (through them having expert knowledge

[409] Footnote 396 on page 291 discusses how the division into just two policy arenas (technical *engineering* and non-technical '*general public and political)* adopted in this study is a generalisation. In practice it may be worthwhile to consider sub-categories of policy arenas within: different technical authorities (e.g. state road authority, local government transport department, transit authority etc.) and across different non-technical groupings (e.g. state legislature, within individual political parties, local councils, stakeholder groups in the specific implementation versus the more general public who may have less immediate interest unless it becomes a significant political issue, transit users associations, motorists associations etc.).

[410] The notable exception being the case of Zürich, where it was necessary for further lobbying, city directives and the passage of time for the City's departments to shift from opposing the *Citizens' Transit Priority Initiative* as unnecessary towards fuller support for transit prioritisation. However, in this instance it appears to have been more a lack of legitimacy for **more aggressive** forms of prioritisation, rather than for prioritisation at all, that was the initial obstacle within the City's departments and staff. City staff and departments appear to have been in favour of transit prioritisation, but just wished to adopt an approach that would have less impacts on other traffic.

[411] How much a politician or other non-technical expert might be able to influence the transport systems in directions that are counter to expert advice is beyond the scope of this study. It does appear that there are likely to be some things that are *unconditionally illegitimate* (e.g. unsafe proposals that no engineer would be willing to sign off or assist with). However, other proposals might well get implemented and retained with little to no support or even active opposition from many transport experts.

and some degree of professional independence, objectivity and impartiality, leading to *legitimacy through trust*).

Unfortunately, we appear to already be in a post-fact world where engineering, scientific and other arbitration of truth is given little value. Instead there is often a desire for 'balance' and to give equal time and consideration to dissenting views, regardless of their quality or *reasonableness* (McIntyre 2018)[412]. The current zeitgeist[413] appears to often favour populism-based politics and/or involve confrontational, us-versus-them and science-versus-fake-news engagements in many of the policy-making or -influencing arenas (Cushion & Lewis 2010; Boenker 2012)[414]. Although not responding directly to these issues, the narrative of this thesis suggests that approaches based on *incrementalism,* a willingness to compromise and pragmatism might be more effective than appeals to rationalism.

Using legitimacy as a lens may help in risk management, particularly for major projects and programs

An implication of the above is that there may be a need to convince participants in *general public and political policy arenas* of the merits of a transit priority implementation. Despite practitioners typically having already built a solid technical case and obtained legitimacy within *engineering policy arenas* before details about an implementation are proposed publicly, this might not be sufficient for more widespread legitimacy. This is not just a problem for transit prioritisation, as obtaining legitimacy may also be a significant challenge for practitioners in transportation policy, major projects, and infrastructure implementation on a wide range of issues.

It appears that **formal** consideration of **legitimacy** is **not typical** in project management practices or in the implementation of major programs and policies. At least, the specific terms and detailed understandings that might be taken directly from *legitimacy theory* (e.g. *conditional normative support*, *legitimacy through trust*, *sociological legitimacy* etc.) do not appear to be used in

[412] For example, debate about climate change appears to have already shifted into a post-fact policy arena, despite scientists having reported concerns for over 100 years (Riberio 2020). There has long been overwhelming consensus amongst technical experts that the climate is warming (NASA 2020). However, it was perhaps not until around the time of the Gore et al. (2007) film *An Inconvenient Truth* that efforts to communicate these findings to the broader *public and political policy arenas* started to gain widespread traction. Throughout the 2000s and 2010s though, unfortunately, there still remained a desire within non-technical policy arenas to hear 'both sides' in climate change policy debates, despite at least 97% of scientists being in agreement that climate change is a real and pressing issue (Oliver 2014). More recently, there appears to have been a shift towards more forceful forms of advocacy amongst scientific educators and communicators (Oliver 2019; Thebault 2019), commensurate with the increasingly urgent need for action. However, is unclear whether such approaches will do much to persuade those who are not already convinced.

At the same time, however, many actors appear to have adopted more pragmatic approaches that do not necessarily depend on large changes in top-down climate and energy policies or widespread political support and consensus. *Bottom-up and incremental* initiatives are, for example, evident in the many efforts to move towards more sustainable transportation systems through mode shift away from single occupant, carbon-intensive vehicular travel (Georgakis & Nwagboso 2012). To an extent efforts towards developing carbon capture technology (Booth et al. 2012, pp. 155-7) may be akin to the pragmatic strategy of *grade-separation*, in that it might allow everyday (car-driving) practices to remain generally unchanged, albeit at a potentially very high financial cost. Whether any of the other *pragmatic strategies*, especially trials and pop-ups, might be used to help to further *legitimise* and increase the pace of change towards sustainability in transportation remains to be seen.

[413] The "attitudes and ideas that are generally common…during a particular period in history…especially…in literature, philosophy, and politics" (Collins Dictionary 2020).

[414] Boenker (2012, pp. 14-28) reviewed news headlines and body text in 2007, 2008 and 2009 for MSNBC, FOX and CNN across 12 different frames. This content analysis study found that the Strategy / Conflict frame was most frequently coded, appearing in 33% and 36% of all headlines and bodies respectively.

programme, project and risk management approaches[415]. Clearly, however, these areas often seek to address the same sort of problems that *legitimacy theory* describes[416]. The point made here, however, is that such approaches might gain benefits or otherwise be further improved from a greater use of language and concepts of *legitimacy theory*.

What might be lacking without explicit inclusion of *legitimacy theory* understandings and vernacular is a **formal** acknowledgement of the **need to manage legitimacy risks** in the *general public and political policy arenas*, **in addition** to risks within engineering and project management[417]. If there is an upcoming election it may not matter whether a proposed (transit priority implementation or other) program provides value-for-money or has an excellent business case. Instead, the battle (for street space or otherwise) might need to be fought in the media, amongst politicians, or at the ballot box[418].

Skilled and experienced practitioners likely tend to consider all or many of these sorts of risks informally, or perhaps almost instinctively as part of their knowledge of how policy-making in the real-world works. There may, however, be benefits for greater formalisation of such assessments, and the adoption of the 'language of *legitimacy theory*' to improve implementation processes and outcomes, and as lens through which to better understand non-technical risks, and project and programme management. Some legitimacy risks might not be something that practitioners can

[415] As an example, the *Infrastructure Lifecycle Review Process* adopted by the Victorian Government and other governments in Australia involves a series of *Gateway Reviews* at critical points in the development and delivery of projects. This is effectively a strategic-level process for managing major projects and risk (VicDoT&F 2019). In general, this process appears to be techno-rational, normative and direct practitioners towards undertaking a series of reviews focused on business cases, risk management, obtaining value-for-money, and adopting a quality assurance approach. It appears to be firmly bedded within an *engineering*-style *policy arena* where the demonstration of *reasonableness* at each of the *Gateway Review* stages is sufficient to assure *acceptance* and therefore legitimacy. However, the point made here is that this appears to lack explicit or formal consideration of legitimacy itself using the terminology, language and concepts from *legitimacy theory*.

[416] For example, applying for regulatory approvals to undertake works is an effort towards gaining *normative legitimacy*. Stakeholder consultation may be both a requirement of an approvals process (and so a necessary step towards *normative legitimacy*), but also part of a wider effort to gain support from and educate the public about a proposal (and so be part of developing legitimacy *through reasonableness*, and a more general sense of *sociological legitimacy*). Other forms of public engagement, appear to go even further towards trying to develop *legitimacy through public consent* for major changes to transportation and land use systems, such as the deliberative democracy processes used in Perth's strategic planning that move "...from one mode of practice ('decide-announce-defend') to… a more inclusive and deliberative style of planning that seeks to inform the policy-making and implementation process…"(Legacy et al. 2014).

[417] Incorporating *legitimacy* into such a strategic-level review and risk management process might be relatively simple. For example a table (rows: *normative legitimacy, sociological legitimacy, etc.*; columns: policy arena categories (*engineering*, *general public and political*) and sub-categories (different institutions, stakeholder groups, etc)) might be used to prompt practitioners to qualitatively assess whether the current status of a project or program is *accepted, proper, disputed* or *illegitimate* in each policy arena, what that legitimacy is reliant upon, and the likelihood and consequences of delegitimation.

[418] Given the secondary data sources used in this research it is not entirely clear how much the various implementers involved in each implementation included in this study had incorporated non-technical risks into their project / programme planning and management processes. However, there are some indications, for example:

- A communications kit had been prepared for the *Clarendon Street Tram Priority Pilot* to "ensure consistent (communication) measures are presented…(and) created a simple, easy-to-use kit (for) encouraging City of Port Phillip residents to *Think Tram*" (VicRoads Media and Events Unit 2004). However, the sample responses to media questions included in that kit do not provide much detail on the parking impacts (other than that some spaces will be removed, and the "local council will be reviewing the layout of parking provisions for the precinct"), despite that importance of parking removals in later protests against the scheme. Similarly, the kit states that the trial would run for three months (followed by an assessment of the effectiveness of the measures and then permanent implementation of those that were successful), but this contrasts to the claims of some who were opposed to the trial that it was already "a done deal" (Quin 2005a).
- The sudden implementation of the pedestrian mall in Curitiba over a weekend and after the law courts had closed suggests that this might have been to reduce the risk of legal action or an injunction halting the implementation.

Unfortunately, it appears to be difficult to confidently assess what level of risk management occurred and what risks were considered in the implementations included in this study without direct access to the implementers themselves. Researching practices in non-technical risk management during transit priority implementation might be an area for future research.

resolve while maintaining a proper distance from electoral processes, but there may be some benefits from more formal consideration of what might happen, and what should be planned for, if the political winds change[419].

There are many other 'wicked problems' facing transportation, science, techno-rationalists and society at large (Clarke & Stewart 1997; Wiegmann 2013; Ney & Verweij 2015). A broader contribution of this research, beyond transit prioritisation alone, may be to provide suggestions for how address some of these problems that relate to knowing the technical solutions, but not how to get them implemented. The same concepts of the 'amount of priority that is legitimate' and the *pragmatic strategies* developed in this study might be applicable to some of these areas as well. For example, technical solutions have long been proposed for road pricing (Smeed et al. 1964; Small 2004; Santos & Fraser 2006; Ardıç et al. 2015), on-street parking (Shoup 2005), environmental sustainability and many other major challenges. What may have been lacking in tackling these challenges, however, is a way of understanding how legitimacy, politics and public policy might be addressed in pragmatic ways that might help practitioners to make progress. The wider implication is that it might be possible to develop similar types of *pragmatic strategies* in other areas, beyond transit priority implementation, to help to address legitimacy challenges where science, engineering and other techno-rational fields intersect with public policy-making and politics.

11.4.2 Implications for research

Key implications of this study for research in transit priority and transport policy are that:

- legitimacy theory appears to have relevance to the research areas of transport policy and urban planning, road and transit engineering, and project and risk management;
- the new *framework for transit priority and legitimacy* and the *pragmatic strategies for transit priority implementation in car-centric cities* that have been developed in this study appear to have theoretical implications for research in *tactical urbanism*, road and transit engineering, and transport policy; and
- the findings of this study confirm the importance of, and reinforce the calls of Marsden and Reardon (2017) and others for, greater engagement with *public policy analysis*, power, politics and other related issues in transport policy research.

These implications for research are discussed in more detail in the following sections.

Relevance of legitimacy theory to transport policy and related areas

Legitimacy theory may be a research field that is somewhat remote from transit priority, transport policy and engineering more generally. However, the implications of this research suggest that that

[419] This might suggest having a 'Plan B' or a series of alternative plans that can be turned to in the event that the current plan is delegitimated, or including legitimacy and political circumstances in scenario planning.

legitimacy might be significant factor that can influence, or perhaps even cause, changes in transport policy or the conditions on road and transit networks[420]. *Legitimacy theory* appears likely to provide a lens for improving research understanding of some of the pressing problems in transportation. Chapter 3 has already highlighted some of its potential connections to transport policy, road and traffic engineering and related subjects. This thesis has clearly demonstrated the importance of the various types of legitimacy to transit prioritisation and the allocation of road space and intersection time. However, *legitimacy theory* and *public policy analysis* are broad fields.

There are further issues such as *input legitimacy* and *output legitimacy* (Scharpf 2003), the many approaches from *public policy analysis* (reviewed in Chapter 3, Table A.1), and further candidates for solving wicked problems (Ney & Verweij 2015). All of these and others might provide insights into transit priority and transportation more generally. The implication for researchers in transport policy, traffic engineering and related fields, therefore, is that these connections with *legitimacy theory* and related areas are not just potentially useful, but important and under-explored.

Theoretical implications for existing frameworks, models and research

Strategic transportation planning, transport / traffic impact assessments, LATM, Placemaking, Network Operations Planning, *street reclaiming* and tactical *urbanism*, and other related frameworks, models and research areas were discussed in Chapter 3 (Section 3.2). The outcomes of this research might suggest that there are theoretical implications for these areas, in addition to the narrow focus of this study on transit priority. It appears that the ideas of *bottom-up implementation*, *incrementalism* and other concepts that have helped to shape the *pragmatic strategies* outputted by this study have already been incorporated into research on *tactical urbanism* or used to in transport research more generally[421]. However, these previous research efforts generally appear to be narrow in scope. They also do not appear to have built overall frameworks or other research outputs combining multiple concepts from across *public policy analysis* and *legitimacy theory*, as has been done in this study.

This implication for research relates to the critique of transit priority research in Chapter 2 and, in particular, the discussion of how BRT research has used concepts that match *incrementalism* without appearing to be based on or connected to *incrementalism* theory. This study connects the

[420] For example, the four-level categorisation system of Deephouse et al. (2017, p. 33) may help to explain many of the road user and institutional attitudes towards transit prioritisation, road allocation, safety and other elements of transportation networks. For some issues the status quo or proposed changes appear to be simply *accepted*, or might have the potential to be made *proper* after due consideration and technical analysis. On other issues, however, implementation might be intensively *debated*, or even considered *illegitimate* and unacceptable under any circumstances.

For example, railway engineering typically operates with a fail-safe approach where multiple redundancy is an *unconditional* feature. Similarly, occupational health and safety has long had a Vision Zero attitude towards workplace death and injury. In a typical warehouse environment there are typically strict safety regulations governing the use of forklifts, which might include using temporal or physical separation to limit exposure or even ban forklift operations entirely if pedestrians are nearby (Larsson et al. 2003; WorkSafe Victoria 2010). Such an approach does not appear to extend completely to road environments. Instead, it is *accepted* as a cultural norm (Hill 2010) that cars, trucks and light rail vehicles can interact with pedestrians, cyclists and other vulnerable road users without separation or segregation (Korve et al. 1996; Korve et al. 2001; Basford et al. 2002; Norton 2007; Currie & Reynolds 2010; Novales et al. 2014; COST TU1103 2015; Lawrence et al. 2018; Hysing 2019; Creutzig et al. 2020).

[421] For example, Tesseyman (1999); Pulichino (2003); Pulichino and Coughlin (2005); Bailey and Grossardt (2006); Eidelman (2010); Perl (2012) and others have been cited previously in this thesis in the context of having applied public policy analysis, public involvement or other related models or frameworks to the study of transportation.

transit priority measures that underpin much of the BRT concept itself, to *legitimacy*, *implementation* and other related theoretical knowledge. The implication for other researchers in transit priority, BRT and related areas is that there may benefits in connecting their work on implementation to these concepts as well.

Section 11.2.2 noted that the contribution of this research is to characterise *pragmatic strategies* that appear to already be in use. It also provides a framework and language through which practitioners and researchers can explore non-rational factors in transportation policy-making. As such, it is suggested here that researchers seeking to engage with these issues adopt this language and framework, or otherwise make efforts to engage with, connect, or unify the knowledge and theoretical understanding generated here in this study with their own future work.

Another implication of this study for researchers, perhaps of a more routine or detailed nature, is that there is a need to incorporate elements of legitimacy, the *framework for transit priority and legitimacy* or the *pragmatic strategies* into guides, synthesises of practice and other research outputs aimed towards practitioners. There is a wealth of transit priority implementation materials available in the existing research literature that are specifically aimed towards practicing engineers and planners, some of which has been included in the review in Chapter 2. The implications of this study, however, suggest that a greater emphasis on implementation and inclusion of concepts from legitimacy, *public policy analysis* should be included in such outputs in the future. This might help to provide both technical and non-technical guidance to practitioners, and therefore increase the likelihood of successful priority implementation.

Reinforcing calls for greater engagement with public policy analysis

The final implication for research that flows from this study relates to the calls of Marsden and Reardon (2017) and others for the engagement with non-techno-rational approaches, questions of politics and governance, and a broader focus on the 'policy-making' in transport policy. These calls were discussed in Chapter 2, Section 2.4.5, and helped to provide motivation for this study. The Marsden and Reardon (2017) paper has already received widespread attention in the research literature[422]. However, this study perhaps helps to demonstrate the potential of research that directly responds to their call to engage with power, governance and politics, and, in particular, legitimacy. The final implication of this study for research, therefore, may be to <u>**reinforce** these previous calls for engagement with *public policy analysis* and related fields</u>.

As discussed in Chapter 3, there appear to be broad research gaps in this area. This study has perhaps provided an example for future research in this area that might help to fill these gaps, albeit with a narrow focus on just transit priority implementation. The implication, therefore, is that there is yet more to be done in connecting transport policy to other fields related to policy-making.

[422] Seventy citations are currently listed on Google Scholar (Google 2020c). Scopus reports 46 citations and a field-weighted citation factor of 5.89 (Elsevier Science 2020).

11.5 Future research directions

There are clearly wide research gaps in the current research understanding at the intersection of transit priority implementation, legitimacy theory, public policy analysis and transportation policy, as was discussed in the conclusions to Chapter 3. This study has made a contribution towards filling these gaps, but has focused entirely on transit prioritisation and only examined four case study cities in detail. While this might be seen as limitation of this study, particularly with respect to what can be achieved within a PhD thesis, it may instead hint more at the opportunities for future research.

There is scope to learn more about why transit priority implementation and other transportation policies are successful or not-as-successful in different cities, and different political and institutional contexts. While this study has generated a new framework and some *pragmatic strategies for car-centric cities*, which contribute to existing knowledge, there appear to be significant opportunities to build on the research output of this study. This might include: further refining of the framework and the development of more detailed hypotheses and theories; identifying further *pragmatic strategies* for practitioners in *car-centric*, *transit-centric* or other types of cities; and to further investigate and test research understandings of how politics and other non-rational factors might interact with techno-rational engineering in transit priority implementation and transport policy.

The gaps in the existing research literature appear to be quite broad because, as identified by Marsden and Reardon (2017) and others, transportation policy research has tended to focus on techno-rational approaches and to neglect policy-making issues. This study, however, is only an initial foray into researching such issues, with an emphasis on transit priority rather than transportation policy-making as a whole. This section, therefore, seeks to provide some insights into the future research directions in transit priority implementation, policy and other related areas that are suggested by the findings and limitations of this study. Sections 11.5.1 and 11.5.2 provide some directions for future research that might allow the framework and the pragmatic strategies to be further developed. In Sections 11.5.3 and 11.5.4 there is a brief discussion of how the findings of this study might suggest future research directions beyond the limits of transit priority implementation, and into project and risk management, transport more broadly, and perhaps back into fields related to policy analysis more generally.

11.5.1 Testing or elaborating on the framework and pragmatic strategies

The limitations of the case research approach adopted in this study were discussed in the earlier critique in Section 11.3.1. Only four cities have been examined in this study. However, even within this small sample only a few instances of priority implementation have been reviewed in detail. Much of the potential for future research would seem to relate to testing, elaborating on, filling in gaps and otherwise increasing confidence, certainty and depth around the findings of this research by looking at further instances of priority implementation.

There appears to be ample opportunity for further research examining other transit priority implementations, either in the four cities included in this study or in other cities. Such research may provide an opportunity to build on this study, and might focus on:

- testing or elaboration of the progressions and framework discussed in Chapter 9[423];
- further study and refinement of the *pragmatic strategies* identified in this study; and
- the development of further *pragmatic strategies* for legitimising transit priority measures through:
    - searching for other strategies that are already in use by practitioners, but which have not been found in this study, or
    - identifying new ways to legitimise transit priority implementation that have not yet been used in practice.

Part of the contribution of this study has been to identify that legitimacy, in all of its many forms, appears to have been important to the implementation of transit priority measures. However, this study has relied on secondary data, which was collected for other purposes and to answer research questions not directly related to legitimacy. Having completed a *theory generation* process in this study, the suggestion made here is that an important next step for research in this area is to collect primary data specifically for the purposes of understanding transit priority legitimacy. This also suggests that there is need to use primary data to confirm, interrogate or expand on the findings of

[423] This might include:

- Exploration of failure or mixed successes in transit-centric cities,
- Exploring the various topographies of legitimacy and transit priority in different cities, contexts and for different implementations. This might include the development of 'legitimacy topographies' for transit priority implementation in other generic types of city, not just the *car-centric* and *transit-centric* categories used in this research. This might include:
    - 'in between' types of cities, which are towards the middle of the spectrum, and
    - cities with commuter-focused-on-road-transit-systems;
- Testing of the prepositions that underlie the framework;
- Review of the areas where this study has pushed at the boundaries of the framework, particularly with respect to Progressions that remain as yet only theoretical (as discussed in Section 9.5.4);
- More detailed review of implementations in Melbourne and Toronto that were (ultimately) successfully implemented, given that the focus in Part B was on challenges in *car-centric cities* (with 'challenges' perhaps taken as being synonymous with 'mixed outcomes and failure' in this thesis, rather than including 'challenges that were overcome'). For example:
    - A tram extension to Box Hill was successfully implemented as part of the Route 109 Project (see footnote 157 and Currie and Shalaby (2007, p. 36)), somewhat overlapping *Think Tram*. The Route 109 Project is notable for having used a consensus building and highly consultative approach, Cross-case comparison to the *Clarendon Street Tram Priority Pilot* might provide an opportunity to look at different approaches and outcomes in the same city.
    - the St Clair Avenue West and King Street Transit Pilot projects in Toronto were both ultimately successfully implemented, albeit with challenges overcome along the way. Cross-case comparison to the *Transit City LRT Plan* might, likewise, provide an opportunity for further insight, particularly given that the more central midtown and downtown locations of these two projects, respectively, may be indicative of implementation in somewhat less *car-centric* parts of Toronto, which potentially might provide an opportunity to more closely examine the 'messy middle' between the extremes of *car-centric* and *transit-centric* contexts; and
- Use of a disaggregate approach to examine legitimacy in different *policy arenas.* This might include:
    - considering how legitimacy for transit priority might differ between *political policy-making arenas* (i.e. within a parliament or council), stakeholders (e.g. local residents and businesses, transit service users, cyclists, drivers, other groups), and the general public (who may not be aware of the implementation unless it becomes an election issue, or is widely reported in the media).
    - institutional frames of reference to consider transit priority legitimacy varies amongst engineers and planners, road and transit authorities or governmental institutions, state (Canton) versus local levels, private transit operators versus public regulators etc.
    - the impact of jurisdictional boundaries (e.g. are more suburban areas included (as in Toronto) or excluded (as in Zürich))
    - exploring legitimacy for transit prioritisation within different political parties or socio-economic groupings, or through time.

this study. Future research activity might seek to directly address questions of legitimacy for transit priority implementation, and could involve:

- interviews with implementation participants to gain perspectives on what was and was not considered legitimate at various times during an implementation process, and in various policy arenas;
- Delphi studies involving researchers and practitioners engaged in transit priority implementation, which might help to gain insights into the legitimacy of priority measures, or to review and improve upon the *framework* and *pragmatic strategies*;
- direct measurement and comparison of:
  - legitimacy levels for transit priority implementation across various *engineering*, *general public and political policy arenas* in a range of cities and contexts, and
  - legitimacy levels for transit priority implementation and the actual outcomes of implementation efforts (e.g. transit service speed and reliability improvements); and
- action research or other approaches that might seek to better understand the use of *pragmatic strategies* in real-world practice by reporting on events and outcomes, and directly measuring legitimacy levels before, during and after implementation.

There also appears to be an opportunity for future research that seeks to make more detailed connections with other public policy analysis frameworks, models and theory, or the use of these other approaches to further study and understand transit priority implementation. Chapter 9 included some discussion of how the legitimacy framework might connect back into other public policy analysis frameworks, approaches and theory[424] However, it is noted that there are a very large number of public policy analysis approaches, many of which overlap. Deciding which specific approaches to use when exploring potential connections would appear to be a challenge, but such research might include:

- exploration of the wider factors that might influence how much transit priority implementation is considered legitimate[425];
- making connections to *organisational institutionalism* in researching how business case development, economic modelling and other assessments associated with infrastructure policy-making bodies, treasury and governmental budgeting processes, and related

[424] See the end of Section 9.4.4 and discussion of connections to the Multiple Streams Framework and agenda-building models in footnote 316.

[425] The legitimacy of transit priority appears likely to be influenced by much more than just priority- or transport-related issues. Instead larger issues such as environmental sustainability (e.g. climate change, greenhouse gas emissions, air quality etc.), broader political issues and related changes, and many other factors might influence how much transit priority is legitimate at a place at a certain time or even whether prioritisation is on the policy agenda.

agencies might impact on the legitimacy of transit priority implementation (see discussion in Section 3.3.2);

- studying the framing of the impacts of transit priority implementation[426]; and
- developing better understandings of how and why transit priority implementation efforts commence, or why the removal of priority measures might move onto a policy-making agenda[427].

The research described in this thesis is entirely qualitative. As such, there appears to be an opportunity for future research in this area using quantitative research, other research methodologies or a mix of methods. This might include quantitative definition or delimitation of the boundaries between: *car-centric* and *transit-centric cities*[428]; success, mixed outcomes and the failure of implementation; speed versus reliability improvements; and other variables and factors that have been tackled qualitatively in this study. One challenge for such research, however, appears to be that transit priority legitimacy may be very sensitive to context (e.g. governance and institutional structures, political contexts and local events etc.) and so efforts to research transit priority legitimacy quantitatively may need to be embedded within a case research approach. There may be issues related to how much quantitative findings about an implementation or city might be reliably considered generalisable to other contexts[429]. However, in general, it appears that there are many avenues that might be addressed in future research to help improve understanding and quantify interactions between legitimacy and transit prioritisation.

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[426] For example, transit priority implementation can help existing drivers (as well as on-road transit) because of reduced congestion (from those drivers who do make a mode shift) or other benefits such as improved road safety, as briefly discussed in Section 11.2.1. While these sorts of secondary benefits appear to be included in techno-rational evaluation models, it is unclear the extent to which they are used in public and political messaging about why transit priority implementation is of benefit, and whether these sorts of 'win-wins' might help to legitimise transit priority.

A challenge may be that the benefits to other road users from transit prioritisation (e.g. mode shift to transit decreases congestion for those car drivers who continue to drive) are possibly more removed than direct impacts from priority measures themselves (e.g. removal of a traffic lane to provide an exclusive bus lane might look like a major negative for general traffic). Future research might seek to further explore the issue of how transit prioritisation might potentially benefit other road-users (e.g. decreasing congestion, providing more choice, or better alternatives for when they might not have to drive, etc.) and how this might be better communicated or otherwise leveraged to help legitimise transit priority in public and political policy arenas (see also discussion of the Dunning-Kruger effect in Section 3.5.5).

[427] Some transit priority measures may resist delegitimation because of the sunk costs involved in their implementation and the potential expense involved in making further changes. For example, space priority measures that involve physical separation through kerbing or similar might be more resistant to removal than the removal of a *painted bus lane* or other such relatively 'non-permanent' type of priority measure.

This might suggest that research into the 'optimal' type of physical transit priority measure in terms of **resistance to delegitimation** could be a useful direction to support incremental implementation efforts by practitioners. This sweet spot might vary from place to place dependent on local context. However, there may be benefits for practitioners if future research can develop a toolkit of small-scale and 'likely to be successfully implemented and unlikely to lead to delegitimate' interventions, that also happen to be good at improving transit speed and reliability!

[428] There may be opportunity to explore whether the legitimacy of implementations are related to both *car-* and *transit-centric-ness* of a city / place, or if it is more to do with just the importance of the car alone. This suggests exploring the legitimacy of implementation of pedestrian or cyclist measures in various cities to see if there is legitimacy for prioritisation across all non-car-modes, or whether legitimacy for (non-car) prioritisation is mode specific. The example of the *Rue des Flores* pedestrian mall suggests that in Curitiba it may have been more about shifting to a less car-dominated city, rather than specifically towards a transit-dominated city. However, there is little evidence that Curitiba has sought to prioritise bicycles as well as buses and pedestrians during the implementation of the *Plano Diretor* (although this study has not reviewed cycling in Curitiba in any detail).

[429] This relates to further contextual factors that might complicate future research in this area, such as with respect to whether legitimacy is impacted by:

- political values and differing perspectives on how much government should intervene in private travel,
- how different members of society and groups might feel about the reasonableness of transit prioritisation, and
- whether there is an 'average' legitimacy level across a community that matters or if it is legitimacy among decision-makers, elites or other groups that matters to transit priority implementation.

11.5.2 Operationalising the *pragmatic strategies*

The findings of this study have not yet been widely shared with practitioners. There appears to be a need to take the outputs of this research through the next step of developing toolkits and guides that might help enable greater use of the *pragmatic strategies* in the real world.

Some of the examples included in this thesis may provide models and templates for best practices[430]. However, there appears to be an opportunity for future research that might seek to develop guides and similar outputs to assist practitioners to implement transit priority measures along the lines of each of the *pragmatic strategies* described in this thesis. It may be possible to further develop and test each of the *pragmatic strategies* in conjunction with the development of best practice guides.

There also appears to be an opportunity for the use of industrial design-type research approaches to develop simple and re-useable versions of standard transit priority measures that might be easily implemented or adjusted. 'Cone pilots' to create temporary bus lanes have already been reported in the literature, while Curitiba developed a 'standard' *bus boarding tube* and traffic engineers have long had access to standardised 'spike-down' kerb and speed humps. There may be value in research to develop standardised and easily removable/alterable priority measures such as *platform stops*, separation measures and other transit priority treatments that might facilitate *pop-ups*, *trials* and experimentation in the real world.

More broadly, there may be opportunities for future research into how to *legitimise* transit more generally. Technical reports, transport plans, the annual reports of transit authorities and other such documents all tend to present technical material in a format focused towards engineers and decision-makers, and with an emphasis on costs, operating subsidies and other matters related to transit efficiency. What might be lacking amongst all of this is a wider appreciation of the benefits of transit, and an understanding of how to clearly communicate this into the political and public policy arenas so as to help to *legitimise* transit services themselves as a *reasonable* use of public funds. Previous research has already demonstrated the clear benefits of transit for reducing traffic congestion (Aftabuzzaman et al. 2010), transit for improving road safety (Currie & Reynolds 2010, 2011; Goh et al. 2013; Naznin et al. 2015; Naznin, Currie, Logan, et al. 2016; Naznin, Currie, Sarvi, et al. 2016; Litman 2019b) and the many other benefits of transit and transit prioritisation. However, these may not be fully appreciated by decision-makers and in the general public during debates within the political and public policy arenas. *Legitimacy* and *legitimising* transit might provide a lens

[430] To a certain extent the recent publication of *Best Practices in Implementing Tactical Transit Lanes* (UCLA Institute of Transportation Studies 2019) might represent the type of research outputs needed to support the use of the *pragmatic strategies* for transit priority implementation in practice. Shorter guidelines documents, templates and tools or other materials might also be generated to directly assist practitioners in addressing legitimacy challenges in transit priority implementation. For example, the *King Street Transit Pilot* dashboard (City of Toronto & Toronto Transit Commission 2018) appears to provide an excellent template for any other project team seeking to report on the results of a transit priority implementation. However, whether there is sufficient materials available to practitioners to easily generate their own similar reports on trials or implementation, but tailored to their own project or local context, is unclear.

for future research into how to better communicate the benefits and ***reasonableness*** of improving transit to the broader community, which may help to improve both ridership and services.

Legitimacy appears likely to be important to more than just transit priority implementation, but also many other issues and challenges in transportation and land use planning. There have been references earlier in this thesis to conflict, protest and policy-making and other related issues in other aspects of transportation[431]. The findings of this research, and in particular some of the pragmatic strategies, may be applicable for researchers and practitioners working in walking, cycling, placemaking or other areas related to transport systems and public policy making. There may be the potential to develop similar legitimacy frameworks or pragmatic strategies for the implementation of pedestrian or cyclists facilities, for placemaking and road management[432], and perhaps across broader topics beyond transport, as discussed in the following.

11.5.3 Infrastructure delivery and risk management

This study has touched on operations and project management, risk management and infrastructure planning. There is already a broad body of research in these areas, much of which appears to be focused towards developing normative schemes for best practices, and for developing dashboards and project lifecycle tools to aid in the delivery of major infrastructure schemes. The outcomes of this particular study, however, suggest that these fields might benefit from a greater consideration of risks associated with 'legitimacy' in the development of guidance for practitioners[433].

Incorporating some of the concepts from *legitimacy theory* that have been discussed in this thesis into project, risk and operations management tools and systems, strategic transport and land use planning, or other such efforts might be an area worthy of future research. There may also be an opportunity to explore how *legitimacy theory* and the various models from *public policy analysis* are relevant to, or might be used to better understand or improve infrastructure planning and delivery, project and operations management, and related areas more broadly.

11.5.4 The problems of techno-rationalism across broader contexts

The outcomes of this research suggest a need to address research gaps and other broader problems related to techno-rationalism and real-world decision-making. In this respect the call of Marsden

[431] In particular, policy-making and issues relating to bicycling and the legitimacy of cyclists as road users. See, for instance discussion in Section 3.2.4.

[432] For example, it may be possible to incorporate understandings of politics and legitimacy into frameworks such as *SmartRoads* and Complete Streets, the concept of Movement & Place in road management, and broader issues in transport and traffic engineering. Along similar lines, walking and cycling research and practice appear to often relate to issues of safety, equity and the unequal treatment (and perhaps legitimacy) of different classes of road user (see, for example, Delbosc et al. (2019); Schmitt (2020) and Norton (2007)). However, in general, it appears that research understandings from *legitimacy theory*, *public policy analysis* and related fields may be yet to be fully incorporated into pedestrian, cyclist and other (similarly broad) fields of transport research.

[433] Section 11.4 above has already discussed how there may benefits from explicitly considering political legitimacy as a potential source of risk or otherwise incorporating *legitimacy theory* into project management and related areas. Further research might involve more detailed study of the extent to which non-technical and political / legitimacy risks are included in transit priority implementation, project delivery and other current practices. However, there may be considerable variation and it appears likely that types of factors might already be included informally by experienced practitioners. Regardless, there appears to be a likely avenue of research focused around whether there is a great need for *legitimacy theory* and related concepts to be included in formal processes or methodologies for project and program delivery (e.g. including explicit consideration of 'legitimacy' into Gateway Reviews and similar processes).

and Reardon (2017) for a greater engagement with public policy analysis, politics and power in transportation policy research is again echoed here. However, as discussed in the following, the findings of this study might suggest that there is a need for a response across even broader research contexts, not just transportation policy.

The discussion in Section 11.4 sought to explore the implications of this research for other areas at the intersection of techno-rationalism and policy. In particular that section discussed some of the ‘wicked problems’, and a lack of *trust* in science as an input to policy development in the modern, ‘post-fact’ world. Popularism-based politics has also been discussed in the context of how it might *delegitimate* transit prioritisation, strategic transport plans or other efforts, but not provide much help in determining or delivering viable alternatives. That discussion is continued here, but taken further to argue for future research into adapting the new *transit priority and legitimacy framework* and the *pragmatic strategies* that have been developed in this thesis to broader contexts.

As well as the lack of engagement of transportation policy with public policy analysis and political science there appears to be a similar lack of engagement in the opposite direction. Transportation policy, transport economics and other such research and journals appear to be highly focused upon the technical problems of transportation. As such they are unlikely to attract the attention of more general policy and political science researchers. There is much transportation policy research that draws upon knowledge from *public policy analysis*, but this appears to be generally a one-way street[434]. Unfortunately, there may not be much knowledge flowing back in the other direction; from transport towards the more general understandings of policy that exist in *public policy analysis*, law, political science and related fields[435].

The position taken here, therefore, is that the findings of this research might be of benefit to other fields of policy research, beyond just transportation and transit priority. This thesis has relied extensively on existing knowledge from *public policy analysis*, *legitimacy theory* and other related fields. There appears to remain much more that can be done to continue to apply these fields of knowledge to transportation policy. This might involve the adoption of other methodologies to test and elaborate on the research findings made here, but also to expand the field of transportation policy research more generally. However, it might also be that there is something that can be learnt **by *public policy analysis*** and related fields **from transportation policy**.

Transit prioritisation and transportation systems may provide a test bed of many different contexts and political challenges through which the sometimes-esoteric theories and models of *public policy analysis* and related research areas are observable and often of key importance to progress. It is

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[434] Please excuse this pun. It was intentional.

[435] As an example, a recent paper by the author ('*"O teach me how I should forget to think"; Safe Systems, human factors, institutions and a Montague Street bridge crash*' (Reynolds 2019)) called for much greater engagement by road safety engineers involved in the development and operation of the *Safe Systems* approach to road safety with the legal and justice fields. Despite the significant advancements in road safety engineering towards harm-minimisation-based approaches that reflect modern understandings of human factors in vigilance-based task, the institutions responsible for enforcement appear to remain within frameworks focussed on driver negligence and the discouragement of momentary inattention. Unfortunately, however, these frameworks appear to be unlikely to significantly improve road safety outcomes, regardless of the level of enforcement or the use of punitive methods to discourage certain behaviours, because when it comes to driver error in many cases humans prove to be fallible, prone to making mistakes and not built for the modern road system (Transport Accident Commission (TAC) 2016), regardless of how much the framers of *normative* road laws might hope otherwise.

from this test bed that this thesis was developed a framework for understanding transit priority, but this framework might also be useful for thinking about legitimacy more generally. Perhaps this might be over-extending upon the real importance of this study to other, non-transport researchers. However, the hope expressed here is that its findings may be applicable or help prompt further research in public policy analysis and related fields, not just in transport. This may provide a way of strengthening the connections between theory and practice, and between transportation policy and those research fields that consider power, legitimacy and politics more generally.

11.6 Concluding remarks

Transit priority implementation and transportation policy appear to be much harder in reality than they might appear when viewed from the idealised conditions of techno-rationalism, and engineering and planning theory. That is not to say that any of the technically-orientated models, frameworks and work underlying transit, transportation and urban planning is in any way 'easy' in and of itself. Rather, the point here is that the technical aspects are just one component, and that previous research and practice may have overlooked the fact that there is a whole different arena of complexity over on the policy side of the 'equation' that is implementation. When compared to the entire problem of transit priority implementation, the technical aspects may sometimes be the relatively easy part.

Physics and mathematics sometimes seek simplification through the framing of problems in easy-to-measure terms. This might assume that there is a frictionless inclined plane, that only Newtonian physics applies, or that that the problem involves a chicken in a vacuum and a spherical cow (Stellman 1973; Harte 1988; Wikipedia 2020). So too might transportation policy too often first assume that all decisions will be made rationality, thereby simplifying the modelling so that politics, institutional factors and any non-*engineering policy arenas* do not have to be considered. Unfortunately, however, it is not possible to simplify these factors out of existence in reality. Pro-car populism appears to exist to various degrees in most cities, and transport research and practice needs to continue to find ways to respond to this and other non-technical problems.

There appears to be a need to put the *policy arena* (back) into the consideration of transportation policy. The research outputs of this thesis have suggested new ways of considering transit prioritisation and legitimacy, and *pragmatic strategies* for practitioners seeking to implement priority measures in *car-centric cities*. Many of these appear to be already be used in practice and are continuing to shape transportation systems and urban environments. The current challenges of climate change and (the more recent) COVID-19[436] pandemic suggest that *legitimacy* may be increasing for these types of pragmatic solutions. The contribution of this research, however, has been to categorise these types of strategies, identify approaches that might increase the likelihood of technically appropriate solutions being adopted and accepted, and to provide a new framework and language for practitioners seeking to improve on-road transit services and transportation systems. The challenges of implementation itself are left as an exercise for the reader.

[436] For example, there appears to have been a plethora of *tactical urbanism* style conversions of existing road space from general traffic to pedestrian and cyclist uses in response to the need for greater social distancing due to COVID-19. Whether similar conversions of general traffic lanes to exclusive transit usage (to help to provide greater capacity on buses and trams, and so avoid the need for crush-loading conditions) remains as yet to be seen.

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Appendix A. Public policy analysis approaches

Table A.1 shows different *public policy analysis* approaches that are discussed and categorised in the selected research literature. This provides further details related to discussion in Section 3.3.

Table A.1 Synthesis of public policy analysis approaches shown in selected research literature

Category	Janis and Mann (1977)	Lindblom (1979)	Huber (1981)	Shrivastava and Grant (1985)	Bobrow and Dryzek (1987)[2]	Hickson (1987)	Eisenhardt and Zbaracki (1992)	Parsons (1995)	Lyles and Thomas (1988)	Das and Bing-Sheng (1999)	Turpin and Marais (2004)	Caramani (2011)	Knill and Tosun (2011)[3]	Peters (2011)	Andersen (2011)	Stopher and Stanley (2014)
*Groups of approaches that appear to be related or generally similar to the **five major** approaches discussed in more depth in Chapter 3*																
Rational	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Bounded rationalism[1]	✓						✓	✓		✓	✓					✓
Quasi-satisficing	✓															
Elimination by aspects	✓															
Autocracy				✓					✓	✓						
Information processing					✓			✓								
Welfare economics					✓			✓								
Institutionalism[2]			✓	✓				✓			✓	✓	✓	✓		✓
Actor centred institutionalism														✓		
Avoidance									✓	✓						
New institutionalism												✓				
Social structure					✓			✓								
Incrementalism	✓	✓				✓				✓	✓		✓			✓
Simple incrementalism		✓														
Disjointed incrementalism		✓								✓						
Strategic analysis		✓														
Logical incrementalism										✓						
Adaptive				✓					✓	✓						
Path dependence															✓	
Political			✓	✓			✓		✓	✓	✓	✓				✓
Comparative politics								✓								
Conflict model	✓															
Policy convergence, diffusion, transfer													✓		✓	
Political philosophy					✓			✓								
Political process								✓		✓						
Public choice					✓			✓								
'Garbage can' model			✓			✓	✓			✓	✓					
Ungrouped approaches, ordered alphabetically																
Case-oriented analysis												✓				
Consocialism														✓		
Corporatism														✓		
Decisive									✓	✓	✓					
Governance														✓		
Grounded theory												✓				
Individual differences											✓					
Marxism														✓		
Mixed scanning	✓															✓
Multiple perspectives										✓	✓					
Naturalistic											✓					
Network theory														✓		
Policy feedback															✓	
Policy / social learning															✓	
Systematic or structural functionalism												✓		✓		
Systems theory														✓		

Notes: Source: Author's synthesis of selected literature, and assessment of groupings

1. Bounded rationalism is also known as satisficing. Institutionalism is also known as organisational procedures. Lindblom (1979) uses the term 'no longer fiddling' to describe rationality-based methods. Many approaches overlap or are known by multiple terms.
2. Bobrow and Dryzek (1987**)** categories as reported in Parsons (1995, p. 33).
3. The Knill and Tosun (2011) listing is too long to show in full in the above table, but also includes: punctuated equilibrium theory; group models; elite models; the median voter theorem; policy initiation models; policy windows; policy monopolies; bureaucratic behaviour; veto players; top-down, bottom-up and hybrid implementation models; cognitive frames; normative frames; policy paradigms; and advocacy coalitions.
4. Literature (top row) selected based on an informal 'snowball' search, starting with Parsons (1995), with additional cross-comparison to Althaus et al. (2007, 2013); Stopher and Stanley (2014).

Appendix B. Research methodology details

B.1 Introduction

Appendix A provides additional details about case study research methodologies and the research methodology adopted for this study. This material supports Chapter 4 of the thesis.

B.2 Review of social research methods

Table B.1 shows a synthesis of various other social science research methods.

Table B.1 Synthesis of social science research methods.

Research Method	Denscombe (2007, p. 4)	Alasuutari et al. (2008, p. 2)	Pierce (2008, p. 2)	Bickman and Rog (2009, pp. 2-5)	Cecez-Kecmanovic and Kennan (2013)
Case studies	✓	✓	✓	✓	✓
Experiments	✓	✓	✓	✓	
Action research methods	✓		✓		✓
Comparative methods		✓	✓		
Ethnography	✓				✓
Grounded theory	✓				✓
Longitudinal methods		✓	✓		
Mixed methods	✓			✓	
Quasi-experiments		✓		✓	
Systematic reviews, meta-analysis	✓			✓	
Surveys and sampling	✓				✓
Cross-national studies		✓			
Design science research					✓
Field study					✓
Historical methods					✓
Interactive model				✓	
Organizational diagnosis				✓	
Panel studies		✓			
Phenomenology	✓				

Source: Author's synthesis

Nineteen different methods are described in the selected literature. Case studies, experiments and action research are the most frequently mentioned methodologies in the social science methodology literature. Further discussion of the reasons for selecting a case study research approach for this study are provided in Section 4.3 and Table 4.1.

B.3 Case study types

Case studies can be used for a wide range of purposes, not just research, as shown in Table B.2.

Table B.2 Case study types (modes) discussed in selected research literature

Type	Bonoma (1984)	Benbasat et al. (1987)	Darke et al. (1998)	Eisenhardt (1989)	McCutcheon and Meredith (1993)	Cavaye (1996)	Meredith (1998)	Stuart et al. (2002)	Voss et al. (2002)	Denscombe (2007)	Eisenhardt and Graebner (2007)	Roth (2007)	Siggelkow (2007)	Barratt et al. (2011)	Ketokivi and Choi (2014)	Yin (2009, 2014, 2018)
Research	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓
Exploratory case studies	✓	✓	✓		✓		✓	✓	✓			✓		✓		✓
Descriptive case studies	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓		✓
Explanatory case studies for theory building or generation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Theory testing or verification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	
Theory elaborating, extension or refinement				✓			✓	✓	✓		✓		✓		✓	
Non-research	✓		✓							✓						✓
Evaluations										✓						
Teaching cases	✓		✓													✓
Cases as record keeping																✓
Journalism and popular case studies																✓

Source: Author's synthesis

B.3.1 Criticisms and misunderstandings about case study research

Table B.3 summarises common criticisms and misunderstandings about case study research.

Table B.3 Common criticisms and misunderstandings about case study research discussed in selected research literature

Common criticisms and misunderstandings	Bonoma (1984)	Benbasat et al. (1987)	Eisenhardt (1989)	Meredith (1998)	Cavaye (1996)	Darke et al. (1998)	Stuart et al. (2002)	Denscombe (2007)	Eisenhardt and Graebner (2007)	Barratt et al. (2011)	Ketokivi and Choi (2014)	Siggelkow (2007)	Yin (2009, 2014, 2018)
Confusion with other methods	✓	✓	✓		✓				✓		✓		✓
Confusion with use of case studies for non-research purposes in teaching, record keeping or journalism	✓					✓							✓
Misconception that cases need to be 'representative	✓						✓	✓	✓			✓	
Misconception that case study research lacks scientific rigor because it does not seek statistical significance	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Lack of acceptance of case study methodology			✓		✓				✓		✓		✓
Views that case studies are for exploratory / theory generation only.							✓				✓		✓

Source: Author's synthesis

Case study methodology does not seek to obtain statistical significance, use random sampling of cases or other similar approaches that are typical in experiments, surveys or sampling-based research methods. However, there is often confusion about the difference between case studies (in with each case is equivalent to an 'experiment') and random sampling methods (with an 'experiment' consisting of data points drawn from many cases)(Eisenhardt & Graebner 2007, p. 26).

Ketokivi and Choi (2014, p. 239) explicitly reject the common criticisms of case study research that "trace back, in one way or another, to the premise that all scientists should seek formalization, generalization, and abstraction". In their paper on the recent *Renaissance of Case Research as a Scientific Method*, they suggest that this premise is inconsistent with the study of organisations, as individual case context is critical to understanding influencing factors and the reasons for outcomes. This is particularly relevant for this study, as the success of transit priority implementation appears to be influenced by city, institutional and political context.

Table B.4 provides direct responses to the common criticisms and misunderstandings of case study research methodologies as each applies to this study.

Table B.4 Responding to common criticisms and misunderstandings about case study research

Common criticisms and misunderstandings	Addressed?	Detailed response about relevance to this study
Confusion with other methods	Yes	This study explicitly adopts case study methodology.
Confusion with use of case studies for non-research purposes in teaching, record keeping or journalism	Yes	This study is expressly for the purposes of research.
Misconception that cases need to be 'representative	Yes	This study does not seek to examine representative cases, but instead uses a theoretical sampling approach to examine polar extremes, leading examples and cases that can lead to unusual and revelatory insights.
Misconception that case study research lacks scientific rigor because it does not seek statistical significance	Yes	This study does not seek statistical significance, as it is a case study that seeks to examine a small number of transit priority implementations to great depth. The study obtains scientific rigor through seeking generalisation through transparency of framing, using controlled logical deductions to make findings, and presenting the results in a manner that allows replication by other researchers, specifically through extensive citation to source material.
Lack of acceptance of case study methodology	Yes	Section 4.3.1 provides an extensive literature review of the advantages of case study methodology. Section 4.6 (Table 4.6) explicitly validates the selection of case study methodology against the Denscombe (2007, p. 65) list of questions to help researchers **confirm** whether a selection and design of case study methodology is justified.
Views that case studies are for exploratory / theory generation only.	Yes	As this study is primarily for theory generation purposes this common criticism does not appear relevant.

Source: Column 1: Author's synthesis, Columns 2 & 3: Author's assessment.

As shown above, the study design and methodology respond to all of the common criticisms and misunderstandings about case research that are identified in the research literature.

B.3.4 Challenges of case study research

The literature on case study research methodology describes further challenges, which are more directly related to carrying out a case study itself. These are summarised in Table B.5.

Table B.5 Challenges when undertaking case study research discussed in selected research literature

Challenges	Bonoma (1984)	Benbasat et al. (1987)	Eisenhardt (1989)	Dyer et al. (1991)	Cavaye (1996)	Darke et al. (1998)	Meredith (1998)	Barratt et al. (2011)	Bates et al. (2000)	Stuart et al. (2002)	Voss et al. (2002)	Denscombe (2007)	Eisenhardt and Graebner (2007)	Siggelkow (2007)	Ketokivi and Choi (2014)	Yin (2009, 2014, 2018)
Justifying why a case study is needed	✓		✓					✓						✓		
Significant variation in methods			✓	✓	✓	✓	✓			✓					✓	✓
Influence of researcher skill	✓	✓	✓				✓			✓	✓					✓
Influence of the observer effect												✓				
Duality: the study has to be grounded in context, but seek generalisation	✓	✓	✓		✓		✓			✓	✓	✓			✓	✓
Research design and scoping						✓										
Defining the unit of analysis		✓						✓				✓				✓
Case selection issues		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Needing to carefully select cases		✓						✓								✓
Too many cases is overwhelming, but too few means complexity is missed		✓		✓	✓	✓		✓	✓	✓	✓	✓	✓			✓
No ideal number of cases				✓		✓										
Single case studies are appropriate for some studies		✓	✓		✓	✓	✓	✓	✓	✓						✓
Four to ten cases are ideal			✓		✓		✓	✓		✓						
Six to ten cases are ideal																✓
Avoiding selection bias		✓				✓								✓		
Maintaining transparency						✓		✓		✓	✓				✓	✓
Avoiding self-fulfilling prophecies															✓	
Demonstrating objectivity in data collection and analysis		✓				✓		✓		✓	✓	✓				✓
Understanding the role of and how to incorporate existing theory								✓								
Acknowledging and addressing plausible rival explanations																✓
Gaining access and obtaining cooperation	✓	✓				✓	✓				✓	✓				✓
Need for ethics approval and informed consent											✓					✓
Size, cost, complexity and the slow process of case study research	✓					✓	✓			✓	✓				✓	✓
Possible slippage of the study, its orientation and research questions																✓
Possible overly complex, narrow or idiosyncratic outcomes			✓													
Issues related to the presentation of findings	✓	✓	✓		✓	✓	✓	✓		✓		✓	✓		✓	✓
Presenting findings logically and with sufficient evidence		✓				✓		✓		✓		✓	✓			✓
Presenting findings without too much focus on description instead of meaning	✓	✓						✓		✓						
The lack of a standard format for case study presentation		✓						✓					✓			✓
Potential for different interpretations	✓						✓						✓			✓
Difficulties in getting case studies published						✓	✓			✓			✓			
Addressing common criticisms and misunderstandings	✓		✓		✓	✓	✓			✓					✓	✓

Notes:

1. Table rows ordered to group similar challenges together.

Source: Author's synthesis

A key challenge when undertaking case study research is the need to be both grounded in context, but also seeking generalisation. Ketokivi and Choi (2014) call this the "duality criterion", as the research needs to investigate individual cases in great detail, but at the same time be aimed towards making findings about more than just the cases that are examined. Denscombe (2007) discusses issues of generalising from a single, or small number, of cases, and highlights that researchers using case study methodology should provide "an explicit defence against the allegation that you cannot generalize from case study findings" (p.36). This study provides such a defence is Chapter 9.

Designing and scoping are widely highlighted as a significant challenge in case study research. Yin (2009, 2014, 2018), in particular, discusses how a case study protocol can help with scoping, clearly defining case boundaries and the unit of analysis, and maintaining transparency in how the research is framed and conducted. Ketokivi and Choi (2014, p. 232) point to a lack of transparency in how many case studies are framed and constructed, which can lead to different interpretations or misinterpretation of the empirical context. This study made use of a formal case study protocol, which was revised throughout the study, to guide the research and to help maintain transparency.

Deciding how many cases to investigate is identified as a difficulty by many authors as multiple cases can provide validity and generalisation of results and lead to robust and testable theories, but with too many cases details become too hard to process and comprehend (Barratt et al. 2011, p. 331). Many authors cite the suggestion of Eisenhardt (1989) that the ideal number is in the range of four to ten. Yin (2009, 2014, 2018) suggests a similar range of six to ten, with two to three cases selected to replicate the findings, and then further cases used to explore variations. This study generally fits within the suggested ranges, with four cases and seven sub-units of analysis.

Further challenges relate to gaining access to case material; the size, complexity and slow process of case study research; slippage of the case study and research questions during the research; and avoiding narrow or complex findings that fit only the cases studied. The applicability and responses to these challenges as they relate to this study are directly addressed in Table B.6.

Table B.6 Responding to the challenges of undertaking case study research

Challenges	Addressed?	Detailed response about relevance to this study
Difficulties in getting case studies published	Yes	Not directly relevant to this study, as it is a thesis.
Justifying why a case study is needed	Yes	Section 4.3 discusses how a case research approach is justified by the 'how' and 'why' forms of the research questions, the lack of control over events, and the focus on contemporary events.
Presenting findings logically and with sufficient evidence	Yes	Standard forms and approaches have been adopted where possible, including: • the case study protocol approach of Yin (2009, 2014, 2018); • case reporting using detailed narratives has been adopted, as per the recommendations of Benbasat et al. (1987, p. 383); Eisenhardt (1989, p. 540); Dyer et al. (1991, pp. 617-8); Darke et al. (1998, pp. 286-7); Voss et al. (2002, p. 212); Eisenhardt and Graebner (2007, p. 29); Yin (2009); Barratt et al. (2011, p. 331); Yin (2014, 2018); and • the use of tables, particularly in responding to case study questions, as per the recommendations of Eisenhardt (1989, p. 540); Miles and Huberman (1994); Barratt et al. (2011, p. 331) Stuart et al. (2002, p. 429); Voss et al. (2002, p. 213); Eisenhardt and Graebner (2007, p. 29); Yin (2009, 2014, 2018). These are included in Appendix B.
Presenting findings without too much focus on description instead of meaning	Yes	The case study questions have been used to focus the study towards the underlying meaning of the cases, and limit description of processes to only what is necessary for context.
The lack of a standard format for case study presentation	Yes	See above. Standard forms and approaches have been adopted where possible.
Potential for different interpretations	Yes	The potential for different interpretations and ambiguity in the findings has been minimised through presenting the results in a manner that allows replication by other researchers, specifically through extensive citation to source material. In general, public policy analysis and legitimacy theory have not been widely applied to transit priority implementation, and so different interpretations and further hypotheses in future research would appear to be of benefit to the field, rather than necessarily a major challenge for this study.
Significant variation in methods	Yes	Addressed through a thorough literature review of the various approaches to case study methodology (see Section 4.3.1), and clear description of the methods adopted for this study.
Influence of researcher skill and the observer effect.	Yes	Observer effect impacts avoided by not including direct observation, survey or interview methods in the study.
Duality: the study has to be grounded in context, but seek generalisation.	Yes	Study explicitly seeks generalisation of findings, and has used multiple cases to assist in ensuring that findings are general rather than case specific.
Research design and scoping, and defining the unit of analysis	Yes	Case study protocol used to manage research design and scoping. Unit of analysis discussed in Section 4.4.1.
Needing to carefully select cases and the number of cases	Yes	Four cases and a total of seven sub-units (implementations), which matches the range of four to ten cases recommended by Eisenhardt (1989); Cavaye (1996); Darke et al. (1998); Meredith (1998); Stuart et al. (2002); Barratt et al. (2011).
Maintaining transparency in the framing of the research	Yes	Transparency in the case study framing is maintained through the use of a case study protocol, and the description of the methodology in this chapter.
Gaining access, cooperation and ethics approval	Yes	Ethics, access and cooperation issues have been avoided by not including direct observation, survey or interview methods in the study. There is no use of human participants in this study.
Size, cost, complexity and slow process of case study research.	Yes	Number of cases restricted to only four, so as to reduce the complexity and length of the study. Size, cost and complexity were also reduced by having only a single researcher on the study.
Possible slippage of the study, its orientation and research questions	Yes	Potential slippage of the study and its research questions has been managed through revision of the case study protocol.
Possible overly complex, narrow or idiosyncratic outcomes	Yes	The theoretical outcomes have been expressed using simple figures and terms in Chapters 9 and 10. This reflects the efforts throughout the study to explicitly seek generalisation of the findings, and to build a framework and strategies rather than an all-embracing theory.

Source: Column 1: Author's synthesis as shown in Table B.5; Columns 2 & 3: Author's assessment.

As show in Table B.6 the study design and methodology responds to all of the challenges of case study research that are identified in the research literature. Beyond the challenges of undertaking case study research that are discussed above, there are also limitations as to what can actually be achieved using this method, as shown in Table B.7.

Table B.7 Limitations of case study research methodology discussed in selected research literature

Limitations	Bonoma (1984)	Eisenhardt (1989)	Cavaye (1996)	Meredith (1998)	Stuart et al. (2002)	Denscombe (2007)	Eisenhardt and Graebner (2007)	Yin (2009, 2014, 2018)
Not effective for answering "how much" or "how many" types of research questions	✓						✓	✓
Cannot generalise case study findings to a population using statistical methods			✓		✓	✓		
There is no control over independent variables, which may threaten internal validity			✓					
Relationships between variables and factors may be found, but it may not be possible to determine the direction of causality			✓	✓				

Source: Author's synthesis

Case study methodology is not good for research questions that relate to 'how much' or 'how many'. Nor can case study findings be generalised to a population using statistically methods, because the method does not involve random sampling or the study of a statistically significant sample. Case studies are also not experiments and so there is no control of independent variables, meaning that it may not be possible to determine causality if a relationship between variables has been found.

Despite these challenges and limitations, the key reason for adopting case study methodology is to focus on a small number of cases that "are unusually revelatory, extreme exemplars, or opportunities for unusual research access" (Eisenhardt & Graebner 2007, pp. 26-7). This allows researchers to go into great depth to understand a complex phenomenon, rather than instead investigating a larger and statistically significant number of cases to only a shallow level of detail (Denscombe 2007, pp. 54-5). Case study methodology is therefore well suited to this study as: transit priority implementation is a relatively uncommon occurrence, which occurs through highly complex governance, political and institutional structures that suggests the need to focus on depth rather than breadth here.

Table B.8 shows **how this study directly addresses** the limitations of case study research.

Table B.8 Responding to the limitations of case study research

Limitations of case study research methodology	Addressed?	Detailed response about relevance to this study
Not effective for answering "how much" or "how many" types of research questions.	Yes	This study does not have "how much" or "how many" types of questions.
Cannot generalise case study findings to a population using statistical methods.	Yes	This study does not seek to generalise the case study findings to a larger population through the use of statistical methods.
There is no control over independent variables, which may threaten internal validity.	Yes	The variables of particular relevance in this study is the *legitimacy of transit priority,* and the *success of transit priority implementation*. Cases selected include both *car-* and *transit-centric cities*, with successful and unsuccessful implementation outcomes. It appears that there is correlation between outcome and city type, but this study does not seek to directly assign a direction of causation for this relationship. Rather the findings of this study suggest that city type may influence transit priority legitimacy, and transit priority legitimacy may influence outcomes. However, there appear to be feedback loops and many other influencing variables, and so this study does not seek to directly address the direction of causality amongst these variables.
Relationships between variables and factors may be found, but it may not be possible to determine the direction of causality.	Yes	

Source: Column 1: Author's synthesis, Columns 2 & 3: Author's assessment.

As shown in Table B.8, the study design and methodology responds to all of the limitations of case study research that are identified in the research literature.

B.4 Case selection

Section 4.4.3 outlines the sampling approach and case selection in narrative form. Table B.9 provides a summary and a mapping of the cases back to the various sampling approaches.

Table B.9 Selected cases mapped to the sampling approach

Sampling approach	Selected case			
	Melbourne, Australia	**Toronto, Canada**	**Zürich, Switzerland**	**Curitiba, Brazil**
Theoretical				
Polar extremes	Car-centric		Transit-centric	
	Mixed outcomes		Highly successful implementation	
Leading example	N/A	N/A	Long programme	BRT network
Replication	Similar to Toronto	Similar to Melbourne	Successful outcomes	
Opposite	Representative democracies		Direct democracy	Dictatorship
Critical case	*Think Tram* scale back	*Transit City* cancelation	Voted for priority	
Revelatory	Compromise, removal	War on the car	*Citizens' Initiative*	Mayor Jamie Lerner
Unusual case	N/A	Mayor Rob Ford	Direct citizen ballot	Dictatorship
Typical case	Typical suburban development patterns		N/A	N/A
Longitudinal study	1990s to present		1970s to present	
Forced selection	VicRoads funded study	N/A	N/A	N/A
Opportunistic	Local knowledge of researcher		N/A	N/A
Convenience	Proximity	Availability of research literature		

Source: Author's assessment

The four cases have been selected for reasons across the entire range of types of theoretical sampling. Melbourne and Toronto provide *replication* as both are similar *car-centric cities* with mixed successes at transit priority implementation. These two cities both have low-density suburban development patterns that are typical of many cities in developed nations. The more *transit-centric cities* of Zürich and Curitiba provide *replication* of two *leading examples* of highly successful programs of priority implementation, and are thus *polar extremes* of Melbourne and Toronto. Having transitioned from military dictatorship to democracy, Curitiba provides an *opposite* case to the democracies in Melbourne and Toronto, and Zürich's system of direct voting.

The scaling back of Melbourne's *Think Tram* program following the compromise in Clarendon Street and Toronto's cancelation of Transit City are both *critica*l and *revelatory* cases for understanding why transit priority implementation might face challenges. Similarly, Zürich and Curitiba are *critical*, *revelatory* and *unusual* cases for understanding why citizen's might vote for a transit priority ballot initiative (Zürich) or representatives who are strongly for transit improvement (Curitiba's election of Mayor Lerner to his third term). All four cases provide the opportunity for *longitudinal study*, with relevant priority implementation stretching back to the 1970s in Zürich and Curitiba, and 1990s in Melbourne and Toronto. Melbourne has also been included because of *forced selection*. This study is funded by Monash University and VicRoads, and so Melbourne essentially has to be included as a case. Melbourne is also a *convenient* case given the researcher's geographic location. Local contacts in both Melbourne and Toronto provided *special opportunity* for access and understanding of these two cases.

In general, the selected cases have been primarily chosen for *theoretical sampling* reasons, in line with the recommendations of the research literature. Research funding and practicalities did add some *forced*, *convenience*, and *opportunistic* motivations for the selection of the cases, especially Melbourne. However, this is considered to be reasonable compromise that is unlikely to add significant bias to the study.

Appendix C. Part B case study results: *car-centric cities*

C.1 Introduction

This Appendix includes additional supporting material relevant to Chapters 5 and 6. Additional context about the cities of Melbourne and Toronto is included in Section C.2. Section C.3 provides additional context about each of the implementations in Melbourne and Toronto, while Section C.4 provides details about the legitimacy of each of the implementations.

C.2 Case city contexts

Table C.1 Summary of Melbourne and Toronto contexts, case study questions 1 and 2

Question	Melbourne	Toronto

1: What is the governance structure in the city?	• A three-level governance system, with Federal, State and Local Government
	• Westminster parliamentary systems at the Federal and State levels, and city councils at the Local level. Local Government is subordinate to and an instrument of the State Government (VicDELWP 2020).
	• Authority over roads and transport at the State Government level. However, Local Government is responsible for local roads, footpaths, parking, and planning administration.
		• A four-level governance system, with Federal, Provincial, Regional and Local Government.
		• Westminster parliamentary systems at the Federal and Provincial levels, and city councils at the Regional and Local levels.
		• The City of Toronto itself, however, fulfils the roles of both the Regional and Local levels as the result of an amalgamation in 1998 of one Regional level (Metro Toronto) and six Local level municipalities (the former City of Toronto, East York, Etobicoke, York, North York and Scarborough) (City of Toronto 2020b).
		• Governance tends towards local and regional autonomy. Roads, transit, policing and other services are provided by Local, Regional and Provincial level institutions, the mix of which varies from municipality to municipality. Within the City of Toronto:
		  • there are some Provincial Highways, but most roads are controlled by the City itself;
		  • local transit services are provided by the Toronto Transit Commission (TTC), which is a City agency that manages the subway, streetcar and bus services within the City of Toronto;
		  • regional rail and bus services to/from the Golden Horseshoe area are controlled by Metrolinx, a Provincial agency; and
		  • policing is undertaken by the Toronto Police Service.

Question	*Year*	*Greater Melbourne*	*Victoria*	*Source*	*Year*	*City of Toronto*	*Toronto Census Metropolitan Area (CMA)*	*Greater Toronto Area (GTA)*	*Greater Toronto & Hamilton Area (GTHA)*	*Greater Golden Horseshoe*	*Source*
2: What is the population?	*1901*	501,580	1,209,900	*Australian Bureau of Statistics (2019)*	*1901*	238,080	440,000	-	-	-	*Wikipedia (undated-a) summary of Statistics Canada Census data*
	1911	600,160	1,339,893		-	-	-	-	-	-	
	1920	763,000	1,550,727		-	-	-	-	-	-	
	1930	999,650	1,792,605		*1931*	856,955	810,000	-	-	-	
	1940	1,083,000	1,914,918		*1941*	951,549	900,000	-	-	-	
	1950	1,302,200	2,237,182		*1951*	1,176,622	1,262,000	-	-	-	
	1960	1,831,100	2,857,389		*1961*	1,824,481	1,919,000	-	-	-	
	1970	2,447,600	3,444,936		*1971*	2,089,729	2,628,045	-	-	-	
	-	-	-		*1976*	2,124,291	2,803,101				
	1980	2,835,500	3,914,303		*1981*	2,137,395	2,998,947				
					1986	2,192,721	3,427,170	3,733,085			
	1990	3,163,590	4,378,592		*1991*	2,275,771	3,893,933	4,235,756			
	-	-	-		*1996*	2,385,421	4,263,759	4,628,833	5,096,682	6,935,499	
	2000	3,450,077	4,704,065		*2001*	2,481,494	4,682,897	5,081,826	5,572,104	7,532,246	
	2005	2,697,372	4,989,246		*2006*	2,503,281	5,113,149	5,555,912	6,060,471	8,164,593	
	2010	4,105,857	5,461,101		*2011*	2,615,060	5,583,064	6,054,191	6,574,140	8,759,312	

	2015	4,586,012	6,022,322		*2016*	2,731,571	5,928,040	6,417,516	6,954,433	9,245,438	

Sources: as indicated

Table C.2 Summary of Melbourne and Toronto contexts, case study questions 3 to 6

Question	Melbourne	Toronto
3: What is the size of the city?	9,990km^2 (Greater Melbourne Capital City Statistical Area) (Australian Bureau of Statistics 2017)	630km^2 City of Toronto (Statistics Canada 2016) 5,905km^2 Toronto Census Metropolitan Area (CMA) (Statistics Canada 2016) 7,124km^2 Greater Toronto Area (GTA) (Wikipedia undated-d) 8,244km^2 Greater Toronto and Hamilton Area (GTHA)(Wikipedia undated-c) 31,562km^2 Greater Golden Horseshoe (Wikipedia undated-b)
4. What is the population density of the city?	see below	see below
5: What is the transit usage / ridership in the city?	• 1950: 449 annual trips per capita (Mees 2010, p. 92). • 1960: 222 annual trips per capita (Mees 2010, p. 92). • 1970: 142 annual trips per capita (Mees 2010, p. 92). • 1980: 95 annual trips per capita (Mees 2010, p. 92). • 1990: 97 annual trips per capita (Mees 2010, p. 92) • 2000: 103 annual trips per capita (Mees 2010, p. 92).	• 1950: 292 annual trips per capita (Mees 2000, p. 178; 2010, p. 92). • 1960: 183 annual trips per capita (Mees 2000, p. 178; 2010, p. 92). • 1970: 185 annual trips per capita (Mees 2000, p. 178; 2010, p. 92). • 1980: 213 annual trips per capita (Mees 2000, p. 178; 2010, p. 92). • 1990: 223 annual trips per capita (Mees 2000, p. 178; 2010, p. 92). • 2000: 173 annual trips per capita (Mees 2010, p. 92).
6: What is the transit mode split?	*Journey to work* • 1951: 74% of motorised trips (Mees 2000, p. 180; 2010, p. 147). • 1964: 42% of motorised trips (Mees 2000, p. 180; 2010, p. 147). • 1976: 26% of motorised trips (Mees 2000, p. 180; 2010, p. 147). • 1986: 19% of motorised trips (Mees 2000, p. 180; 2010, p. 147), 18% of all trips (Mees 2000, p. 181) • 2000-06: 13.9% (Mees 2010, pp. 60-1), 2006: 14.16% (Loader 2018). • 2011: 12% (Australian Bureau of Statistics 2017), 16.34% (Loader 2018). • 2016: 18.15% (Loader 2018). *All trips* • 1980: 9% (Loader 2019), 1986: 10% (Mees 2000, p. 181). • 1990: 8% (Loader 2019). • 1994: 5% (Currie (2016b) based on Victoria Activities and Travel Survey) • 2000: 8% (Loader 2019). • 2010: 11% (Loader 2019). • 2019: 10.5% (Loader 2019).	see below

4. What is the population density of the city? — Melbourne

Inner	*Middle*	*Outer*	*Total*	*Notes*	*Source*
			15.7 per hectare	Urban uses only	Mees (2010)
			26 per hectare	Urban uses only	Loader (2015b)
41.1 per hectare	26.9 per hectare	19.6 per hectare	25.4 per hectare	Urban uses only	Mees (2000, p. 164)
29.2 per hectare	19.6 per hectare	12.0 per hectare	16.8 per hectare	Gross density	Mees (2000, p. 164)
			4.5 per hectare	Gross density	Australian Bureau of Statistics (2017)
			18 per hectare	Gross density	Loader (2015b)
			14 per hectare	Gross density	Currie (2016b)
45-60/ha	Single family housing				Cervero (1998)

4. What is the population density of the city? — Toronto

Inner	*Middle*	*Outer*	*Total*	*Notes*	*Source*
71.9 per hectare	37.5 per hectare	23.1 per hectare	33.1 per hectare	Gross residential density	Mees (2000)
65.4 per hectare	30.8 per hectare	14.7 per hectare	23.7 per hectare	Overall urban density	Mees (2000)
70 per hectare	34 per hectare	20 per hectare	27.2 per hectare	Overall urban density	Mees (2010, pp. 60, 102)
			55 people per hectare	Overall urban density	Loader (2015a)

6: What is the transit mode split? — Toronto

Year	*Journey to work*			*All trips*			*Source:*
1964	33% of motorised trips,			-			*Mees (2000, p. 181)*
1976	33% of motorised trips,			-			*Mees (2000, p. 181)*
1986	33% of motorised trips, 31% of all trips			22% of all trips			*Mees (2000, p. 181)*
	City resident	*to the City*	*GTHA residents*	*City resident*	*to the City*	*GTHA residents*	
1986	33%	33%	22%	25%	26%	17%	*Transportation Information Steering Committee (TISC) et al. (2018)*
1996	28%	28%	17%	22%	23%	13%	
2006	28%	30%	16%	23%	24%	13%	
2011	29%	33%	17%	24%	26%	15%	
2016	31%	34%	18%	27%	28%	16%	

Sources: as indicated

Table C.3 Summary of Melbourne and Toronto contexts, case study questions 7 to 9

<table>
<tr><th>Question</th><th>Melbourne</th><th>Toronto</th></tr>
<tr><td>7: What is the private automobile mode split?</td><td>Journey to work
2000-06: 79.3% (Mees 2010, pp. 60-1), 2006: 80.43% (Loader 2018).
2011: 78.16% (Loader 2018),: 81% (Australian Bureau of Statistics 2017).
2016: 76.20% (Loader 2018).
All trips:
1994: 75% (Currie (2016b) based on Victoria Activities and Travel Survey)</td><td><table>
<tr><th></th><th colspan="3">Journey to work</th><th colspan="3">All trips</th><th rowspan="2">Transportation Information Steering Committee (TISC) et al. (2018)</th></tr>
<tr><th>Year</th><th>City residents</th><th>to the City</th><th>GTHA residents</th><th>City residents</th><th>to the City</th><th>GTHA residents</th></tr>
<tr><td>1986</td><td>58%</td><td>58%</td><td>67%</td><td>66%</td><td>66%</td><td>74%</td><td></td></tr>
<tr><td>1996</td><td>60%</td><td>60%</td><td>69%</td><td>68%</td><td>68%</td><td>78%</td><td></td></tr>
<tr><td>2006</td><td>60%</td><td>59%</td><td>71%</td><td>68%</td><td>67%</td><td>79%</td><td></td></tr>
<tr><td>2011</td><td>58%</td><td>57%</td><td>71%</td><td>64%</td><td>65%</td><td>78%</td><td></td></tr>
<tr><td>2016</td><td>53%</td><td>52%</td><td>68%</td><td>57%</td><td>57%</td><td>73%</td><td></td></tr>
</table></td></tr>
<tr><td>8: What is the car ownership rate?</td><td>1951: 11.3 cars per 100 residents (Mees 2000, p. 182; 2010, p. 151).
1961: 22.4 cars per 100 residents (Mees 2000, p. 182; 2010, p. 151).
1971: 29.5 cars per 100 residents (Mees 2000, p. 182; 2010, p. 151).
1980: 40 passenger cars per 100 residents (Loader 2019).
1981: 44.6 cars per 100 residents (Mees 2000, p. 182; 2010, p. 151).
1990: 42 passenger cars per 100 residents (Loader 2019).
1991: 49.6 cars per 100 residents (estimate only) (Mees 2000, p. 182; 2010, p. 151).
2000: 48 passenger cars per 100 residents (Loader 2019).
2010: 55 passenger cars per 100 residents (Loader 2019).
2018: 57 passenger cars per 100 residents (Loader 2019).</td><td>1996: 44.0 (City of Toronto) and 51.9 cars per 100 residents (GTHA),
2006: 44.0 (City of Toronto) and 51.9 cars per 100 residents (GTHA),
2011: 42.3 (City of Toronto) and 53.6 cars per 100 residents (GTHA), and
2016: 41.7 (City of Toronto) and 51.9 cars per 100 residents (GTHA)(Mees 2000, p. 182; Transportation Information Steering Committee (TISC) et al. 2018)</td></tr>
<tr><td>9: What is the road network like in the city?</td><td>Minimal freeway construction until a 1969 plan called for a freeway network covering the inner city. This plan was cancelled (Mees 2010, pp. 99-100), but major freeways were built into the suburbs to the south-east (Monash Freeway), east (Eastern Freeway), north-west (Tullamarine Freeway connecting to the airport) and to the south-west (West Gate Freeway), and the Western Ring Road. However, the overall freeway network continues to have missing links and freeways that end suddenly (e.g. the Eastern Freeway terminates a few kilometres north-east of the CBD). The CityLink tollway was built in the late 1990s to connect the Tullamarine, West Gate and Monash via tunnels and an elevated freeway. Eastlink, another tollway, was built in the 2000s to provide a ring road across the outer eastern and south-eastern suburbs. However, a plan for a new east-west road tunnel to connect to the Eastern (Eddington 2008) was abandoned after a change of government (Martinis & Moyan 2017). Further major road construction is continuing in the outer north-eastern suburbs (Major Transport Infrastructure Authority 2019), and to provide a second crossing of the Yarra River as an alternative to the West Gate Bridge(Victoria State Government 2020b).
The CBD has a grid layout. Similar grid-like patterns are evident in many arterial roads across the rest of the city, although varies between suburbs.
There are a number of wide tree lined boulevards with three road carriageways, the inner of which is shared between centre-running trams and other traffic. However, most arterial roads in the inner and middle suburbs are only two to four lanes wide, and there are many locations where the outer lanes are blocked by on-street parking. Strip shopping centres are a feature of the inner and middle suburbs,</td><td>Roads throughout most of the urban areas of the GHTA are typically laid out on a grid, aligned to match the generally east-west direction of the shore of Lake Ontario.
Traffic signals, parking regulations and most other elements of the road environment are controlled by either Local or Regional governments, with considerable variation from one to another. For example, roundabouts are uncommon within the City of Toronto, but have been present in the nearby Region of Waterloo since 2004 (Region of Waterloo 2019).
There is a provincial highway network, which includes major freeways throughout many parts of the GTHA. In some places these freeways have separate express and collector carriageways in each direction accommodating 12 to 18 traffic lanes. Two major freeways connect through the inner city: the Don Valley Parkway and the Gardiner Expressway. There has been little road construction in the City of Toronto since the Spadina Expressway was cancelled in 1971, “but expressway construction has continued apace in the outer suburbs” (Mees 2000, pp. 221-2).
The cancelation of the Spadina Expressway was part of the larger push-back against urban freeway construction in the 1970s. Jane Jacobs had recently moved to Toronto from New York. and was part of protests against the Spadina Expressway. This was a proposed north-south freeway that would have connected through the inner suburbs and involved significant land acquisition and impacts on existing urban neighbourhoods. The opposition was ultimately successful, with the City of Toronto purchasing a narrow strip of land to prevent further construction of the Spadina Expressway south of Eglinton Avenue. North of Eglinton Avenue the Expressway is now known as Allen Road and provides a dual carriageway connection to the rest of the freeway network (Osbaldeston 2008; Levy 2015; Laurence 2016).</td></tr>
</table>

Sources: as indicated

Table C.4 Summary of Melbourne and Toronto contexts, case study question 10

Question	Melbourne	Toronto

10: What is the transit network like in the city?	• The suburban rail network consists of 16 lines and 218 stations (Public Transport Victoria 2017), providing connections into the central city through a radial network (Cervero 1998, p. 323). A City Loop distributes commuters to five stations around the CBD. A new underground railway line (the Metro tunnel) is currently under-construction add capacity to the network (Rail Projects Victoria & Victorian State Government 2018). There is also an extensive programme to remove rail level crossings across Melbourne, with a total of 75 sites to be grade-separated (Level Crossing Removal Authority 2020)
	• The train and tram services were privatised through a franchising model in 1992 and are now operated as Yarra Trams and Metro Trains (Mees 2010, pp. 95-106).
	• The tram system is a legacy streetcar network, but low-floor trams and raised platform stops are progressively being introduced to provide level boarding access. The tram network has approximately 250km of double track, and 167km (75% of the network) is in *mixed traffic* operating environments. Because of the *mixed traffic* running trams are slow and average only about 16km/hr. *Mixed traffic* running also results in unreliability, with in the order of 20-33% of services not running on-time (i.e. less than 5 minutes late). Headways can be as low as every 2-3 minutes within the CBD where many routes converge, but in outer areas and at non-peak times headways tend to be lower, and may be in the in order of 20 minutes. (Cervero 1998, pp. 324-5; Currie & Reynolds 2010; Currie 2016b; Public Transport Victoria 2017, 2018; Reynolds et al. 2018).
	• Around 1,750 buses and 346 routes provide cross-suburb services and connections into the central city from areas not serviced by the rail network. Buses are operated through contracts with 13 privately owned bus companies (Cervero 1998, p. 325; Public Transport Victoria 2017). However, the buses are generally infrequent and poorly coordinated with trains with routes that "meander in a vain attempt to avoid transfers by directly linking as many origins and destinations as possible" (Mees 2010, p. 94). This was partially addressed by the introduction of the *SmartBus* network in the 2000s. The *SmartBus* routes provide more direct and higher frequency orbital connects and better passenger amenities, including real-time arrival displays. They also have higher levels of priority, but still operate in *mixed traffic* conditions (Currie & Delbosc 2010; Public Transport Victoria 2010; Parker 2011; Currie & Delbosc 2014). However, bus routes along the Eastern Freeway operate "in a classic 'commuter' pattern" by providing direct connections to the CBD rather than as feeders to the rail network, and "the three networks (train, tram and bus) in Melbourne are not planned as a network; indeed, they are essentially unplanned" (Mees 2000, pp. 238-40).
		• Metrolinx is the Provincial transit authority for the Greater Golden Horseshoe.
		• Transit across the GTHA and Greater Golden Horseshoe area is a mix of commuter and longer distance rail and buses operated by GO Transit and local services provided by Regional or Local municipalities.
		• Local transit within the City of Toronto is provided by the Toronto Transit Commission, which operates:
		  ◦ Line 1, the Yonge-University-Spadina subway line, which forms a U shape and provides generally north-south services to the downtown;
		  ◦ Line 2, the Bloor-Danforth subway, which provides east-west services across the city;
		  ◦ Line 3, the Scarborough RT which connects to the eastern end of line 2, but uses a different technology to the subways;
		  ◦ Line 4, the Sheppard subway, which consists of 5 stations running east through the north of the city from a connection to Line 1.
		  ◦ A streetcar network consisting of approximately 80km of double track (Currie & Shalaby 2007), with 10 routes and 245 streetcars (Toronto Transit Commission 2019b);
		  ◦ A bus network with 159 routes and approximately 2,000 buses (Toronto Transit Commission 2019b)
		• Mees (2000, 2010) highlights Toronto's transit network, which encourages transfers through high frequencies and a direct route structure mimicking the grid-like road structure. Service headways on the Toronto subway are 2-3 minutes during the peak and no more than 6 minutes at other times. Streetcar headways are generally in the order of 3-4 minutes during peak periods, 4-6 minutes off-peak and still less than 10 minutes in the evening and Sundays. Bus frequencies are much higher than in Melbourne, with most routes operating at 10 minute headways or as simply having 'frequent service' rather than times shown on the timetables, while "the absolute maximum headway is 30 minutes, but even in the late evening and on Sundays, frequencies of 10 minutes or better can be found on many routes" (Mees 2000, pp. 226-56).

Sources: as indicated

C.3 Melbourne

C.3.1 Implementation contexts

Table C.5 *Think Tram, Clarendon Street Tram Priority Pilot* and *Stud Road Bus Lanes*, case study question 12

Question	*Think Tram* program	*Clarendon Street Tram Priority Pilot*	*Stud Road Bus Lanes*

12: What was the transit priority implementation?	• A $30 million joint program between the Department of Infrastructure (DoI), VicRoads and Yarra Trams, later extended with a further $47.3 million in funding. Initially focused on 8 priority routes, with a target of reducing tram journey times by 25% (Currie & Shalaby 2007)
	• The works included:
	  ◦ Installation of *active TSP*,
	  ◦ Installation of *physical separation measures*,
	  ◦ *Tram stop alternations* including installation of platform *stops* and *optimisation of stop locations*, and
	  ◦ Revision of the road rules that relate to driving with trams (Yarra Trams et al. 2004; Currie & Shalaby 2007)
		• Part of the *Think Tram* program, this project involved the installation of priority measures along the Clarendon Street corridor including the first installation of *hook turns*[437] outside the Melbourne CBD.
		• The works included:
		  ◦ Installation of *hook turns* at 4 intersections,
		  ◦ Installation of 450 metres of *fully-mountable separation kerbing* north of Market Street
		  ◦ Installation of 100 metres of *fully-mountable separation kerbing* south of Thompson Street
		  ◦ The removal of one of the two right turn lanes at Albert Rd / Clarendon St intersection.
		  ◦ *Right turn bans* at the intersections of Clarendon St with Chessell St and with Ross St,
		  ◦ Relocation of existing *near side tram stops* to become *far side stops* at three intersections
		  ◦ Installation of *kerb extensions* at the stops
		  ◦ Removal of 20 parking on-street spaces to accommodate the new *far side stops*, although in response to trader concerns about the impacts of parking removal the City of Port Phillip added 29 spaces in surrounding side streets, for a net increase of 9 spaces (Smith 2005; Currie & Shalaby 2007).
			Bus lanes along approximately 14km of Stud Road, between Boronia Road (Bayswater) and David Street (Dandenong) (Whittaker 2009). The original plan was to add extra lanes to provide the *bus lanes*, but in practice some of the existing traffic lanes were converted to exclusive bus use. The number of general traffic lanes was reduced from three in each direction to only two in the one-kilometre section between Ferntree Gully Road and Kelletts Road, and between the Burwood Highway and Boronia Road. In many locations the *bus lanes* did not continue through intersections, but instead stopped short of the queuing area and restarted some distance beyond the far-side of the intersection. (Bernecich 2011a; The Scarlett Syndrome 2011)

Sources: as indicated

[437] *Hook turns* were briefly described in Chapter 2. They are a transit priority measure that moves right turning vehicles to the left side of the road, away from the centre running trams. Vehicles turning right complete their turn as the traffic lights change to allow cross-traffic to cross through the intersection, and therefore right turning vehicles do not queue on the tracks and delay tram movements. See Currie and Reynolds (2011) and Chapter 2 for further details.

Table C.6 *Think Tram, Clarendon Street Tram Priority Pilot* and *Stud Road Bus Lanes*, case study question 13

Question	*Think Tram* program	*Clarendon Street Tram Priority Pilot*	*Stud Road Bus Lanes*
13: What were the events?	• 2002: The *Melbourne 2030* plan was released, which had a goal of increasing the transit mode share of motorized trips in Melbourne from 9 to 20% by 2020, and called for decreases in delays to on-road transit through a "cooperative program between VicRoads, the Department of Infrastructure and private transport providers" (VicDoI 2002). • 2004: The *Think Tram* program was launched (originally named the *Tram Priority Program*)(Yarra Trams et al. 2004) with a target of reducing tram journey times by 25% on eight priority routes Transport (Yarra Trams et al. 2004; Smith 2005, p. 2). Clarendon Street was selected as the initial project for the program.	• July 2004: The project was first announced in the press. • August 2004: VicRoads and City of Port Phillip staff "presented a concept to the South Melbourne Business Association seeking in principle support" (Smith 2005, p. 2). • September 2004: The state government minster announced the project officially. • September-October 2004: The project brochure (VicRoads et al. 2004) was letter-dropped to the surrounding area. • October-November 2004: There was a 14-day advertising period for public comment on the planning permit application for the works. • January 2005: The planning permit was approved, there was a an official launch of the *Think Tram* program, and the measures were installed in Clarendon Street (Batchelor 2005b). • March 2005: VicRoads, Yarra Trams and City of Port Phillip staff met with Bicycle Victoria about cyclist concerns. The Clarendon Street traders had a meeting, and then the traders, VicRoads, Yarra Trams and the City staff met with the Minister to discuss concerns about the project. A protest website was launched (Quin 2005a, 2005b). • April, May, June 2005: Further stakeholder meetings were held, and City, VicRoads and Yarra Trams staff prepared reports and a community attitudes survey was undertaken (Coyle 2005; Smith 2005; Sweeney Research 2005; Yarra Trams 2005a). • May 2005: The Clarendon Street Charter was launched in agreement with the City of Port Phillip mayor, calling for "More trade not less trade", "Safe and reliable travel", and a "Better streetscape" (City of Port Phillip & South Melbourne Business Association 2005; Yarra Trams 2005a). • June 2005: The City Council Policy and Strategy Committee considered the reports and formally requested the partial removal of the scheme. The far-side stops were removed and on-street parking was reinstated, but the other measures were retained (City of Port Phillip 2005; Kulesza 2005; Silkstone 2005; VicRoads 2005; Victoria State Government 2005).	• 2008: The Victorian State Government, led by then Premier John Brumby, introduced the *Keeping Melbourne Moving* strategy, which included $37.8 million for the *Targeted Tram and Bus Priority* program (VicRoads 2010; The Scarlett Syndrome 2011). • July 2008: The Eastlink tollway opened, changing traffic patterns throughout the eastern suburbs and reducing traffic congestion on many roads, including Stud Road (Milesi 2008). • 2009: The *Stud Road bus lanes* were implemented. • 2010: There were widespread complaints from the public, changes in support for the lanes amongst local councillors, calls for more buses to make better use of the lanes, and many drivers who travelled illegally in the lanes despite the risk of fines (Bernecich 2010; Dimond 2010b, 2010d, 2010c, 2010a). The federal member of parliament received much correspondence from residents and called for the removal of the *bus lanes* (Tudge 2010). The state opposition party, the Liberals, promised to remove the *bus lanes* if elected. • November 2010: The Liberal party won the state government election. • 2011: The Public Transport Users Association called for the *exclusive bus lanes* to be converted into *HOV lanes.* However, between Ferntree Gully Road and Kellets Road the *bus lanes* were removed and converted back to general traffic operation. However, the *bus lanes* were retained in other sections where there had been new road widening to accommodate the lanes and so no loss of general traffic lanes, (Bernecich 2011b, 2011c, 2011a; The Scarlett Syndrome 2011). The result, therefore, was a mix of bus operating environments along Stud Road with some sections of *exclusive bus lane*, but *mixed traffic* operation through many intersections and between Ferntree Gully Road and Kellets Road. The *bus lanes* stretched across two separate electoral districts and the local members of parliament did not work together to have all sections of the *bus lanes* that had replaced general traffic lanes removed at once (Bernecich 2011c). The *bus lanes* were ultimately retained between the Burwood Highway and Boronia Road, despite the *bus lanes* in this section having been implemented by removing traffic lanes rather than by road widening.

Sources: as indicated

Table C.7 *Think Tram*, *Clarendon Street Tram Priority Pilot* and *Stud Road Bus Lanes*, case study question 14 to 16

Question	*Think Tram* program	*Clarendon Street Tram Priority Pilot*	*Stud Road Bus Lanes*
14: How did the transit ROW change?	The program introduced part-time tram lanes on six routes, a small number (<10) platform stops and removed a small number of stops (<10), but generally did not significantly change the ROW conditions (Currie & Shalaby 2007; Currie, Goh, et al. 2013)	Away from the tram stops there was little change to the transit ROW. In the middle of the works area conditions shifted from ROW C.11 (*mixed traffic*) to ROW C.10 (*mixed traffic*, but with general traffic *turn restrictions* to facilitate transit (e.g. *hook turns*, *turn bans* etc.)). At the northern and southern ends of the works area the ROW conditions were improved to ROW C.3 (*Transit lane* separated by *mountable kerb*) for a total of approximately 450 metres. Moving the tram stops from the nearside of the intersection to become *far side stops* changed the nature of the transit ROW. As discussed in Chapter 2, Sections 2.2.3 and 2.3.2, *far side stops* can allow more effective *TSP* systems as by moving passenger boarding and alighting to be after a transit vehicle has passed through a traffic signal there is less variability in when to provide *transit-only phases, green extensions* or other time priority measures.	The transit ROW shifted from ROW C.11 (*mixed traffic*) to ROW C.4 (transit in an *exclusive linemarked lane*), but not through all intersection. The one-kilometre section between Ferntree Gully Road and Kelletts Road was later converted back to ROW C.11 (*mixed traffic*) when the lanes were removed.
15: Was the implementation process successful?	"The experience of the Clarendon Street trial…led to a more consultative approach being taken"(Currie & Shalaby 2007). It appears that the remainder of the implementation efforts were generally successful.	The implementation process was partially successful, as the measures that most improved the ROW operating conditions, the *mountable separation kerbing*, remain in place and unchanged to this day. However, the implementation was controversial and led to public protest and opposition. Currie and Shalaby (2007) described the *Clarendon Street Tram Priority Pilot* scheme as "not a complete failure". Despite the modest travel time improvements and public opposition, the scheme successfully converted approximately 1.6km of ROW C.11 into approximately 400 metres of ROW C.3 and 1.2km of ROW C.10, with the *mountable separation kerbing*, *hook turns*, and *turn bans* being retained. The *Clarendon Street Tram Priority Pilot* scheme clearly did not go as well as might have been hoped. However, narratives suggesting that the *Clarendon Street Tram Priority Pilot* scheme was a failure may be skipping over the key words in its title: **pilot scheme**. Amongst the eye-catching headlines that "…tram stop trial gets the hook" (Silkstone 2005) and that the old tram stops (and Clarendon Street) were "back in business" (Hagan 2005) it is easy to forget that the *Clarendon Street Tram Priority Pilot* scheme was a trial at the beginning of *Think Tram*. A range of measures were tested in real-world conditions and it was established that implementing *far side stops* for trams in Melbourne is more difficult than it might appear at first glance. The scheme demonstrated that drivers tend to stop behind trams and block intersections (Coyle 2005). Hence driver education and appropriate signage to keep intersections clear might be an important component of implementing *far side stops*.	No. The implementation was partially removed due to public and political opposition, and a change of state government.
16: Did the implementation have successful outcomes?	Improvement to performance was limited and in the order of <5% (Currie & Shalaby 2007). A before-after study suggested that run time reduced by 1.6% for space priority measures and 0.9% for time priority. Space priority measures reduced variability by 10.2%, while time priority measures reduced variability by 1.9% (Currie, Goh, et al. 2013)		There was debate about whether the outcomes of the *bus lane* implementation was successful. Tudge (2010) suggested that "at least 17 full buses per hour are required to justify a dedicated bus lanes (but) the Stud Road bus lane has 6-7 half-full buses per hour". In contrast, a State Government spokesman claimed that the bus route had "become the second most popular bus route thanks to additions such as the lanes" (Bernecich 2010) and a council report stated that there had been a 70% increase in patronage (Dimond 2010b). However, debate in the media appeared to centre on anecdotal evidence that "buses were running at below 10 per cent occupancy during their [Councillors Cossari and Cole's] two peak-hour visits) (Dimond 2010b), but a "torrent of angry letters" about the impacts on traffic, safety and other impacts of the lanes (Dimond 2010a)

Sources as indicated.

C.3.1 Implementation legitimacy

Table C.8 *Think Tram, Clarendon Street Tram Priority Pilot* and *Stud Road Bus Lanes*: legitimacy, case study questions 19 to 21

Question	Think Tram program	*Clarendon Street Tram Priority Pilot*	*Stud Road Bus Lanes*
19: How was *normative legitimacy* relevant to the implementation?	The *Think Tram* program had *normative legitimacy* through being a program launched by the Minister, and having been called for in the *Melbourne 2030* plan that was state government policy.	The *Clarendon Street Tram Priority Pilot* had *normative legitimacy* through the granting of a planning permit for the works. The compromise partial removal of the scheme had *normative legitimacy* through the State Government accepting (and acting on) the request from the City of Port Phillip's Strategy and Policy Review committee for removal of the far-side stops.	Stud Road is a major arterial road that was directly controlled by VicRoads, the state road authority. As such, the state government had *normative legitimacy* to alter the road cross-section to implement the *bus lanes*.
20: How was *sociological legitimacy* relevant to the implementation?	*Melbourne 2030* provided the *sociological legitimacy* for the *Think Tram* program, but unfortunately *Melbourne 2030* itself appears to have lacked widespread support and legitimacy (Mees 2011). The 25% journey time reduction target for *Think Tram* appears to have had *sociological legitimacy* within the *Think Tram* team, but not across the broader *public and political policy arenas*. In general, the limited changes to the road environment and the small improvements to tram performance suggest that there was *sociological legitimacy* for improving tram performance as long as it did not significantly impact on road traffic.	The idea of doing a pilot on Clarendon Street, rather than anywhere else on the network, appears to have originated within the *Think Tram* team itself. There appears to have been little *sociological legitimacy* for the pilot within the broader community, and active opposition to the measures after they were implemented. However, this appears to be primarily related to the *sociological legitimacy* of their being on-street parking along Clarendon Street to support business activity. Once the *far side stop*s were removed and parking restored there appears to have been *sociological legitimacy* for the retention of the other measures, as they did not significantly impact on other traffic.	The *Keeping Melbourne Moving* strategy, the *SmartBus* network standards and other transportation plans all helped to provide *sociological legitimacy* for the implementation of the *bus lanes*. The basis for this *sociological legitimacy* is that the project was in accordance with the *strategic objectives* laid out in these transport plans. However, the reduction of capacity for general road traffic lacked *sociological legitimacy* due to impacts on other road users.
21: How was public *consent* relevant to the transit priority implementation?	There appears to have been little direct *public consent*, public involvement or even consultation for the *Melbourne 2030* plan or the *Think Tram* program (Mees 2011). However, *public consent* was to some extent provided through political representation.	There appears to have been little to no *public consent* for the *Clarendon Street Tram Priority Pilot* amongst the local community. Involvement appears to have been generally down at the level of *informing* prior to the pilot being implemented, although there may have been direct negotiation during meetings after the public opposition emerged. However, there appears to have been no involvement of transit riders in the decision for a compromise partial removal.	There does not appear to have been *public consent* for the implementation of the *bus lanes*, other than through the indirect consent provided through their election of the state government. However, the volume of letters to newspapers and elected representatives after the implementation that were opposed to the bus lanes suggests that there was a lack of *public consent*. Tudge (2010) stated that "over 90 per cent of residents indicated that they were against the bus lane" in response to his anti-*bus lane*s electoral newsletter article and a request for the community to send him their views. This suggests that there was little *public consent* amongst the local electorate for the *bus lanes*, but may not have included the entire public (e.g. bus commuters passing through the area, but not resident within the electorate). The election of the Liberal Government following their promise to remove the *bus lanes* if elected suggests that there was *public consent* for the removal of the *bus lanes*, however, the state government election was not decided on this issue alone.

Source: Author's assessment

Table C.9 *Think Tram, Clarendon Street Tram Priority Pilot* and *Stud Road Bus Lanes*: legitimacy, case study questions 22 to 25

Question	Think Tram program	*Clarendon Street Tram Priority Pilot*	*Stud Road Bus Lanes*
22: How was *reasonableness* relevant to the implementation?	*Reasonableness* may have impacted the implementation of *Think Tram* in that: the *Melbourne 2030* plan established some *reasonableness* for the program; it is (technically) *reasonable* to prioritise trams over general traffic and parking, and it was *reasonable* to reduce the scale of the program and abandon the 25% target after the events of Clarendon Street.	The implementation of additional parking on side streets appears to have been an attempt at using *reasonableness* to reduce opposition. The Smith (2005) report seeks to demonstrate the acceptability of the compromise through *reasonableness*, based on evidence of the impacts of the pilot. However, in general, the opposition to the scheme appears to have used anecdotal descriptions of how the changes were *unreasonable* for local businesses and street users, rather than analysis on impacts to all of society, including transit riders etc.	The *reasonableness* of the *bus lanes* was questioned by Tudge (2010), residents and many other members of the community on the grounds of insufficient bus frequency, safety concerns and traffic impacts. There were some statements suggesting that the *bus lanes* had increased patronage (Bernecich 2010; Dimond 2010b) and so were *reasonable* due to successful outcomes. However, the broader concerns of frequency, safety and traffic impacts do not appear to have been responded to in the *public and political policy arenas* by the state government, VicRoads or other proponents of the *bus lanes*.
23: How was *legitimacy as unconditional duty* relevant to the implementation?	The *Think Tram* program perhaps shows that there was an almost *unconditional duty* to limit impacts on other road users when installing tram priority measures.	Clarendon Street suggests that on-street parking along strip shopping centres has *unconditional legitimacy* in Melbourne.	*Legitimacy as unconditional duty* does not appear to have been relevant to the implementation.
24: How was *conditional normative legitimacy* relevant to the implementation?	*Melbourne 2030* and the *Think Tram* 25% target provided *normative legitimacy* for implementing tram priority measures, but after the events relating to the *Clarendon Street trial* it appears that the program team recognised that the level of tram priority in Melbourne is conditional on having little to no impact on other road users.	The provision of car parking appears to have been *conditional* on location, as additional parking in the side streets to replace parking in Clarendon Street was not sufficient. The *normative legitimacy* for tram prioritisation appears to have been *conditional* on public and political responses.	The *bus lanes* appear to have only been legitimate in places where they were implemented through road widening, and therefore met the *condition* of avoiding impacts on other traffic.
25: How was *legitimacy through trust* relevant?	There appears to have been little public *trust* in the planning experts who developed and endorsed the *Melbourne 2030* directions (Mees 2011), which included *Think Tram*.	There appears to have been little public *trust* and a "lack of initial consultation" (Smith 2005, p. 11) as a problem with the pilot scheme. A media release issued by the campaign opposing the pilot scheme includes quotations from local traders who clearly did not believe that the pilot scheme was a trial, and thought instead that retaining the changes to Clarendon Street was "a done deal" (Quin 2005a).	*Legitimacy through trust* does not appear to have been relevant to the implementation.

Source: Author's assessment

C.4 Toronto

C.4.1 Implementation contexts

Table C.10 *Transit City* and the *Eglinton Crosstown LRT* contexts, case study question A12

Question	*Transit City*	*Eglinton Crosstown LRT*

12: What was the transit priority implementation?	• The *Transit City Light Rail Plan* proposed seven new LRT lines:
	  • the *Eglinton Crosstown LRT* (31km),
	  • the *Etobicoke-Finch West LRT* (18km),
	  • the *Scarborough-Malvern LRT* (15km),
	  • the *Don Mills LRT* (18km),
	  • the *Jane LRT* (17km),
	  • the *Sheppard East LRT* (14km), and
	  • the *Waterfront West LRT* (11km)
	• The initial proposal envisaged LRT lines similar to those on Spadina Avenue and St Clair Avenue West, with streetcars operating in kerb-separated ROW (ROW B.3) in the centre of the roads. However, tunnels were proposed at interchanges with subways and for approximately 10km of the *Eglinton Crosstown LRT* (Toronto Transit Commission 2007a; Bow 2017a).
	• The *Transit City Bus Plan* included increases to service levels, bus priority at traffic signals, *far side stops*, *TSP*, *queue jump lanes* and other improvements (Toronto Transit Commission 2009).
		• A 19-kilometre standard gauge LRT running east-west along Eglinton Avenue between Mount Dennis (Weston Road) and Kennedy Road:
		  • Underground right-of-way (ROW A.1) with automatic train control between Mount Dennis (Weston Road) and Laird; and
		  • a dedicated right-of-way (ROW B) and manual driving between Laird and Kennedy
		• The project will be owned by *Metrolinx*, but will be operated by the TTC. It is being delivered by the private *Crosslinx* consortium and is expected to cost approximately $CAD 5 billion (Levy 2015; Thompson 2016b; Bow 2017a, 2018; Metrolinx 2018a; D'Urbano 2019).
		• The connection from Mount Dennis (Weston Road) west to Pearson Airport is to be completed by 2030-1 as the *Eglinton Crosstown West Extension* (Metrolinx 2020b).

Sources: as indicated

Table C.11 *Transit City* and the *Eglinton Crosstown LRT* contexts, case study question 13

Question	Year	*Transit City and Eglinton Crosstown LRT*
13: What were the events?	2003	• The *Ridership Growth Strategy* (Toronto Transit Commission 2003) proposed surface rapid transit corridors and identified where the network would be overcapacity by 2011.
	2005	• The *Building a Transit City* report (City of Toronto & Toronto Transit Commission 2005) proposed transit priority and dedicated ROW construction.
	2006	• The Province formed *Metrolinx* as a new regional transit authority for the GTHA and Greater Golden Horseshoe (Government of Ontario 2006)
	2007	• *March*: the City of Toronto and the TTC launched the *Transit City Light Rail Plan*, which included the *Eglinton Crosstown LRT* (Toronto Transit Commission 2007a; Bow 2017a). • *June*: The Province launched its *MoveOntario 2020* policy (Kalinowski 2007; Levy 2015), including *Transit City* and "promised $12 billion to launch up to 52 separate transit expansion projects throughout the Greater Toronto Area" (Bow 2017a). • *November:* A TTC evaluation recommended building the *Etobicoke-Finch West LRT, Eglinton Crosstown LRT* and *Sheppard East LRT* first (Toronto Transit Commission 2007b).
	2008	• Metrolinx (2008) published *The Big Move* regional transport plan for the GTHA, which incorporated *Transit City* (Levy 2015).
	2009	• *April:* The Province announced $7.2 billion for the *Eglinton Crosstown LRT*, the *Etobicoke-Finch West LRT* and to convert the Scarborough RT to an LRT. Funding for the *Sheppard East LRT* came later, one-third of which was from the federal government (Bow 2017a). • *July:* The TTC released a preliminary design for the *Eglinton Crosstown LRT* (Bow 2018). • *Transit City* was further refined as planning studies were undertaken. The *Eglinton Crosstown LRT* implementation was planned to be over two phases: the 19km central and eastern sections between Weston Road and Kennedy Road; followed by the western Pearson Airport and Weston Road which is now the *Eglinton Crosstown West Extension* (Toronto Transit Commission 2010; Levy 2015). • *Metrolinx* and the TTC negotiated changes to the *Eglinton Crosstown LRT*, including that it would be standard gauge (Collins 2010; Kalinowski 2010; Thompson 2016b; Bow 2017a). • Local resident groups expressed concerns about *Transit City* (Bow 2017a). • *December:* a *Transit Project Assessment; Environmental Project Report* for the full *Eglinton Crosstown LRT* (Toronto Transit Commission & City of Toronto 2010) was approved by the City of Toronto (2009).
	2010	• *May:* a notice to proceed was issued for the *Eglinton Crosstown LRT* (Gerretsen 2010). • In the lead up to the City of Toronto elections various candidates criticised *Transit City* and put forward their own plans (Bow 2017a). • *October:* Rob Ford won the mayoral election with 47% of the vote (Watkiss 2010). • *December:* On his first day as Mayor, Rob Ford announced the cancelation of *Transit City* (Kalinowski & Rider 2010). However, *Transit City* was provincially funded and the *Sheppard East LRT* had already started construction (Bow 2017a).
	2011	• *March:* negotiations between the mayor and *Metrolinx* resulted in an agreement for all of the *Eglinton Crosstown LRT* to be moved underground and extended to Scarborough by rebuilding the Scarborough RT (Line 3). Other funding would be transferred towards Mayor Ford's proposed subway extensions. ***Transit City* was effectively over**, but some elements have since been incorporated into later proposals and plans (Bow 2017a, 2018). • *October*: Construction began on the *Eglinton Crosstown LRT* (Thompson 2016b).
	2012	• TTC Chair Karen Stintz and councillors raised concerns over insufficient passenger demand to justify all of the *Eglinton Crosstown LRT* being underground. The all-underground plan was rejected by the City of Toronto Council in a "Council Rebellion" (Bow 2018). The TTC General Manager was then sacked by TTC commissioners loyal to Mayor Ford. *Metrolinx* shifted back to working on the original *Eglinton Crosstown LRT* (Bow 2018).
	2015	• The *Eglinton Crosstown LRT* was delayed a year to September 2021 (Kalinowski 2015).
	2016 2017	• Problems with delivery of the light rail vehicles for the line led to legal action between *Metrolinx* and Bombardier, the contracted supplier (Spurr 2016b, 2016a; Jeffords 2017).
	2020	• 2020: *Metrolinx* announced the *Eglinton Crosstown LRT* will not be completed until mid-2022 due to construction delays (CBC News 2020).

Sources: as indicated

Table C.12 *Transit City* and the *Eglinton Crosstown LRT* contexts, case study questions 14 to 16

Question	*Transit City*	*Eglinton Crosstown LRT*
14: How did the transit ROW change?	Existing buses operating in *mixed traffic* (ROW C) were to be replaced by *longitudinally-* or *grade-separated* LRT (ROW B or A) along seven corridors. However, the plan was cancelled and only the *Eglinton Crosstown LRT* is to be constructed.	Existing buses operating in *mixed traffic* (ROW C) will be replaced by approximately 10km of *grade-separated* LRT (ROW A.1) and approximately 9km of *longitudinally-separated LRT* (ROW B.3).
15: Was the implementation process successful?	No. The *Transit City* plan was abandoned, although parts of it have been incorporated into later plans, and the *Eglinton Crosstown LRT* is under construction.	The implementation process appears to have been complicated by changes in plans, political manoeuvring and delays.
16: Did the implementation have successful outcomes?	No. The abandonment of *Transit City* led to a shift towards more expensive subway construction in the City of Toronto.	Construction is ongoing, and it appears that the *Eglinton Crosstown LRT* will successfully provide a high level of transit priority.

Sources as indicated.

C.4.2 Implementation legitimacy

Table C.13 *Transit City* and the *Eglinton Crosstown LRT tram priority pilot*: legitimacy, case study questions 19 to 22

Question	*Transit City*	*Eglinton Crosstown LRT*
19: How was *normative legitimacy* relevant to the implementation?	*Transit City* gained *normative legitimacy* through being accepted at meetings of the TTC board of commissioners (Toronto Transit Commission 2007a) and the City of Toronto executive committee (City of Toronto 2007). Further *normative legitimacy* was provided by it being incorporated into the Province's *MoveOntario 2020* policy and *The Big Move* regional transport plan (Kalinowski 2007; Metrolinx 2008; Levy 2015; Bow 2017a). Rob Ford did not actually have the direct authority to cancel *Transit City* because "council as a whole endorsed Transit City and it will take a council vote — not a decision from the mayor alone — to change course" (Kalinowski & Rider 2010). The Province appears to have had control through providing much of the initial funding for *Transit City*, and also through the powers vested in its regional transit authority *Metrolinx.* However, the Province did not appear to have exercised these powers outside of negotiations as "through all this debate, premier Dalton McGuinty and the minister of transportation Bob Chirelli stated that they were looking for a clear direction from the city of Toronto and that they respected the council's decision" (Bow 2018).	*Normative legitimacy* for the implementation of the *Eglinton Crosstown LRT* was provided by the *Eglinton Crosstown LRT Transit Project Assessment; Environmental Project Report* being approved by the City of Toronto Council (City of Toronto 2009) and the Provincial Minister issuing a notice to proceed (Gerretsen 2010). The *Eglinton Crosstown LRT Transit Project Assessment; Environmental Project Report* described how other legislative and approval requirements would be met or addressed, and how the *Eglinton Crosstown LRT* was based on "a plan that built upon the transit concepts in several studies, including the Toronto Official Plan, the TTC Ridership Growth Strategy, Building a Transit City and the Mayor's "Transit City" Platform (2006)" (Toronto Transit Commission & City of Toronto 2010). The rejection of Ford's all-underground plan by the City of Toronto Council (Bow 2018) meant that this option did not have any *normative legitimacy* and so could not proceed further.
20: How was *sociological legitimacy* relevant to the implementation?	The Spadina Avenue and St Clair Avenue West streetcar projects appear to have provided examples of the sort of LRT facilities envisaged in the *Transit City* plan. "The opening of the Spadina line also sent a message to the people of Toronto that the city was serious about retaining and modernizing its system of streetcars" (Currie & Shalaby 2007), The high costs of subway construction appear to have provided support in Toronto for LRT implementation, providing *sociological legitimacy* for the *Transit City* plan amongst the TTC and City of Toronto. However, Levy (2015) questions the ridership projections that supported *Transit City*, and suggests that "low-cost (predominantly) at-grade rapid transit in the form of LRT was clearly the 'flavour of the week'". The election of Rob Ford appears to have reversed the policy direction to favour of subway construction and provided *legitimacy* to the idea that road space should primarily be for private vehicles.	There appears to have been much debate about what the *Eglinton Crosstown LRT* should be: • the original *Transit City* plan suggested that it should be an at-grade LRT, but go underground when there was insufficient space for it to be accommodated in the road reserve (Levy 2015). • Ford's plan suggested that the *Eglinton Crosstown LRT* should be built fully underground to avoid traffic impacts, acting as a cheaper form of subway; and • other narratives have suggested it should be built as a pre-metro to allowed for a future upgrade from LRT to a heavy rail subway, but this has not eventuated and the current tunnels under construction will only be able to accommodate LRT vehicles (Levy 2015).
21: How was public *consent* relevant to the transit priority implementation?	*Public consent* does not appear to have been relevant to the initial formulation of the *Transit City* plan, other than that the plan was approved by the City Council as representatives of the people. The election of Rob Ford as mayor effectively demonstrated that there was a lack of sufficient *public consent* for the LRT plans to go ahead.	The *Eglinton Crosstown LRT Transit Project Assessment; Environmental Project Report* describes the public consultation involved in the project. This appears to have mostly consisted of *informing* through public notices, project websites and "three rounds of public open houses" (Toronto Transit Commission & City of Toronto 2010, pp. XXIV-XXV).
22: How was *reasonableness* relevant to the implementation?	*Transit City* appears to have presented LRT as a *reasonable* alternative to high-cost subways for improving transit services across the City of Toronto. Evidence for this *reasonableness* appears to have been based on previous studies, but "details presented to the public…were relatively sparse: indeed, little if any rigorous analysis of the initiative was available, other than media commentary – not all of which was positive" (Levy 2015). The *reasonableness* of abandoning the *Transit City* plan in favour of Mayor Ford's subway plan was not clearly established, and "Patrice Dutil, associate professor in Ryerson University's Department of Politics and Public Administration…referred to Ford's subway plan as back-of-the-envelope calculations." (Kalinowski & Rider 2010).	The *Transit Project Assessment; Environmental Project Report* provided evidence as to the *reasonableness* of the original proposal (Toronto Transit Commission & City of Toronto 2010). Ford's all-underground proposal does not appear to have been based on *reasonableness*, and some "saw the full burial as a waste of money, since LRT cars that don't come to the surface are more expensive than traditional subways" (Bow 2018).

Source: author's assessment

Table C.14 *Transit City* and the *Eglinton Crosstown LRT tram priority pilot*: legitimacy, case study questions 23 to 25

<table>
<tr><th>Question</th><th>Transit City</th><th>Eglinton Crosstown LRT</th></tr>
<tr><td>23: How was legitimacy as unconditional duty relevant to the implementation?</td><td colspan="2">Unconditional duty does not appear to have been relevant to the Transit City plan or the Eglinton Crosstown LRT, other than unconditional duty associated with complying with the relevant legislation and processes required for implementation.
Ford's cancellation of Transit City and push to fully-underground the Eglinton Crosstown LRT, almost regardless of the cost or reasonableness of this, suggests that the idea that roads are for private motorists had unconditional legitimacy for him and his supporters.</td></tr>
<tr><td rowspan="2">24: How was conditional normative legitimacy relevant to the implementation?</td><td colspan="2">In general, there appears to have been legitimacy for the idea of improving transit services in the City of Toronto and along Eglinton Avenue. However, this legitimacy appears to have been conditional on either:
the implementation being low-cost and so allowing more to be done with the available funding, which favoured Transit City's plan for at-grade LRTs; or
having minimal impacts on private motorists, which favoured instead building subways and all-underground LRTs.</td></tr>
<tr><td>For Transit City the second condition won out, and the at-grade LRT based plan lost legitimacy in favour of subways.</td><td>For the Eglinton Avenue Crosstown LRT the "Council Rebellion" (Bow 2018) effectively enforced the first condition by rejecting the all-underground option.</td></tr>
<tr><td>25: How was legitimacy through trust relevant?</td><td colspan="2">The original Transit City plan appears to have relied on trust in the recommendations of previous reports and the merits of the LRT-based planning direction, as "details presented to the public…were relatively sparse" (Levy 2015).
Transportation experts appear to have been trusted to undertake technical analysis and cost estimates for the various plans.
However, overall support for governmental institutions may have been lacking, following the problems on the St Clair LRT project and, although not directly related, other events such as the five-week garbage collection strike in 2009 (Silver et al. 2020).
Trust in the opinions of technical experts does not appear to have been relevant to the debates about subways and underground construction. For example, despite an expert panel recommending LRT rather than a subway for Sheppard Avenue this finding was "dismissed by Mayor Rob Ford without seeing the report" (Rider 2012).</td></tr>
</table>

Source: author's assessment

Appendix D. Part C case study results: *transit-centric cities*

D.1 Introduction

Chapters 7 and 8 have discussed transit priority implementation in two cities that, at least outwardly, appear to be quite different. The long running transit priority implementation program in Zürich, a major financial centre in the heart of Europe, followed a successful public vote on a citizen-submitted ballot initiative. In Curitiba, almost 10,000 kilometres away amongst coups and the endemic corruption problems of Latin America (Lipton et al. 2017), a military dictatorship provided technocrats the time and support needed to implement transit priority with little public involvement at all.

Zürich and Curitiba have both succeeded at prioritising on-road transit services. However, the mechanisms through which the two cities have succeeded and won support for on-street transit priority implementation have been very different. This Appendix explores what insights can be drawn from the contrasting successes in these two *transit-centric cities*. It is structured as follows:

- Section D.2 compares the city contexts of Zürich and Curitiba;
- Section D.3 compares the contexts of the transit priority implementations examined in Chapters 7 and 8; and
- Section D.4 compares the *legitimacy* surrounding the transit priority implementations examined in Chapters 7 and 8.

D.2 City contexts

Table D.1, Table D.2 Table D.3, Table D.4, Table D.5 and Table D.6 show details of the city contexts of Zürich and Curitiba. Figure D.1 compares population trends.

Table D.1 Zürich city contexts, case study questions 1 to 4

<table>
<tr><th>Question</th><th>Zürich</th></tr>
<tr><td>1: What is the governance structure in the city?</td><td>
A three-level governance system, with the Canton of Zürich being one of the 26 cantons that make up the confederation of Switzerland. The City of Zürich is the local authority, but the metropolitan area of Zürich extends into surrounding municipal areas (Nash 2001, pp. 46-9; Low, Gleeson, Green, et al. 2005, p. 144).
Separate legislative and executive branches at all levels of government (Nash 2001, pp. 46-9).
There is a large amount of local autonomy, with planning functions split between the Canton and local government (Apel & Pharoah 1995, p. 131; Nash 2001, pp. 46-9)
Voters also participate in direct democracy through referendums. A referendum can be held on any issue, if there are sufficient signatures collected to support the issue being placed on the ballot. All investments of over $10 million Swiss francs have to be directly voted on by the public. Federal measures have to be approved by both a majority of the population and of the Cantons (Joos 1994; Apel & Pharoah 1995, p. 131; Cervero 1998, p. 305; Nash 2001, pp. 46-9)
</td></tr>
<tr><td>2: What is the population of the city?</td><td><table>
<tr><td>Year</td><td>City of Zürich</td><td>Zürich Agglomeration</td><td>Canton of Zürich</td><td>Reference</td></tr>
<tr><td>1900</td><td>176,900</td><td>N/A</td><td>431,000</td><td rowspan="12">Nash (2001, p. 40)</td></tr>
<tr><td>1941</td><td>359,700</td><td>N/A</td><td>674,500</td></tr>
<tr><td>1950</td><td>390,000</td><td>605,800</td><td>777,000</td></tr>
<tr><td>1960</td><td>440,200</td><td>754,500</td><td>952,300</td></tr>
<tr><td>1970</td><td>422,600</td><td>884,800</td><td>1,107,800</td></tr>
<tr><td>1977</td><td colspan="3">Citizens’ Transit Priority Initiative approved</td></tr>
<tr><td>1980</td><td>369,500</td><td>898,900</td><td>1,122,900</td></tr>
<tr><td rowspan="2">1990</td><td>365,000</td><td>940,200</td><td>1,179,000</td></tr>
<tr><td colspan="3">S-Bahn system opens, ZVV formed</td></tr>
<tr><td>1991</td><td colspan="3">Second ballot initiative passes, providing funding for further prioritisation of transit</td></tr>
<tr><td>1997</td><td>335,900</td><td>928,000</td><td>1,178,400</td></tr>
<tr><td>2000</td><td>360,000</td><td>1,132,800</td><td>1,247,900</td><td rowspan="3">Nash et al. (2018, p. 8)</td></tr>
<tr><td>2010</td><td>390,000</td><td>1,248,700</td><td>1,373,100</td></tr>
<tr><td>2015</td><td>410,000</td><td>1,334,300</td><td>1,466,400</td></tr>
</table></td></tr>
<tr><td>3: What is the size of the city?</td><td>City of Zürich: 92km² (Cervero 1998; Nash 2001),
Zürich Verkehresverbund (ZVV) transit agency service area: 1,730km² (Cervero 1998)</td></tr>
<tr><td>4: What is the population density of the city?</td><td><table>
<tr><td>City of Zürich</td><td>Middle and outer suburbs</td><td>Canton of Zürich</td><td>Notes</td><td>Reference</td></tr>
<tr><td>67 per hectare</td><td>32 per hectare</td><td>38 per hectare</td><td>Urban uses only</td><td>Mees (2010)</td></tr>
<tr><td>38.6 per hectare</td><td>-</td><td>6.8 per hectare</td><td rowspan="2">Gross density</td><td>Nash (2001, p. 39)</td></tr>
<tr><td>-</td><td>-</td><td>6.4 per hectare</td><td>Low, Gleeson, Green, et al. (2005, p. 145)</td></tr>
<tr><td>Dense inner city & narrow streets</td><td colspan="2">Dispersed, car-orientated and at lower densities.</td><td>-</td><td>Apel and Pharoah (1995, pp. 127-31)</td></tr>
</table></td></tr>
</table>

Sources: as indicated

Table D.2 Summary of Zürich transport context, case study questions 5-10

Question	Zürich
5: What is the transit usage / ridership in the city?	• 1950: 407 average annual transit trips per resident for Zürich city trams and buses (Nash 2001, p. 43). • 1960: 446 average annual transit trips per resident for Zürich city trams and buses (Nash 2001, p. 43). • 1970: 479 average annual transit trips per resident for Zürich city trams and buses (Nash 2001, p. 43). • 1980: 588 average annual transit trips per resident for Zürich city trams and buses (Nash 2001, p. 43). • 430 average annual transit trips per person in the area covered by the Zürich transport authority (Joos 1989, p. 75). • 560 average annual transit trips per resident (Cervero 1998, p. 299).
6: What is the transit mode split?	*Journey to work* • 1970: 49% for residents of the city working in the city (Nash 2001, p. 44). • 1970: 51% for commuters travelling into the city for work (Nash 2001, p. 45). • 1980: 55% for residents of the city working in the city (Nash 2001, p. 44). • 1980: 47% for commuters travelling into the city for work (Nash 2001, p. 45). • 1980: 67.5% transit mode split for residents of the city. 45.8% for residents of the Zürich agglomeration, and 48.0% for residents of the rest of Greater Zürich (Apel & Pharoah 1995, p. 145). • 1990: 61% for residents of the city working in the city (Nash 2001, p. 44). • 1990: 58% for commuters travelling into the city for work (Nash 2001, p. 45). • 1990: 76.1% transit mode split for residents of the city. 50.9% for residents of the Zürich agglomeration, and 55.5% for residents of the rest of Greater Zürich (Apel & Pharoah 1995, p. 145). • Transit mode shares of: 76.1% (within city), 40.8% (city to inner ring of suburbs), 42.2% (city to outer ring of suburbs); 50.9% (inner ring to city), 21% (inner ring to inner ring) and 22.5% (inner ring to outer ring); and 55.9% (outer ring to city), 21.3% (outer to inner) and 28.5% (outer to outer) (Cervero 1998, p. 303). *All trips* • 1989: 38% transit mode split for residents of the city, 33% for all trips in the city, and 18% for trips in the Canton. (Apel & Pharoah 1995, p. 148). • 2000: 30% transit mode split (Nash et al. 2018, p. 8). • 2005: 34% transit mode split (Nash et al. 2018, p. 8). • 2010: 39% transit mode split (Nash et al. 2018, p. 8). • 2015: 41% transit mode split (Nash et al. 2018, p. 8).
7: What is the private automobile mode split?	*Journey to work* • 1970: 26% for residents of the city working in the city (Nash 2001, p. 44). • 1970: 49% for commuters travelling into the city for work (Nash 2001, p. 45) • 1980: 26% for residents of the city working in the city (Nash 2001, p. 44). • 1980: 53% for commuters travelling into the city for work (Nash 2001, p. 45) • 1990: 26% for residents of the city working in the city (Nash 2001, p. 44). • 1990: 42% for commuters travelling into the city for work (Nash 2001, p. 45) *All trips* • 1989: 28% auto mode split for residents of the city, 37% for all trips in the city, and 51% for trips in the Canton. (Apel & Pharoah 1995, p. 148). • 2000: 40% auto mode split (Nash et al. 2018, p. 8). • 2005: 36% auto mode split. (Nash et al. 2018, p. 8). • 2010: 30% auto mode split. (Nash et al. 2018, p. 8). • 2015: 25% auto mode split (Nash et al. 2018, p. 8).
8: What is the car ownership rate?	• 373 cars per 1,000 population in the city, 435 in the Canton (Apel & Pharoah 1995, p. 149) • 1999: 36% vehicle ownership rate in the City of Zürich, 46% in the Canton (Nash 2001, p. 45) • 53% of households in Zürich have no cars (Nash et al. 2018, p. 9).
9: What is the road network like in the city?	• Limited road capacity, due to the constraints of geography and the lack of wide ceremonial roads (Cervero 1998, p. 305; Mees 2000, p. 120). This is particularly the case in the inner city due to narrow streets and traffic limitation policies dating from the 1980s. However, main roads in Zürich are controlled by the Canton, which does not have as great a focus on limiting traffic movement (Apel & Pharoah 1995, pp. 127, 33-34). • Despite plans for freeways in the 1950s and 1960s, public opposition meant that many of these were not implemented (Nash 2001, p. 51). • There has been implementation of many measures to discourage traffic in the City such as traffic calming, reduction of roadway capacity, limits on parking and reduced parking requirements for developments near transit (Cervero 1998, p. 312; Nash 2001, p. 13).
10: What is the transit network like in the city?	• A historic tram network dating back to horse drawn tramway services that started in 1882. Electric trams date back to 1893, with buses being introduced in 1927 (Gunnarsson & Löfgren 2001, pp. 32-3). • The Zurich Verkehrsverbund (ZVV) was formed in 1990 and organises all transit services in the Zürich area. There are over 40 operators, including the Verkersbetreibe Zürich (VBZ) that operate streetcars and buses in the City of Zürich itself. There are 14 tram lines (122.6km), 6 trolley buses (53.8km), 55 bus lines (109.8km) and also three inclined railways (Nash et al. 2018, p. 9). Fitzroy and Smith (1993, p. 212) provide slightly different values for the network from 1990 being: 13 tram routes (117.3km), an 89.7km bus network and 36.3km of trolleybus lines, suggesting there has been some minor expansions. • The S-Bahn train system, mostly operated by the Swiss Federal Railways (SBB), was built in 1990 and provides commuter and regional transport across the suburban areas (Apel & Pharoah 1995, p. 144; Nash et al. 2018, p. 9). • Services in the city have high frequencies, with headways of 7 to 8 minutes during the day, 12 minutes in the evenings and a limited overnight bus services on weekends (Nash 2001, p. 41). In suburban areas where high frequencies are not possible, transit operates on a pulse system coordinated with the S-Bahn system, which operates on 30 minutes frequency, so that transfers can be made easily between regional and local services (Nash 2001, pp. 106-7; Mees 2010, pp. 134-7).

Sources: as indicated

Table D.3 Curitiba city contexts, case study questions 1

Question	Curitiba
1: What is the governance structure in the city?	• Through the early 20th century Brazil had a series of political revolutions, crises and changes of governance. The Vargas dictatorship ran through the 1930s, but was ended by military coup in 1945. This led to a short democratic period in the 1950s and 60s with presidents who were elected "on platforms that were explicitly technocratic and anti-political" (Moore 2007, p. 77). Another coup in 1964 resulted in a military dictatorship that continued until the 1980s. • Brazilian law does not allow mayors to have consecutive terms. In Curitiba this restriction, and "the volatility of Brazilian politics" (Kruckemeyer 2000, p. 198) has meant rapid implementation is a priority. • Elections for the position of Curitiba's mayor were suspended between 1966 and 1985 by the military dictatorship. Mayors of Curitiba were instead directly appointed by the state governors. The City Council, however, remained an elected body. • From 1945, urban planning in Curitiba had been guided by the car-oriented *Agache Plan*. However, this plan would have had high costs and impacts due to wide boulevards and overpasses to accommodate traffic. • In the 1960s the Economic Development Company of Paraná (CODEPAR) refused to fund traffic related projects, but did agree to support the development of a new city plan. • A competition was held to develop to a *Plano Preliminar de Urbanismo* (Preliminary Master Plan for Curitiba), and was won by a group from São Paulo consisting of urban planner Jorge Wilhelm and *Serete Limited* (Society for Studies and Projects). This plan was further developed with input from a local group, including Jamie Lerner, who had submitted an unsuccessful bid, but who were then included in the Wilhelm team. • The *Plano Preliminar* became the *Plano Diretor* (or Master Plan) in 1966 when it was approved by the City Council (Ardila-Gomez 2004, pp. 55-90; Duarte et al. 2011, p. 86). Notably, the *Plano Diretor* approved by the City Council is "a highly flexible-and therefore scantily detailed-plan because [planners] realised that the Director Plan had to change in response to many situations" (Ardila-Gomez 2004, p. 80). • The *Instituto de Pesquisa e Planejamento Urbano de Curitiba* (IPPUC) (the Urban Planning and Research Institute of Curitiba) was formed in 1965 to further develop and implement the *Plano Diretor.* It is a quasi-autonomous multidisciplinary agency, separate to the city's planning department, with a broad mandate to implement the *Plano Diretor*, test new solutions and revise the plan itself. • Ney Braga had been mayor of Curitiba in the 1950s and was "in effect, was the power broker during 30 years in Paraná's politics" (Ardila-Gomez 2004, p. 132). Initially "Braga appointed his own wife Franchette (an engineer), as IPPUC director so as to better control its operation" (Moore 2007, pp. 77-8). • Kruckemeyer (2000, p. 198) notes that IPPUC was formed around the time that the first group was graduating from a new architecture program at the University of Paraná, and that it "has not only been the center for effective planning in the city; it has also been the origin of many of the political leaders of Curitiba, and a foundation of their political power" (Kruckemeyer 2000, p. 198). IPPUC itself appears to have come to have significant power as "[s]ince the Institute has been established for such a long period of time and its technicians are permanent, and most importantly because it has proven its planning capabilities, it is difficult for any mayor to drastically change IPPUC's mandate" (Dera 1995, p. 50). • Braga arranged for Jamie Lerner to be appointed mayor in 1971. Lerner is a civil engineer and architect (Ardila-Gomez 2004, p. 93), and had been the IPPUC president. As a non-politician Lerner was unlikely to be a political threat to the state governor, and as an insider at IPPUC and a 'technician' he was also Braga's best chance of seeing the *Plano Diretor* implemented. • Lerner's first term as mayor was followed by the appointment of Saul Raiz in 1975, who was part of the same political group based around Braga and Lerner. • Towards the end of the 1970s demands grew for the end of the military regime and direct elections. The military dictatorship installed a civilian administration, which was followed by the adoption of a new constitution in 1988 and a democratically elected President taking office in 1989. • The transition to democracy, however, was gradual. Braga was elected as Governor of the State Paraná by the state assembly for the period of 1979-82, rather than appointed by the military. Braga then appointed Jaime Lerner to his second mayoral term (1979-1983). • José Richa followed Braga as Governor, and appointed Mauricio Fruet as Curitiba mayor for 1983-85. Fruet revised Curitiba's planning guidelines, but these were largely ignored. • The 1985-88 mayoral term saw the return of democratic elections in Curitiba. Lerner ran against Roberto Requião, but lost. McKibben (2007, p. 83) states that "Lerner is widely and affectionately described as a political naif" and was defeated in part through election fraud. Both Fruet and Requião were from a political party that opposed the Braga / Lerner group. • Lerner became mayor for the third time when he was directly elected for the 1989-92 term. He won 49% of the vote in a 5-way contest. He was followed by mayors he supported politically. • Dera (1995, pp. 63-81) discusses the relationships between municipal, state and federal levels of government, and the various powers of the mayor of Curitiba, the council and other bodies under the current governance structure. In general, there is a very large amount of local autonomy, with municipalities having the power to pass laws that "can prevail over a state law, the State Constitution or a federal law, but not over the Federal Constitution" (p.72). The mayor has significant power and independence and is responsible, but not subordinate, to the City Council. Additionally, the mayor is not outranked by state or federal authorities (p.74).

Sources: as indicated and author's synthesis[438]

[438] Sources include: Boles (1992); Rabinovitch (1992); Rabinovitch and Leitmann (1993); Hunt (1994); Dera (1995); Meadows (1995); Cervero (1998); Smith and Hensher (1998); Hawken et al. (1999); Nieri (2000); Ardila-Gomez (2004); Schwartz (2004); McKibben (2007); Moore (2007); Lara (2010, p. 120); Mees (2010); Martinez et al. (2016); Lerner (2018).

Table D.4 Summary of Curitiba population, case study question 2, including timeline of selected events

Curitiba			
Year	*City of Curitiba*	*Greater urban area*	*Reference*
1940	125,000	-	McKibben (2007, p. 63)
	140,656	-	Rabinovitch and Leitmann (1993); Rabinovitch and Hoehn (1995)
	-	202,956	Rabinovitch and Leitmann (1993, p. 2)
1943	120,000	-	Irazábal (2005, p. 87)
1945	*Agache Plan* adopted for development of Curitiba Military coup d'état ends Vargas dictatorship		
1950	180,000	-	McKibben (2007, p. 63) Schwartz (2004, p. 11)
	180,575	-	Rabinovitch and Hoehn (1995, p. 12); Ardila-Gomez (2004, p. 31) Rabinovitch and Leitmann (1993, p. 2)
	-	307,294	Rabinovitch and Leitmann (1993, p. 2)
1960	361,000	-	McKibben (2007, p. 63)
	361,309	510,539	Rabinovitch and Leitmann (1993, p. 2)
	365,309	-	Rabinovitch and Hoehn (1995, p. 12); Ardila-Gomez (2004, p. 31); Irazábal (2005, p. 87); Duarte et al. (2011, p. 82)
1964	Coup d'état ends the period of democratic governance, and results in a military dictatorship		
1965	400,000	-	Cervero (1998, p. 266); Irazábal (2005, p. 87)
	Plano Diretor replaces *Agache Plan*, IPPUC formed		
1970	608,400	-	Duarte et al. (2011, p. 82)
	609,026	-	Ardila-Gomez (2004, p. 31) Rabinovitch and Hoehn (1995, p. 12); Irazábal (2005, p. 87) Rabinovitch and Leitmann (1993, p. 2)
	-	821,233	Rabinovitch and Leitmann (1993, p. 2)
1971	Lerner appointed mayor		
1974	North-south busway opened		
1979	Southeast busway opened		
1980	1,024,975	-	Ardila-Gomez (2004, p. 31) Rabinovitch and Leitmann (1993, p. 2); Rabinovitch and Hoehn (1995, p. 12); Duarte et al. (2011, p. 82)
		1,440,626	Rabinovitch and Leitmann (1993, p. 2)
	East-west busway opened; articulated buses introduced on north-south busway		
1985	1,276,000	-	Rabinovitch and Hoehn (1995, p. 45)
	Civilian government installed at the national level. Requião elected as mayor of Curitiba		
1990	1,285,571	-	Duarte et al. (2011, p. 82)
	1,315,035	-	Ardila-Gomez (2004, p. 31)
	1.6m+		Cervero (1998, p. 266)
	1,608,151	-	Rabinovitch and Leitmann (1993); Rabinovitch and Hoehn (1995)
	-	2,250,959	Rabinovitch and Leitmann (1993, p. 2)
1991	1.29m	1.98m	Smith and Hensher (1998, p. 133)
	Direct bus lines and boarding tubes are introduced on south-east structural axis		
1992	Direct bus lines and boarding tubes are introduced on east and west structural axes		
1995	Direct bus, boarding tubes and bi-articulated buses introduced on north and south structural axes		
1998		2.3m	Cervero (1998, p. 266)
1999	1,580,505	-	Ardila-Gomez (2004, p. 31)
2000	1,587,315	-	Duarte et al. (2011, p. 82)
	-	2.2m	Goodman et al. (2005, p. 75); Gray et al. (2006, p. 51)
	1.6m	2.6m	Irazábal (2005, pp. 3, 94)
	1.65m		Schwartz (2004, p. 9)
2009	1.7m	3.3m	Mees (2010, p. 119)
2010	1,746,896	-	Duarte et al. (2011, p. 82)
	1.8m	3.17m	Lindau et al. (2010a, p. 17)
2016	<1.8m	3.2m	Rosário (2016)
2020	2.7m	-	Forecast mentioned in Moore (2007, p. 83)

Sources: as indicated

Table D.5 Curitiba context: case study questions 3 and 4

Question	**Curitiba**
3: What is the size of the city?	Approximately 435km^2 (Dera 1995, p. 19; Rabinovitch & Hoehn 1995, p. 45; Cervero 1998, p. 266; Nieri 2000, p. 171; Ardila-Gomez 2004, p. 31; Lindau et al. 2010a, p. 17). Cervero (1998, p. 266) states that Greater Curitiba is almost twice the size of Curitiba whereas Smith and Hensher (1998, p. 133) show a figure of 8,763km^2 for the metropolitan region.
4: What is the population density of the city?	1985: 29.4 people per hectare (Rabinovitch & Hoehn 1995, p. 45). 1991: 5.67 people per hectare for the metropolitan area (Smith & Hensher 1998, p. 133). 1991: 30.4 people per hectare average density, densities up to 112.4 people per hectare (Dera 1995, p. 19). 1992: mixed high rise residential: 294 people per hectare, medium to high-density residential: 164 people per hectare, medium density residential: 76 people per hectare, low density residential: 63 people per hectare (net of undeveloped land (Cervero 1998, p. 285). 1995: 49 people per hectare (Ardila-Gomez 2004, p. 31). 2007?: 102.5 people per hectare (Moore 2007, p. 171). 2010?: 42 people per hectare (Lindau et al. 2010a, p. 17).

Sources: as indicated

Table D.6 Summary of Curitiba transport context, case study questions 5-10

<table>
<tr><th>Question</th><th>Curitiba</th></tr>
<tr><td>5: What is the transit usage / ridership in the city?</td><td>1940: 11,113,432 trips per year, increasing to 19,641,232 trips in 1942. The large increase (77%!) related to an increase in services that unlocked latent demand (Ardila-Gomez 2004, p. 39).
1960: 143,100 daily passengers (Duarte et al. 2011, p. 82).
1970: 532,760 daily passengers (Duarte et al. 2011, p. 82).
1971: 580,000 daily trips (Levinson, Zimmerman, et al. 2003b, p. 12).
1974: 677,019 weekday trips (not including transfers)(Rabinovitch & Hoehn 1995; Ardila-Gomez 2004).
1980: 757,899 daily passengers (Ardila-Gomez 2004, p. 193; Duarte et al. 2011, p. 82).
1985: 815,708 weekday trips (not including transfers) (Ardila-Gomez 2004, p. 193).
1989: 1,056,000 daily passengers (Rabinovitch & Hoehn 1995, pp. 34-5).
1990: 1,194,688 weekday trips (Duarte et al. 2011)(not including transfers)(Ardila-Gomez 2004).
1992: 1,028,000 daily passengers (Rabinovitch & Hoehn 1995, pp. 34-5).
1993: 997,000 daily passengers, 1,575,000 if transfers are counted twice (Smith & Hensher 1998, p. 143), 1,538,541 weekday trips (not including transfers) (Ardila-Gomez 2004, p. 193).
1995: 1,713,450 weekday trips (not including transfers) (Ardila-Gomez 2004, p. 193).
1997: 2,135,802 weekday trips (not including transfers) (Ardila-Gomez 2004, p. 193).
2000: 1,542,041 daily passengers (Duarte et al. 2011), 1,935,000 daily passengers (Ceneviva 2000).
2002?: 1,900,000 daily passengers (497,000 for the busways) (Ardila-Gomez 2004, p. 32).
2005?: 2,140,000 daily passengers (Low, Gleeson, Green, et al. 2005, p. 203).
2007: 2,260,000 million weekday trips (Lindau et al. 2010a, p. 20).</td></tr>
<tr><td>6: What is the transit mode split</td><td>Lindau et al. (2010a, p. 17) note that there is no reliable source for mode split data in Curitiba, as there have not been any origin-destination surveys of households. Mees (2010, p. 118) similarly notes the lack of reliable data, and that the Brazilian census does not have a question about mode use for the journey to work. Regardless, the following figures are reported in the literature:
Journey to work:
70% transit mode split (Longini 2001; Levinson, Zimmerman, et al. 2003b; Goodman et al. 2005), or
75% transit mode split (Rabinovitch & Leitmann 1993, p. 18; Worcam 1993; Rabinovitch & Hoehn 1995, p. x; Major 1997; Cervero 1998, p. 267; Smith & Hensher 1998, p. 143; Nieri 2000, p. 173; Wright 2001, p. 124). However, sources are unclear, and these figures match the mode share reported for 1965 (Mees 2010, p. 118), suggesting that the 1965 value may have just continued to be used.
All trips: 45% of motorized trips (Cervero & Dai 2014, p. 130) or of all trips (Fox 2008; Martinez et al. 2016).</td></tr>
<tr><td>7: Auto mode split</td><td>There is a lack of reliable mode split data. The research literature suggests that while automobile ownership is very high in Curitiba by Brazilian standards, actual automobile use is quite low.</td></tr>
<tr><td>8: What is the car ownership rate?</td><td>1994: 267 cars per 1,000 inhabitants (Cervero 1998; Nieri 2000; Ardila-Gomez 2004).
1 car for every 3 people (333 per 1,000 inhabitants) (Worcam 1993).
1 car for every 2.6 people (385 per 1,000 inhabitants) (Hawken et al. 1999, p. 295).
Almost 400 cars per 1,000 inhabitants (Lindau et al. 2010a, p. 17).
2015: 1.33 per inhabitant (1,330 per 1,000 inhabitants) (Martinez et al. 2016).</td></tr>
<tr><td>9: What is the road network like in the city?</td><td>One of the first cities in the world to pedestrianize downtown streets in 1972 (Dera 1995, pp. 9-10; Cervero 1998, p. 265; Kroll 1999; Schwartz 2004, p. 14; Irazábal 2005).
A road network based around a “trinary” system, with five structural axes consisting of a central street with a busway as well as two one-way traffic lanes for direct access to buildings, flanked by one-way streets (citybound and outbound) a block away on either side that provide for general traffic flow and direct (limited-stops) bus services[439].
A hierarchical system of roads with the five “structural axes” having connecting to “priority links”, as well as “collector streets” with commercial activity, and “connector streets” linking the ‘structural axes’ to the ‘industrial city’ area (Rabinovitch 1992, p. 65)[439].
Hunt (1994, pp. 67, 76) notes that “[b]eyond the city center and transit axes, Curitiba unravels in a tangle of semi-paved roads that twist around short hills – rich mixed up with poor, the rich on the hillsides and the poor down below in the ravines” and the favelas, which are shantytown slums that governments have been able extend some services to, but “simply grow of their own accord” and are “endemic to Brazilian cities”.</td></tr>
<tr><td>10: What is the transit network like in the city?</td><td>High capacity busways, orbital cross-town routes and feeder lines that connect to interchange stations.
‘Speedy’ bus services that run along the one-way road and use high capacity multi-articulated vehicles to service ‘boarding tubes’ that provide level-boarding access and off-board fare payment.
The system is operated by 10 private companies who are now paid based on the number of service kilometres provided. A municipal agency, the Urban Development Agency of Curitiba (URBS) plans and manages the system, which is known as the Integrated Transit Network (RIT).
Various authors provide route lengths, stop numbers and other statistics for the system. These are too numerous to list and have varied as the system has developed. One recent listing states that there are 72km of busways, 362 tube stations and 30 interchange stations (Ndebele et al. 2017, p. 2665).</td></tr>
</table>

Sources: as indicated

[439] The volume of research literature on Curitiba’s BRT-based transit system and ‘trinary’ road system is very large. A selection has been reviewed in the preparation of this case study, including: Rabinovitch (1992); Rabinovitch and Leitmann (1993); Worcam (1993); Garcia and Yamamoto (1994); Dera (1995); Rabinovitch and Hoehn (1995); Lloyd-Jones (1996); Rabinovitch and Leitman (1996); Rabinovitch (1997); Cervero (1998, pp. 267, 75-85); Smith and Hensher (1998); Hawken et al. (1999); Kroll (1999); Ceneviva (2000); Kruckemeyer (2000); Nieri (2000); Nash (2001); Wright (2001); Levinson, Zimmerman, et al. (2003b, 2003a); Pulichino (2003); Ardila-Gomez (2004); Schwartz (2004); (2005); Low, Gleeson, Green, et al. (2005); Pulichino and Coughlin (2005); Gray et al. (2006); McKibben (2007); Moore (2007); Fox (2008); Lindau et al. (2010b, 2010a); Mees (2010); Duarte et al. (2011); Charner (2014); Martinez et al. (2016); Rosário (2016); Ndebele et al. (2017).

Both cities have similar three level governance structures, with **significant autonomy at the local level**. However, Zürich has direct public voting (*citizen control*) on major spending and citizen submitted initiatives, while the public there has had much less input into transit priority implementation and city governance in Curitiba. Even after democracy was restored public participation was mostly about choosing a preferred technocratic manager rather than actual involvement in decision-making.

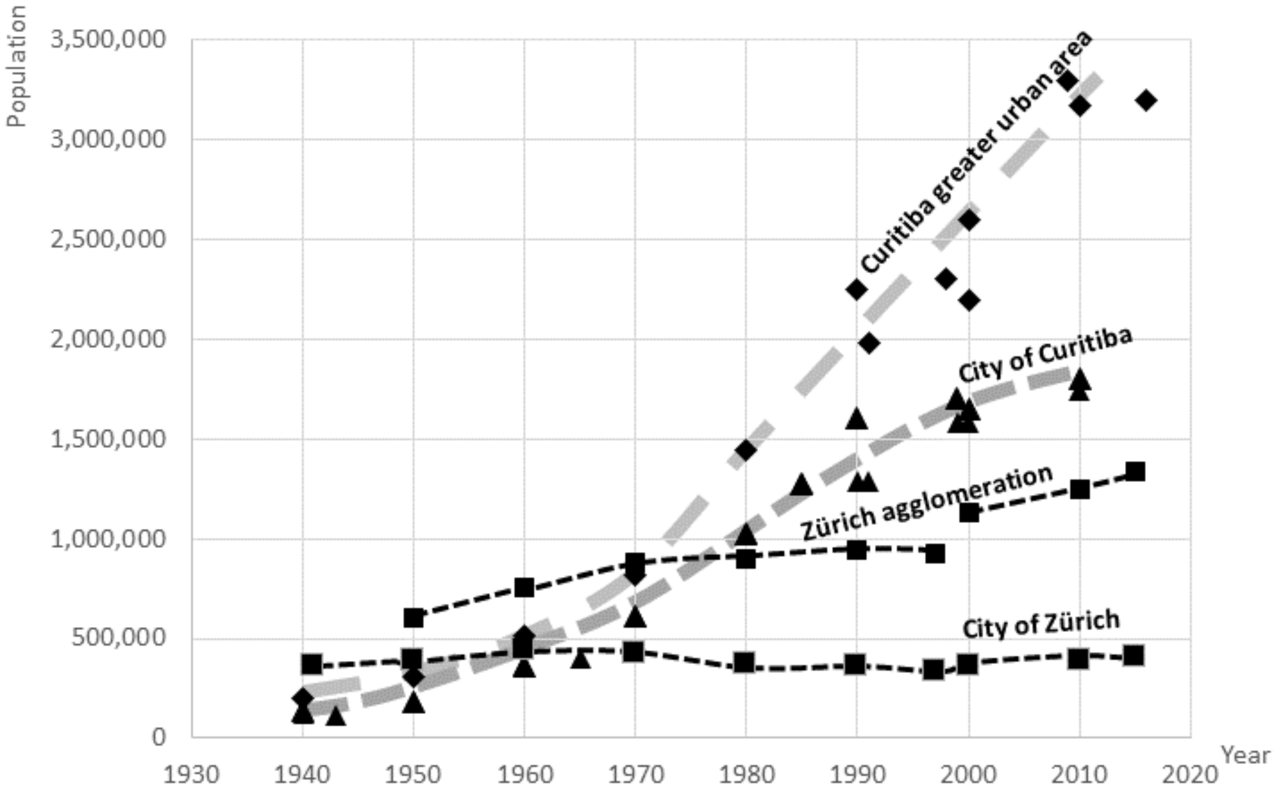

Figure D.1 Population: City of Zürich, Zürich agglomeration, City of Curitiba, Curitiba greater urban area (trendlines indicative)

Both cities have **grown in overall population** during the 20th and 21st centuries, but the **growth rate has been much greater in Curitiba than Zürich**. In 1960 Curitiba's greater metropolitan area had only two thirds of the population as Zürich's greater metropolitan area, but it is now almost two and a half times larger. While population growth has occurred in both the municipality and surrounding urban area in Curitiba, in Zürich it has mostly been in the surrounding municipalities.

This is likely due to the City of Curitiba being a little over **four times larger in land area** than the City of Zürich. Suburban growth in Zürich falls outside the inner-City municipal boundary, whereas at least some of it falls within the boundary of the City of Curitiba. The population in the City of Zürich itself dropped between 1960 and 2000 and has only recently increased back above 400,000. The City of Curitiba, in contrast, has been steadily increasing from 360,000 in 1960 to 1.8 million in 2010.

Population densities are roughly similar. However, the urban form of Curitiba is based around high density corridors radiating from the centre of the city. The City of Zürich, in contrast, does not appear to have any areas of particularly high densities.

Both cities have **similar high transit mode shares**, in the range of 75% for the journey to work and 40-45% for all trips. In 1970, prior to the implementation of the transit priority program, the journey to work transit mode was 51% for City of Zürich residents, which is lower than it is currently, but still would have been **a compelling reason to prioritise transit**. It is unclear whether Curitiba was quite as *transit-centric* as Zürich was prior to implementation, but the challenges of **increasing traffic congestion** provided a compelling reason to prioritise transit in both cities.

Car ownership rates are broadly similar in the two cities, but the **road networks are very different.** Curitiba provides some higher capacity road links along its structural axes. In contrast, Zürich, provides little capacity for traffic within the City's boundaries. There are extensive pedestrianised areas in both cities, in Zürich for historical reasons, but in Curitiba as a result of implementation in the 1970s that was the first step in transforming the city.

The **transit systems are also dissimilar**. Zürich has a mix of modes and a regional train system, while Curitiba's transit network is bus-based. Transfers, however, are a key part of both networks: Curitiba uses 'terminal' interchange stations to facilitate transfers. Zürich facilitates transfers with high service frequencies or the use of a pulse timetable. This common focus on facilitating transfers in the two cities may be in part due to their similar transit planning, management and operation structures. Both cities have a central transit agency that directly undertakes strategic and tactical planning, but manages multiple service providers at the operational level[440].

In summary, the **main differences** between the two cities are:

- the power of the Mayor of Curitiba, in part due to the backing of the military dictatorship in the 1960s, 70s and 80s;
- the general lack of direct public involvement in decision-making in Curitiba compared to the direct *citizen control* of major decisions in Zürich;
- the larger population growth in the City of Curitiba compared to the City of Zürich's decreasing population through the second half of the 20th century;
- the larger geographical size of the City of Curitiba compared to the City of Zürich;
- the higher capacity road network in Curitiba; and
- the larger range of transit modes in Zürich.

The main similarities between the cities are:

[440] See extensive discussion of transit agency structure in Mees (2010).

- the locally autonomous governance structures;
- the large population growth in the suburban areas surrounding the central municipality;
- the high transit mode splits[441]; and
- the car ownership rates.

The similarities in local autonomy, population growth in suburbs and high transit mode splits suggest that in both cities it was the **influx of more traffic from outside the municipality** that may had helped build support within the central municipality for prioritising transit over road traffic. The City of Zürich and the City of Curitiba **were responsible to the central city residents, <u>not suburban drivers</u>.** Transit priority would have been politically palatable because many of the central city residents were already using surface transit, which was being negatively impacted by traffic congestion caused in part by suburban drivers.

If decision-making about transit priority implementation had been within the power of a non-local jurisdiction, for example a larger regional council or at the state / canton level, the successes that have been delivered in these two cities might not have happened. The *Citizens' Transit Priority Initiative* in Zürich passed by only a little over 50%, a number that is suspiciously similar to the transit mode split in the City of Zürich at the time. It is difficult to imagine that there would have been the same result if suburban drivers had also been able to cast a ballot.

Likewise, in Curitiba it may be that the Lerner group's efforts to move the city away from the *Agache Plan* and implement pedestrian malls downtown, *busways* and other transit priority measures might have had a different reception if the entire Greater Curitiba urban area was the geographical level at which decisions were made, rather than the smaller central City of Curitiba. Despite the power provided by the military regime to Lerner during his first term as mayor, the City Council of Curitiba remained an elected body responsible to the citizens of the City, not the larger urban area. The support of economic and intellectual elites for the Wilhelm plan (later the *Plano Diretor*) might also have been in part due to a focus on the inner City, rather than including the larger suburban areas in a more regional planning process.

In general, local governance, external population growth and high transit mode splits appear to have been supportive factors for transit priority implementation in Zürich and Curitiba. However, they are just two cities, and caution is required before seeking to extrapolate from broad statistical data when there is only a small sample. Instead the focus of this study is on detailed examination of individual implementations and their *legitimacy*, which are discussed in the following.

[441] Zürich and Curitiba have journey to work transit mode splits in the order of 75%. These are very high compared to Melbourne, which has a journey to work transit mode split of just 12% (Greater Melbourne region)(Australian Bureau of Statistics 2017).

D.3 Transit priority implementation context

Table D.7 compares the contexts of implementations in Zürich and Curitiba.

Table D.7 Summary of transit priority implementations (case study sub-units) in Zürich and Curitiba: implementation context

Question	Citizens' Transit Priority Initiative	*Rua das Flores* pedestrian mall	Structural axes & busways	Direct bus services and boarding tubes
12: What was the transit priority implementation?	*Parking bans*, *turn restrictions*, *transit malls*, *bus lanes*, *exclusive tram ROW*, *traffic calming* & transit-oriented development policies	Initially a 100 metre stretch of road was converted to a pedestrian mall. Later extended to much of the downtown area.	Five structural axes, each with a trinary road system that includes a *busway*.	Platform stops, off-board fare payment, new limited stops bus services and the implementation of bi-articulated buses.
13: What were the events?	Underground transit plan was rejected by voters. The city had begun implementing some transit priority measures, but a group of transportation professionals and students developed an Initiative for a more extensive program, which was approved at a public ballot. After some initial reluctance, a long running program began and continues to the present day. Later initiatives provided more funding.	The idea of a pedestrian mall was first suggested during the development of the *Plano Diretor* in 1965. Lerner argued for it when appointed mayor in 1971. He oversaw its design and planning in secret, and implemented it suddenly over a weekend. Protests ensued, but the mall turned out to be a success and was later extended.	A planning process resulted in the *Plano Diretor*, which called for a linear city form. The plan was implemented in the 1970s, and extended to include three more axes. BRT was selected over rail or a new 'Transit Expressway' technology. Crosstown services were added later.	The boarding tube idea was originally developed by Lerner in 1984 for another city. He became mayor in 1989 and the boarding tube was then incorporated into the idea of adding *direct bus services* to increase capacity in response to passenger demand. The tubes and direct services were introduced progressively across the network together with the introduction of bi-articulated buses, replacing an LRT proposal.
14: How did the ROW or level of priority change?	Significant transit priority increases. The tram system now operates in dedicated lanes (ROW C.4) or better.	A general traffic environment became a pedestrian mall.	ROW C.11 (*mixed traffic*) became ROW B.3 (a *busway* with non-mountable separation).	Limited-stops bus services were added in one-way *mixed traffic* (ROW C.11). *Pre-boarding fare payment* and level access boarding were introduced network wide.
15: Was the implementation process successful?	Yes. There was initial reluctance, but a successful, long running program ensued.	Yes. Initial opposition was overcome by astute political manoeuvring and support when outcomes proved successful.	Yes	Yes
16: …successful outcomes?	Yes	Yes	Yes	Yes
17: How did it compare to other implementations in the city?	Not assessable. Only one sub-unit of implementation considered in Zürich.	This was a sudden implementation prepared in secret, unlike other implementations in Curitiba.	Similar incremental approach to that taken for the pedestrian mall.	Like the other Curitiba implementations this idea was later incrementally introduced across the network.
18: How did the process and outcomes compare to other cities?	Much more public involvement in overall decision-making than in Curitiba. Similar incremental approaches to Curitiba.	Unlike in Zürich, there was no public involvement or consent. Instead this was a surprise implementation.	Unlike Zürich, there was no public vote on the plan. The implementations involved a similar incremental approach as Zürich.	

Source: Author's assessment

The *Citizens' Transit Priority Initiative*, Curitiba's structural axes and *busways*, and Curitiba's *direct bus services and boarding tubes* have **all been at the city-wide scale**, rather at the individual site or corridor level. Even the *Rua das Flores* pedestrian mall eventually stretched to 49 blocks, although it started with only a 100-metre long implementation.

All four implementations have been, or led to, **long term incremental programs**, rather than being one-off changes. This might suggest that transit priority implementation can be **successful** when it is part of an ongoing *disjointed incremental* program driven by a larger scale vision. The events in Zürich and for the Curitiba structural axes have some similarities, in that in each there was a **period of uncertainty and strategic decision-making prior to the implementation**. In Zürich there were two unsuccessful ballots on underground transit options, then a period of four years between the submission of the Citizens' Initiative and its placement on the ballot, and then further time until the city's governmental authorities fully embraced the plan. For Curitiba the abandonment of the *Agache Plan* and the development and adoption of the *Plano Diretor* took around four years, and then there was a further delay of four years until Lerner became mayor and commenced the implementation.

In contrast, the events surrounding the implementation of the *Rua das Flores* pedestrian mall, and the *direct bus services and* boarding tubes appear to have been less drawn out and complicated. The Lerner group simply **used their existing powers to go and make changes**. The way the pedestrian mall implementation was prepared in secret and implemented over a weekend when the law courts were shut, necessitating some post-implementation negotiation and/or *therapy*. In contrast, the boarding tubes appear to have been unopposed, although the research literature reviewed in this study is silent on this, so some caution is required as to whether the public were supportive of the boarding tubes, either at the city-wide scale or more locally at individual stops. Zürich and the Curitiba pedestrian mall had significant impacts on existing traffic and there were **large changes to the ROW conditions**. In contrast, the structural axes and the direct bus / boarding tubes appear to have **avoided impacts on cars**, by providing additional road and transit capacity, respectively, on the one-way streets. Notably, the *direct bus services and boarding tubes*, introduced a **<u>new</u> service into a *mixed traffic* environment** (C.11) that would have had **minimal impacts on other motorists** other than around the **infrequent stops**, which also led to **high speed transit for passengers**.

The general pattern, however, has been one of high levels of public involvement in the strategic level decision-making in Zürich, but low levels of public involvement in Curitiba. What involvement there was for the public and the elites in Curitiba was at the initial strategic level during the seminar series, but once the strategic level goals and vision of the *Plano Diretor* was set, it appears that the technocrats and the IPPUC were given a relatively free hand to implement changes without much public involvement, consultation or approval at the tactical level. Similarly, the *Citizens' Transit Priority Initiative* involved the public primarily at the strategic, city-wide level. This is perhaps not surprising given the governance systems in the two cities, but suggests that transit priority implementation **can be successful when the public is <u>not</u> involved** at all, **or when they are involved at a strategic level** (city wide vision or goal setting) to provide *legitimacy* for change, as explored further in the following section.

D.4 Transit priority implementation legitimacy

Table D.8, Table D.9 and Table D.10 compare the legitimacy of the implementations

Table D.8 Summary of transit priority implementations (case study sub-units) in Zürich and Curitiba: *legitimacy*

Question	Citizens' Transit Priority Initiative	*Rua das Flores* pedestrian mall	Structural axes and busways	Direct bus services & boarding tubes
19: How was *normative legitimacy* relevant to the implementation?	Elected representatives and government officials had some power, but overall direction and major decision-making was controlled by public ballot. The public's rejection of underground transit plans and passing of the 1977 Initiative provided the *normative legitimacy* and funding to support the overall transit priority program, and shift priority to transit over other road uses.	Lerner had implementation power as the appointed and militarily-backed mayor. The City Council and law courts may have had some power to block the project, but this was outflanked by the project being implemented quickly over a weekend, and then became moot once the project proved to be a success.	The various mayors had power to review the city plan, create APPUC (later IPPUC), and give it planning and implementation powers, therefore allowing technocratic planners to "make decisions with relative autonomy" (Irazábal 2005). The City Council, state government funding through CODEPAR, and the governor's power to appoint mayors were also sources of *normative legitimacy*.	As head of URBS, Ceneviva had significant *normative legitimacy* though his direct control of the bus system. Having received the support of Mayor Lerner for the *direct bus services* (plus the suggestion to use his *boarding tube* idea) it was a relatively simple matter to start implementing the tubes and begin negotiations with the bus operators to obtain the required new bus types and operate the service.
20: How was *sociological legitimacy* relevant to the implementation?	The 1962 *Tiefbahn* and 1973 *U-Bahn / S-Bahn* plans both rested on the idea that transit should be sped up, but that the roads should remain available for traffic. In contrast, the 1977 *Citizens' Transit Priority Initiative* and subsequent events suggest that the prevailing view shifted so that it was the existing surface transit services that should be the most *legitimate* users of the road, and that private vehicles should have lower importance. Over time *sociological legitimacy* was built through implementation, from an initial trial on route 10, to the path that the city should take, to the path that the city must continue to take[442].	The initial media campaign and praise from IAU architects were efforts to build *sociological* ***legitimacy*** **before implementation**. The attitude of "if they had a chance to actually see it, everyone would love it" (McKibben 2007, p. 65), involved building ***legitimacy*** **through implementation**. The promise of a six-month trial provided time for *sociological legitimacy* to develop through successful business outcomes The art festival countering a motorist protest juxtaposed the *sociological legitimacy* of traffic versus people.	Increasing traffic congestion and opposition to road expansion supported the idea that the *Agache Plan* should be reviewed. The seminar series demonstrated that the Wilhelm plan had the backing of the city's elites and should be adopted. The initial *busway* provided *sociological legitimacy* for other *busways* and abandonment of other modes[442]. The contract renewal with incumbent operators reflected the *sociological legitimacy* of the selective area system.	The success of the initial implementation of the *boarding tubes* provided the *sociological legitimacy* for further implementation[442]. However, boarding tubes along the north and south axes were delayed until futurist Alvin Toffler said that the BRT should be fully adopted that the LRT plan lost the last of its legitimacy.
21: How was *public consent* relevant to the transit priority implementation?	Rejection by voters meant that underground transit plans had no *legitimacy* due to a lack of *public consent*. The passing of the 1977 Initiative provided *legitimacy by public consent* for transit prioritisation. Public involvement was therefore at the very top of Arnstein's ladder: *citizen control*.	*Public consent* appears to have had little relevance to the pedestrian mall Public involvement appears to have been at the level of *manipulation* or *therapy*.	*Public consent* appears to have had little relevance. There were some seminar sessions that involved members of the public, but most session involved mostly the elites. Public involvement appears to have been no higher than *informing* or *consulting*.	*Public consent* appears to have had little to do with the implementation, other than through the public's election of Lerner and then Greca to the position of mayor.

Source: Author's assessment

[442] Note again, connections between *incremental* implementation and *path dependency.*

Table D.9 Summary of transit priority implementations (case study sub-units) in Zürich and Curitiba: *legitimacy*

<table>
<tr><th>Question</th><th>Citizens' Transit Priority Initiative</th><th>Rua das Flores pedestrian mall</th><th>Structural axes and busways</th><th>Direct bus services and Boarding tubes</th></tr>
<tr><td>22: How was reasonableness relevant to the implementation?</td><td>The reasonableness of transit priority implementation in Zürich was supported by the high mode shares for the existing surface transit system, and the large cost and potential longer trip times for city residents if the Tiefbahn or U-Bahn / S-Bahn options had been selected (Nash 2001, pp. 44-5, 57). Given that voters had not approved moving transit underground in the first two ballots, prioritising surface transit was the only reasonable alternative (Joos 1994, p. 3). The involvement of professionals and students in the development of the Citizens' Transit Priority Initiative may also suggest it was developed as a reasonable and low-cost alternative prepared by technically minded people. The reasonableness of transit priority had also been established through trials and technical evaluation on route 10.</td><td>Reasonableness is evident in the way that the initial implementation was for only a short section of pedestrian mall (100m) that could easily be removed if it was not liked by the people (Schwartz 2004, p. 48). This implementation appears have had a disjointed incrementalism approach, being based on gradual small changes in accordance with a vision of pedestrianizing the downtown. Similarly, the offer of a six-month trial to appease disgruntled shopkeepers is an appeal to reasonableness to legitimise the initial implementation. It is an apparent compromise to promise to remove the mall if, after it had been given a chance, it was still disliked.</td><td>Reasonableness appears to have provided much of the legitimacy for:
abandoning the Agache Plan, due to the impacts of traffic and road building on the city if the plan continued;
the Plano Diretor itself, which has reasonable and flexible guidelines;
the bus mode choice, which is cheap and proven;
the trinary road system, which used existing roads instead of property acquisition to provide sufficient cross-section; and
changes to bus designs and operations agreed to in the negotiations with the bus companies, which was a middle ground between the status quo and city take-over of bus operations.</td><td>Reasonableness appears to have supported the implementation of the direct bus services and boarding tubes. This option was less expensive than the LRT alternative, an incremental improvement to the bus network, and a pragmatic solution to the problem of needing to increase capacity of the system.</td></tr>
<tr><td>23: How was legitimacy as unconditional duty relevant to the implementation?</td><td rowspan="2">A shift appears to have occurred in Zürich from transit priority implementation having conditional normative legitimacy thru to virtually unconditional legitimacy. In the 1950s and 60s the importance of prioritising transit had been recognised, but this was conditional on minimising traffic impacts. The passing of the 1977 Citizens' Transit Priority Initiative, later advocacy, incremental implementation and environmental regulations led to the 'Waiting Time Zero' policy, which suggests priority for transit was almost unconditional on traffic impacts by the 1980s and 90s.</td><td>Given the military dictatorship, it appears likely that there was an unconditional duty to obey those in charge, which supported the initial implementation.</td><td rowspan="2">Unconditional legitimacy may have had some relevance to the 'selective' areas principle, at least initially in the development of the busway and RIT network. However, the manner in which the inter-district services and free transfers were introduced, and the other changes to bus operations were made suggests that the normative principle of the 'selective' areas was at least somewhat conditional on offers during negotiations.
Continuing development of the BRT appears to have been due in part to path dependence and an unconditional duty to continue the direction set in the Plano Diretor.
The trinary road system appears to have met various conditions in that it provided traffic access and capacity, did not require buildings to be demolished for road widening, as well as providing for the busway. In this way it may have provided transit priority, but avoided denial of access or capacity for traffic.</td><td>The direct bus / bus boarding tube implementation reinforced Curitiba's narrative as an innovative and sustainable city, which was perhaps an unconditional duty. Likewise, the implementation continued the path of the Plano Diretor and fit with the city's rising reputation as "the cradle of BRT". There may have been an unconditional duty to try the bus tubes as they were originally Lerner's idea.</td></tr>
<tr><td>24: How was conditional normative legitimacy relevant to the implementation?</td><td>The state governor's support may have been conditional on how the initial 100m experiment turned out. Support for the concept of a street being for traffic appears to have been conditional on business outcomes, and whether it was full of children. When the mall proved good for business the normative idea that the street was for traffic lost support.</td><td>The direct bus services and boarding tubes were in line with the normative goal of improving the transit network, in accordance with the direction of the Plano Diretor. However, they also met the condition of maintaining the general status quo with respect to the bus companies and operations. In contrast the proposed LRT might not have involved bus operators, and would have required significant operating subsidy.</td></tr>
</table>

Source: Author's assessment

Table D.10 Summary of transit priority implementations (case study sub-units) in Zürich and Curitiba: *legitimacy*

Question	Citizens' Transit Priority Initiative	*Rua das Flores* pedestrian mall	Structural axes and busways	Direct bus services and boarding tubes
25: How was *legitimacy through trust* relevant to the implementation?	*Trust* appears to have played little part in legitimising transit priority in Zürich. In fact, the opposite may be the case as the public voted for the 1977 *Citizens' Transit Priority Initiative* despite the city government recommending against it.	Braga and the state governor clearly *trusted* Lerner sufficiently to appoint him as mayor and not immediately fire him when opposition to the mall occurred. Getting the IAU architects to state their support for the idea suggests an effort to use *trust* through their reputations as experts to build legitimacy.	There appears to have been gradually building of *trust* in local technical analysts in the Lerner group from them initially getting support from the head of the URBS to replace the *Agache Plan*, their inclusion in the Wilhelm team, and later into significant *trust* in the IPPUC and the Lerner's group leadership.	Lerner's election as mayor for his third term with 49% of the vote in a five-way contest suggests significant *trust* in his approach and leadership. This may well have given the implementation further legitimacy, particularly given that the boarding tubes were originally Lerner's idea.
26: How did public involvement and legitimacy related to this implementation compare to other transit priority implementations in this city?	Not assessable. Only one sub-unit of implementation considered in Zürich.	Minimal public involvement. Some ***legitimacy* built before the implementation**, but most **built through implementation** by the *reasonableness* of the results.	There was some limited public involvement, mostly of elites, in the development of the *Plano Diretor*. This plan, past success on the pedestrian mall, and the *reasonableness* of the trinity road system plan built ***legitimacy before the implementation***. *Sociological legitimacy* was further **built through implementation** by using an incremental approach to extend the plan to five structural axes after the successful initial implementation on the north-south axis.	Unlike the other two implementations in Curitiba, this one at least had nominal foundations on public consent through the directly public election of Lerner as mayor. However, the *sociological legitimacy* for the implementation itself was primarily based on *reasonableness* and *trust*, and supported by the adoption of an *incremental* approach.
27: How did public involvement and legitimacy related to this implementation compare to other transit priority implementations in other cities?	Unlike Curitiba the public were directly involved in the decision-making. The result of the first two ballots demonstrated a lack of *public consent* for the underground plans, and so transit priority implementation was the only *reasonable* alternative. The result of the ballot provided *public consent* and *normative* legitimacy for transit priority implementation, which led in later years to *sociological legitimacy* and an *unconditional duty* for the idea that transit should have zero waiting time.	Unlike Zürich, there was no public involvement or *consent*.	Unlike Zürich, there little public involvement and no clear demonstration of *public consent*. There are similarities to Zürich in the way that the high costs and impacts of other options (e.g. metro or LRT, freeway building / the *Agache Plan*) led to on-street transit priority due to its *reasonableness*. However, in Curitiba this has been more to do with the power given to technocrats by the dictatorship and them subsequently building *trust* through performance. In contrast, in Zürich there appears to have been less *trust* in the directions initially set by technical specialists.	With the return of democracy, this implementation in Curitiba has some similarities to Zürich as the election of Lerner as mayor provided some consent for the subsequent implementation through *delegated power*. This implementation is perhaps also like those in Zürich in that it was a *reasonable* continuation of the incremental approach to transit priority implementation.

Source: Author's assessment
Source: Chapters 7 and 8

All of the implementations had clear ***normative legitimacy***. In Zürich power rested with the people, and their wishes were directly demonstrated through passing the legally binding *Citizens' Transit Priority Initiative*. In Curitiba, *normative legitimacy* was provided initially by the mayor's appointment by the state governor and through the military dictatorship. While the legal courts and elected City Council appear to have also had some relevant powers, these do not appear to have significantly influenced the outcomes. *Normative legitimacy* also supported the implementation of the *direct bus services and boarding tubes*, although in that instance through the election of Lerner as mayor and Ceneviva's role as head of URBS.

However, ***normative legitimacy* was <u>not enough</u> for transit priority to be implemented**. In Zürich it was necessary for those involved in the *Citizens' Transit Priority Initiative* to **advocate for its implementation, even <u>after the initiative passed</u>** and became a *normatively legitimate* law. Likewise, in Curitiba the *Plano Diretor* was passed in law by the City Council, but it was not until Lerner became mayor that implementation progressed beyond planning.

The **building of *sociological legitimacy*** was an important precursor to the widespread implementation of transit priority in both Zürich and Curitiba. In Zürich this was supported by the earlier rejection of the underground transit plans, the development of the *Citizens' Transit Priority Initiative*, which **built legitimacy <u>before</u> implementation**. The **trial** of transit priority on route 10, and the ***incremental*** approach taken in response to the ballot initiative both **built legitimacy <u>through</u> implementation**, until there is now an *unconditional duty* to prioritise transit under the *Waiting Time Zero* policies.

In Curitiba legitimacy was **built <u>before</u> implementation** through the rejection of the *Agache Plan*, and the development of the Wilhelm plan, the *Plano Diretor* and the *Preliminary Mass Transit Plan*. Lerner's group then **built legitimacy <u>through</u> implementation**, first through the **pop-up / trial** pedestrian mall, then through the incremental implementation of the *busways* where the initial north-south *busway* may have to an extent provided a **trial** of the concepts before it was extended to other parts of the city. *Sociological legitimacy* was also built by **<u>avoiding impacts</u> on other road users** through the trinary road system, which provided **<u>both</u> a *busway* <u>and traffic capacity</u>**[443], and then implementation of the *direct bus services* in a *mixed traffic* environment, rather than taking capacity from other road users to increase transit capacity.

Notably, in both cities the *sociological legitimacy* was in part been built by **groups initially <u>outside</u> official governance structures**. In Zürich, a group of professionals and students developed the *Citizens' Transit Priority Initiative*, although with support from the Social Democrats. The Lerner group started outside of the government in Curitiba, but then went on to become part of the Wilhelm team, develop the *Plano Diretor*, hold the position of mayor, and set up their own

[443] Thereby meeting any *conditionality* of having to avoid or limit impacts on traffic, or to provide traffic capacity and access as a condition for acceptance of (the *normative* scheme for) transit priority.

institutional powerbase in the form of IPPUC. Likewise, it was the praise of the outsider Alvin Toffler that gave the boarding tubes just a bit more *sociological legitimacy* to result in the abandonment of the LRT plan.

Public consent at the strategic level appears to have been relevant in both cities. The ballot results provided *legitimacy* for the entire implementation program in Zürich. In Curitiba the consent of elites was relevant to the adoption of the Wilhelm plan and the *Plano Diretor* (even during the military dictatorship). Later, the public's election of Lerner and then Greca to the position of mayor provided consent for their decision-making through *delegated power*. In both examples the people have consented to the overall **goals or visions**, which have then been delivered through a process of *disjointed incrementalism*.

Legitimacy through reasonableness appears to have been a factor supporting all four implementations, which all involved ***disjointed incrementalism*** in accordance with *sociologically legitimate* overall goals and visions of: increasing transit priority in Zürich; and the *Plano Diretor* guidelines and increasing transit capacity in Curitiba. The *reasonableness* of prioritising transit in Zürich was supported by the high transit mode shares, rejection of all other alternatives due to costs and impacts, and initial trials and technical evaluation on tram route 10. In Curitiba the *reasonableness* of the pedestrian mall and structural axes / *busways* was established through the technical planning processes and seminar series that developed and selected the Wilhelm plan, further developed it into the *Plano Diretor*, and the IPPUC planning seminars and technical work that produced the *Preliminary Mass Transit Plan*. By only implementing a short section of the pedestrian mall, offering a trial as a compromise when there was initial opposition, Lerner was also using an appeal to *reasonableness* to legitimise the initial implementation. When it proved to be a success it was then *reasonably* and *incrementally* extended to other streets. Similarly, *incremental* implementation helped to establish the *reasonableness* of the *direct bus services and boarding tubes* as these were gradually extended to the entire network.

Legitimacy as unconditional duty and through *conditional normative legitimacy* have been relevant to each of the implementations. In Zürich support for the *normative* principle of improving transit was initially ***conditional* on traffic impacts**[444], but gradually *legitimacy* increased[445] until eventually this *conditional* aspect not impacting traffic appears to have mostly been dropped and replaced by the *unconditional* Waiting Time Zero policies. Similar *conditionality* with respect to retaining traffic capacity and access appears to have been resolved in Curitiba through the *trinary road system*, which meant the roads did not have to widened or property acquired to simultaneously provide a busway and for other road traffic. Support for the *Plano Diretor* likewise appears to have had a shift

[444] as demonstrated by the initial streetcar undergrounding and *U-Bahn / S-Bahn proposals*, and the initial opposition to transit priority from city engineers working towards "a less ambitious priority system that would not inconvenience motorists" (Mees 2010, p. 131).

[445] the *Citizens' Transit Priority Initiative* obtained *public consent*; various directives increased *normative* and *sociological legitimacy*; the amount of priority increased as implementation progressed, building *trust* in the overall direction and *reasonableness* in continuing along the same path; and internal *legitimacy* increased "as older employees have retired and younger staffs have taken leadership roles" (Nash 2001, pp. 65-7).

from *conditional normative legitimacy* to *unconditional legitimacy*[446]. *Conditional* support also appears to have been relevant in Curitiba with respect to the established bus companies and their existing 'selective' areas. This was particularly relevant to the decision to abandon the LRT plans in favour of the extension of the *direct bus services and boarding tubes* to the north and south axes. This path improved transit capacity, but also met the desirable *condition* of maintaining the bus and bus operators as the *status quo* in Curitiba.

Legitimacy through trust does not appear to have been relevant in Zürich, whereas it appears to have supported all three implementations in Curitiba. In Zürich the public voted for the *Citizens' Transit Priority Initiative*, despite the city government opposing it, suggesting a lack of *trust* in the officials at the city[447]. In contrast, there appears to have been significant levels of *trust* in the technocrats in the Lerner group from the military dictatorship and, when asked after the restoration of democracy, the public.

In summary, the common factor in all of these successful implementations is the **building of *sociological legitimacy***. This is invariably supported by existing legal authority, but ***normative legitimacy was <u>not</u> enough*** on its own for successful implementation to occur. Rather, various amounts of *legitimacy* from *public consent*, *reasonableness, unconditional duty,* and *trust* have helped implementers in Zürich and Curitiba build support for the idea that transit priority **should** be implemented.

Sometimes this has involved building ***legitimacy*** **<u>before</u> implementation**, such as through technical analysis, public approval, or acceptance of strategic level visions / goals. Other times this has involved **avoiding impacts** on private automobiles, such as was the initial direction taken by the City of Zürich engineers and a key advantage of the trinary road system and later *direct bus services*. More aggressive approaches are evident in the building of ***legitimacy*** **<u>through</u> implementation** taken by Mayor Lerner to *pop-up* a pedestrian mall in an early form of reverse *tactical urbanism*. However, all four implementations suggest the use of ***disjointed incremental*** approaches to implement priority over time by working towards ***accepted*** **strategic level visions** and gradually building support for more and more implementation.

[446] Support for the Wilhelm plan was at first *conditional* on gaining support from elites in the seminar series. Later on, continuing the direction set by the *Plano Diretor* was practically *unconditional*, due to the institutional power of the *IPPUC*, the success of the early implementations, and the need to continue Curitiba's reputation as 'the cradle of BRT' and a model city for sustainability.

[447] Perhaps in part due to previous failures to win the support of the public for the *Tiefbahn* and *U-Bahn / S-Bahn proposals* in 1962 and 1973. For 15 years officials have been trying to move forward with moving transit underground to clear streets for traffic[448]. However, the public apparently desired less traffic in the city and improved street level traffic. Given this mismatch in desired strategic directions, it is perhaps not surprising that there may have been little *trust* in the bureaucracy in Zürich

[448] Remarkably similar, yet the opposite way around, to the mismatch in Toronto between: the bureaucracy's support of the at-grade, transit prioritising, Transit City proposal; and the suburban and political opposition to this 'war on the car' in favour of moving transit underground so that streets would be more available for traffic.

D.5 Summary and discussion

City context has been relevant in both Zürich and Curitiba due to:

- population growth in suburban areas, generally outside of the city boundary, which led to increasing traffic congestion within the city boundary;
- their governance structures, which allow significant local autonomy over planning and transport and how the City of Zürich and the City of Curitiba were **responsible to the central city residents, not suburban drivers**[449]; and
- the high transit mode shares, which provided a strong reason for prioritising on-road transit over other vehicles as over half of the journeys to work by residents were already on transit;

In terms of **context**, the transit priority implementations have:

- been at the city-wide and **strategic** scale;
- sometimes been preceded by a period of uncertainty and strategic decision-making, which may have opened a *policy window*[450] that helped to build legitimacy **before** implementation; and/or
- been part of or led to long term incremental programs.

In terms of **legitimacy**, the transit priority implementations have:

- had clear *normative legitimacy*, being implemented through the appropriate legal and governance channels, but **had more than just *normative legitimacy* alone**;
- involved the building of sociological legitimacy, both **before** and **through** implementation and sometimes by **avoiding impacts** on other road users, and by groups initially outside the official governance structures[451]

[449] The mayor of Curitiba had significant power during the military dictatorship, and most of what power did not rest in the mayor's office was with the local City Council. While the state governor had the power to directly appoint the mayor during the dictatorship, it appears that state governors remained fairly hands-off in local matters. Likewise, in Zürich the governance structure is such that the local people resident in the City voted on the 1977 Citizens' Initiative, but not suburban drivers. It seems unlikely that many of the citizens of the City of Zürich would have been overly concerned about the impacts of transit priority on commuters coming into the city centre from the surrounding Greater Zürich urban area. Rather, the transit priority implementation in central Zürich would make it easier for Zürich residents (and voters) to get around, at the expense of suburban (and non-voting) car-driving commuters.

[450] A policy window is a short period in time when there is an opportunity to put an issue on the agenda either at the start of a new administration, as part of regular events (e.g. annual budget processes) or due to current events providing sociological legitimacy for change. See Pulichino (2003, p. 36); Knill and Tosun (2011) and others.

[451] In Zürich the Citizens' Transit Priority Initiative was prepared by a group of professionals and students with support from the Social Democrats. In Curitiba it was the Lerner group that formed in the 1960s around shared concerns about the direction of the Agache Plan, that then went on to become part of the Wilhelm team, develop the Plano Diretor, hold the position of mayor multiple times, and set up IPPUC as an institutional power base. Even in the final transit priority implementation considered in this chapter, the direct bus services and boarding tubes it was someone outside of the government, futurist Alvin Toffler, who helped to deliver the final push towards the citywide adoption of the boarding tubes and the abandonment of the unreasonably expensive LRT proposal.

Pulichino (2003, p. 93) puts Zürich in the outside initiative model, but Curitiba in the mobilization model, suggesting that in Curitiba it was the policy leadership of Lerner that mobilised action for transit priority implementation. The argument made here, in contrast, is that the mobilisation by Lerner was pre-dated by the outside initiative of the Lerner groups' involvement in city planning back when they lobbied for the abandonment of the Agache Plan, when they were still outside of governmental institutions.

- had *public consent*, or at least the consent of elites, at the strategic level for overall visions;
- had *legitimacy through reasonableness*, which has been supported by the adoption of a *disjointed incremental* approach;
- involved a **shift from being *conditional*** on the traffic impacts **to virtually *unconditional*** *legitimacy* for continuing the implementation of transit priority; and
- have sometimes, but not always, involved *legitimacy through trust* in technical experts.

Table D.11 directly compares the overall transit priority implementation approaches in Zürich and Curitiba, responding to case study questions 28 and 29.

Table D.11 Comparing transit priority implementation in Zürich and Curitiba: case study questions 28 and 29

Question	Zürich	Curitiba
28: In general, how is transit priority implemented in this city?	With the support and legitimacy provided through a direct public vote in 1977 in favour of prioritising transit, and a *disjointed incrementalism* approach.	Through a technocratic process with foundations on the military dictatorship, with minimal public involvement, and with a *disjointed incrementalism* approach.
29: … compared to the other cities in this study?	More public involvement in the setting of the overall policy direction (*citizen control)* than in Curitiba. A similar *disjointed incremental* approach as in Curitiba.	Less public involvement in the setting of the overall policy direction (*token consultation* down to *therapy* and *manipulation*) A similar *disjointed incremental* approach as in Zürich.

Source: Author's assessment

Overall, transit priority implementation in Zürich and Curitiba has been successful in both cities; and used *disjointed incrementalism* approaches. The approval of broad directions by public vote in Zürich and through a seminar series in Curitiba, set and provided *legitimacy* for the overall vision of increasing priority for transit in each city. The *incremental* approach to delivering priority measures appears to have done much to limit the rate of change from the status quo to a *reasonable* and politically acceptable level, and allowed successes to be built cumulatively to support further and more aggressive implementation as *legitimacy* gradually shifted away from being as *conditional* on limiting traffic impacts to being virtually *unconditional*.

Some conclusions from these two case studies as to how to successfully implement transit priority might be:

• start with already high rates of on-street transit usage and a locally autonomous governance structure with boundaries that include the predominately inner-city areas where traffic congestion is becoming a problem, but exclude the suburban areas that might be the source of much of the traffic;	*Legitimacy through reasonableness* and *normative legitimacy* building *sociological legitimacy.*
• form a technically able group outside of the established institutional structures that is willing to assess the existing city plans objectively, and that will also come up with an alternative plan involving transit priority implementation that is visionary, but relatively silent on specific targets, objectives or proposed projects;	*Legitimacy through reasonableness* and building *sociological legitimacy*.
• win a public vote on the new plan, or successfully defend your plan in a series of seminars;	*Public consent, normative* and *sociological legitimacy*
• being given large amounts of power by an authoritarian central government certainly helps, but is not mandatory;	*Normative legitimacy.*
• implement the plan incrementally	*Reasonableness* leading to an *unconditional duty* and *path dependency*.

Even in these two *transit-centric cities* it does not appear that transit priority implementation was initially *accepted*[452]*.* Instead there has been a progressive shift as the ideal of prioritising transit has moved from:

- being *debated*;
- to *conditional* on minimising or avoiding impacts on private automobiles;
- to *proper* (after *technical evaluation*, seminars, alternate plans, public votes etc.); and finally
- to having (almost) *unconditional legitimacy* through the *Waiting Time Zero* policy in Zürich and the narrative of Curitiba as the "cradle of BRT" and a sustainable city.

This *sociological legitimacy* for transit priority implementation has come from different sources, but in both cases started with transit priority implementation being a *reasonable* course of action due

[452] See Chapter 3, Section 3.5 discussion about *accepted* being "taken for granted", *proper* where "judgements (are) reached in a more deliberative fashion, as in evaluations of propriety", and *debated* is where there is "active disagreement" (Deephouse et al. 2017, p. 33)

to high rates of transit usage. Both had a governance structure that allowed local decision-making, and then used *legitimacy through public consent* or *normative legitimacy* to support the commencement of transit priority implementation. Finally, the implementations were done using a *reasonable* and *disjointed incremental* approach, such that over time the idea of continuing to increase priority for on-road transit services gradually shifted towards almost an *unconditional duty*.

Perhaps this is a difficulty with transit priority implementation that is skated over in the existing research literature. Researchers become **interested in a place only once it has <u>already established itself</u>** as a somewhere with **a successful record** of implementation. Hence, by the time a place such as Zürich and Curitiba becomes prominent for its high levels of transit priority it already has almost *unconditional legitimacy* for transit priority implementation.

Researchers might miss the preceding process of building *sociological legitimacy* for transit priority through *reasonableness*, the development of *public consent* and/or the consolidation of *normative legitimacy*. When attempting to take lessons back to other cities and contexts, researchers and practitioners might miss the need to build *sociological legitimacy* for transit priority **before** or **through** implementation and, at least initially, **avoiding impacts on cars**.

This misconception appears most openly in the first of Ernst Joos' (Deputy Director at the Zürich Transport Authority) *three messages from Zürich concerning the new transport policy*, discussed briefly in Chapter 2.

> *"if you ask the inhabitants of a town which transport policy should be followed, the citizens will not choose the car…" (Joos 1994).*

In this message, Joos appears to have overlooked the favourable circumstances in Zürich for the popularity of non-car travel, given that the journey-to-way **transit mode share was already 49%** in Zürich in 1970 for residents of the city working in the city (Nash 2001, p. 44). By the time of Joos' 1994 message **<u>all of the transit priority</u> envisaged in the *Citizens' Transit Priority Initiative* <u>had already been implemented</u>**, and the passing of **a second ballot initiative** in 1991 likely meant **transit priority had virtually <u>*unconditional legitimacy*</u>** as part of the move towards the ***Waiting Time Zero* policy**. For practitioners working in the context of Melbourne or other car-dominated cities where most voters drive and there is little *sociological legitimacy* for the idea of prioritising transit, this message would likely not have been either believable or helpful.

Appendix E. Selecting approaches and strategies

A challenge for implementers in *car-centric cities* seeking to apply the findings of this research will be to select the approaches and *pragmatic strategies* that best suit their situation and planned transit priority implementations. Something that succeeds in one city or for one implementation might not necessarily work for another given the importance of local context to the legitimacy of transit priority. Therefore, there are limits to what generalisations can be drawn from the cases as to how to select approaches and strategies. Local implementers are likely best placed to select and adapt the *pragmatic strategies* described above to the specific circumstances of their own local context. However, this section discusses how the various *pragmatic strategies* have been combined together in the implementations examined in this study. It also explores which *pragmatic strategies* might be possible for implementing each type of transit priority measure.

E.1 Combining approaches and strategies

Table E.1 summarises the combinations of successful implementations and *pragmatic strategies* that have been discussed above.

Table E.1 Summary of implementations and *pragmatic strategies*

City	Implementation	Priority measures	A1: Technical enquiry	A2: Transport planning	A3: Public processes and/or hearings	B1: Grade-separation	B2: Building new capacity	B3: : Subservient priority	C1: Bottom-up and incremental	C2: Pop-ups	C3: Trials
Melbourne	Clarendon Street Tram Priority Pilot	~~Far side stops~~, hook turns, separation kerb, turn bans	✓	✓	✓		✓[453]	✓			✓
	Stud Road Bus Lanes	Bus lanes		✓			✓				
	Eastern Freeway	Shoulder bus lanes						✓			
	SmartBus network	Queue jump lanes, bus lanes, TSP		✓			✓				
Toronto	Eglinton Crosstown	Grade-separated LRT	✓	✓	✓	✓					
	King Street Pilot	Far side stops, traffic bans	✓	✓	✓			✓			✓
Zürich	Citizens' Transit Priority Initiative	Parking prohibitions, turn restrictions, transit malls, transit lanes, longitudinally-separated ROW, active TSP	✓	✓	✓	✓		✓	✓		✓
Curitiba	*Rua des Flores*	Pedestrian mall		✓						✓	
	Busways	Busways	✓	✓	✓		✓		✓		
	Boarding tubes	Platform stops						✓	✓		
Boston	Pop-up bus lanes	Bus lanes						✓	✓	✓	
New York	14th St busway	Bus lanes, TSP, traffic bans									✓
San Francisco	West Portal delay reduction	Stop relocations, shared transit lane, turning bans						✓			✓

Source: Author's synthesis of Chapter 10

[453] *Building new capacity* is identified as having been used in the *Clarendon Street tram priority pilot* with respect to the addition of extra on-street parking in side streets. There was no building of extra road capacity for the *Clarendon Street tram priority pilot*.

Table E.1 shows how most of the implementations have involved **multiple** ***pragmatic strategies*** being used to support and legitimise the installation of transit priority measures. For example, in Melbourne the *Clarendon Street Tram Priority Pilot* involved:

- *A1: technical enquiry* in the Smith (2005) report supported the long-term retention of the *hook turns*, *separation kerb* and *turn bans*;
- *A2*: *transport planning* in developing *Melbourne 2030* and *Think Tram*, which supported the implementation of the pilot scheme;
- *A3*: *public processes* in the City of Port Phillip Strategy and Policy committee's *hearings*,
- *B2*: *building new capacity* in the form of new on-street parking spaces in site streets,
- *B3*: *subservient priority* was the long-term outcome, as the measures retained after the trial (*hook turns*, *separation kerb* and *turn bans*) had minimal impact on general traffic; and
- the pilot scheme was a *C3: trial*.

This demonstrates that various *pragmatic strategies* can overlap and be used together[454]. However, there are a couple of *pragmatic strategies* that may have to be interrelated, and a few that might

[454] For completeness, the reasoning behind the assessments shown in Table E.1 is as follows:

- In Melbourne the Eastern Freeway shoulder *bus lanes* involved: *B2: building new capacity* as the shoulder lanes were previously un-used by traffic, and *B3: subservient priority* as there were minimal impacts on other traffic by allowing buses to use the shoulders. The *SmartBus* network involved: *A2: a transport planning* approach to develop a network concept of cross-town routes as part of the Principal Public Transport Network (PPTN)(Public Transport Victoria 2010; Ramsay 2010), and *B2: building new capacity* in the form of clearways, full-time or part-time *bus lanes*, often through adding a new lane (Goh et al. 2013, p. 42),
- In Toronto the *Eglinton Crosstown LRT* involved *A1: technical enquiry* as part of the environmental assessment process, *A2: transport planning* as being part of *Transit City*, *A3: public processes* as having been debated and resolved through the City of Toronto council meetings; and *B1: grade-separation* through being underground for much of its route. The *King Street Transit Pilot* included *A1: technical enquiry* to support the development of the pilot plan and to assess the impacts on traffic and transit during the pilot period, *A2: transport planning* through the downtown visioning study (Keesmaat 2016), *A3: public processes* through the City of Toronto council meetings that approved the pilot and the retention of the measures after the end of the pilot, *B3*: *subservient priority* to an extent in that King Street remains open for general traffic for access to adjoining properties for loading, pick-up and drop-off activity and accommodating this existing activity was a key part of the planning, and taxis were given a late night exemption to the movement restrictions (City of Toronto 2017, 2019b) and it was a 12-month *C3: trial*.
- In Zürich the transit priority implementation related to *Citizens' Transit Priority Initiative* involved *A1: technical enquiry* during the route 10 study, *A2: transport planning* through the development of the Initiative itself, *A3: public processes* through the ballot on the initiative *B1: grade-separation* on the current *Rosengatenstrasse* project, an initially *B3: subservient* approach taken by city engineers until the development and adoption of the *Waiting Time Zero* policy; a *C1: bottom-up and incremental* approach in that the priority improvements have been introduced progressively over time through individual projects, and the original proposal was developed by transportation planners and students outside of the central government authorities; and an initial *C3: trial* on route 10.
- In Curitiba the *Rua des Flores* pedestrian mall came out of the *A2: transportation planning* process that developed the *Plano Diretor* and the implementation itself was a *C2: pop-up*. For the b*usways*: selection of the bus-based solution was based on *A1: technical enquiry* and came out of the *Plano Diretor A2: transport planning* process, which also included a *A3:public process* through the seminar series to decide between competing plans, while the building of the structural axes involved *B2: building new capacity*, with addition of the south-east, east and west axes as well as gradual improvements to the overall bus network through a *C1: bottom-up and incremental approach* to network development. For the *boarding tubes* the introduction of the new *direct bus services* and specialised stops suggests a *B3: subservient* approach as there were minimal impacts to other traffic, while the idea for the boarding tubes was developed from the *C1: bottom-up* when Lerner was working in Rio de Janeiro, and the boarding tubes were *incrementally implemented* across the entire network.
- In Boston the City of Everett *bus lanes* were *B3: subservient* because they did not significantly impact on other traffic and were removed each morning before shops opened so there were minimal impacts to parking, were implemented from the *C1: bottom-up* by a traffic engineer and mayor at a local city, and involved a *C2: pop-up*.
- In New York the *14th Street Busway* has some elements of being *subservient* as access to adjacent properties, for pick-up and drop-off, and for loading is still maintained through allowing private vehicles to travel on 14th street for one-to-two blocks (however, it probably has too much impact to other traffic to be completely *B3: subservient*), while the implementation is a *C3: 18-month trial*; and
- In San Francisco the West Portal delay reduction are somewhat *B3: subservient* in that access is maintained, and there are only a few *turn bans* that negatively impact on generally traffic, while the implementation is a *C3: 6-month trial*.

be incompatible with each other. For example, *Pragmatic Strategy B1: grade-separation* appears likely to require significant *A1: technical enquiry,* but may be incompatible with a *C2: pop-up* or *C3: trial*. However, most of the various *pragmatic strategies* appear to be able to be used together in combination to help to build legitimacy before and through implementation, or to reduce legitimacy challenges by avoiding impacts on cars.

E.2 Strategies for different types of priority

The cases and examples shown in Table E.1 provide some evidence for which *pragmatic strategies* might work for which types of transit priority measures, as shown in Table E.2.

Table E.2 Summary of *pragmatic strategies* used for different transit priority measures: evidence from the cases and examples

Transit priority measure	Implementations or examples	A1: Technical enquiry	A2: Transport planning	A3: Public processes and/or hearings	B1: Grade-separation	B2: Building new capacity	B3: Subservient priority	C1: Bottom-up and incremental	C2: Pop-ups	C3: Trials
Transit signal priority (TSP)										
Active Transit Signal Priority	*SmartBus*, Melbourne *Citizens' Initiative*, Zürich, 14^{th} St busway, New York	✓	✓	✓		✓	✓	✓		✓
ROW A Fully-separated										
Grade-separation	Eglinton Crosstown, Toronto	✓	✓	✓	✓					
ROW B longitudinally-separated										
Busways, longitudinally-separated LRT	Busways, Curitiba *Citizens' Initiative*, Zürich	✓	✓	✓		✓		✓		✓
Transit malls	*Citizens' Initiative*, Zürich	✓	✓	✓				✓		✓
ROW C mixed traffic										
Elimination of parking	*Citizens' Initiative*, Zürich	✓	✓	✓				✓		✓
Queue jump lanes	*SmartBus*, Melbourne		✓			✓				
Transit / Tram / Bus lanes	*SmartBus*, Melbourne Pop-up bus lanes, Boston 14^{th} St busway, New York *Citizens' Initiative*, Zürich	✓	✓	✓		✓		✓	✓	✓
Shoulder bus lanes	Eastern Freeway, Melbourne						✓			
Turn and movement restrictions										
Hook turns	*Clarendon St*, Melbourne	✓	✓	✓			✓			✓
Elimination of right turns[455]	*Clarendon St*, Melbourne West Portal, San Francisco	✓	✓	✓			✓			✓
Elimination of through traffic	King Street Pilot, Toronto 14^{th} St busway, New York	✓	✓	✓			✓			✓
Stop treatments and relocation										
Far side stops	King Street Pilot, Toronto	✓	✓	✓			✓			✓
Platform stops	*Boarding tubes*, Curitiba						✓	✓		

Source: Author's synthesis, based on Table E.1

Table E.2 shows that there is generally good coverage for most of the *pragmatic strategies* across a wide range of different types of transit priority measures. However, this synthesis is based on only the cases examined in this research and the selected additional examples that have been discussed

[455] Or elimination of left turns in right hand drive jurisdictions.

in this chapter. Unfortunately, this provides only a small sample of priority measure types that have been successfully implemented by using one or more of the *pragmatic strategies*. Chapter 2 identified the types of time and space priority measures that have been described in the research literature, which is a much larger list than that shown in Table E.2. The following sections, therefore, explore which *pragmatic strategies* might be practical for implementing the many different types of transit priority measures.

E.2.1 Time priority measures

Table E.3 shows an assessment of the relevance of each of the *pragmatic strategies* to the implementation of time priority measures.

Table E.3 Relevance of *pragmatic strategies* to implementing time priority measures

Transit priority measure	A1: Technical enquiry	A2: Transport planning	A3: Public processes and/or hearings	B1: Grade-separation	B2: Building new capacity	B3: Subservient priority	C1: Bottom-up and incremental	C2: Pop-ups	C3: Trials
Transit signal priority (TSP)									
Passive signal priority									
Adjustment to signal timing to favour transit / Green priority weighting	✓✓	✓	✓	N/A	✓	✓	✓	✓	✓
Signal linking and green waves	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Pre-signals / signal islands	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Short cycle times	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Signals installed to facilitate transit	✓✓	✓	✓✓	N/A	✓	✓	✓	✓	✓
Time of day phasing variation	✓✓	✓	✓	N/A	✓	✓	✓	✓	✓
Traffic metering or gating	✓✓	✓	✓	N/A	✓	✓	✓	✓	✓
Transit-only phase and signals	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Turning phase design	✓✓	✓	✓	N/A	✓	✓	✓	✓	✓
Active signal priority									
Activated signs	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Bus priority using AVL	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Bus sluice	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Flexible window stretching	✓	✓	✓	N/A	✓	✓	✓	✓	
Full override (i.e. full pre-emption, railway x-ing)	✓	✓	✓	N/A	✓	×	×	✓	✓
Green early start (red truncation)	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Green extension	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Pedestrian crossing activation	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Phase suppression, reordering or rotation	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Phase re-service	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Priority phase sequences	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Recovery after priority service	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Separate on-call transit phases, phase insertion	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Traffic signal shadowing	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Turning traffic clearance phases	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Real-time adaptive signal priority									
Conditional priority	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Depending on traffic conditions	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Schedule or headway adherence	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Other (i.e. passenger delay, load)	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Differential priority	✓	✓	✓	N/A	✓	✓	✓	✓	✓
General priority at unsignalised intersections	✓	✓	✓	N/A	N/A	×	✓	✓	✓
Yield-to-bus-laws	✓	✓	✓✓	N/A	N/A	×	×	×	✓

Source: Author's assessment, based on Table E.1 and Table 2.2 (from Chapter 2)

1. ✓ indicates where a strategy may likely help to legitimise a measure in a *car-centric city*, ✓✓ indicates where it is likely required.
2. × indicates that a particular strategy is unlikely to be possible, and N/A indicates where it has no relevance.

Table E.3 suggests that, in general, adopting the *pragmatic strategies* of *A1: technical enquiry*, *A2: transport planning*, or *A3: public process and/or hearings* are likely possible ways to increase the legitimacy of implementation for most time-based transit priority measures. The one exception is for *yield-to-bus-laws* as if a jurisdiction does not already have such regulations as part of its traffic law it is likely that the only way to introduce *yield-to-bus-laws* is to go through a public process. However, it may be possible to introduce *yield-to-bus-laws* through a *C3: trial* to help to build legitimacy for changing the laws on a permanent basis.

B1: grade-separation is not applicable to time priority measures, but the remaining *pragmatic strategies* (*B2, B3, C1, C2* & C3) appear to, in general, be applicable for most types of time priority measures. However, the implementation of a *full override* style of *active TSP*, where on-road transit is provided with *railway level crossing* levels of priority at an intersection, appears to be neither *subservient* nor likely to be possible to implement using a *bottom-up or incremental* strategy given the likely magnitude of such a conversion. Similarly, giving on-road transit *general priority at unsignalised intersections* appears to be unlikely to be compatible with a *B3. subservient priority pragmatic strategy*. However, if implemented from the *bottom-up* and *incrementally* (i.e. *Pragmatic Strategy C1*) gradually changing *priority at unsignalised intersections* to favour bus routes at individual intersections, on a one-by-one basis across an entire network, might go relatively unnoticed.

E.2.2 Space priority measures in ROWs A and B

Table E.4 shows an assessment of the relevance of each of the *pragmatic strategies* to the implementation of space priority measures in ROWs A and B.

Table E.4 Relevance of *pragmatic strategies* to implementing space priority measures in ROW and B.

Transit priority measure	A1: Technical enquiry	A2: Transport planning	A3: Public processes and/or hearings	B1: Grade-separation	B2: Building new capacity	B3: Subservient priority	C1: Bottom-up and incremental	C2: Pop-ups	C3: Trials
ROW A fully-separated									
ROW A.1 grade-separated	✓✓	✓	✓✓	✓✓	✓	×	×	×	×
ROW A.2 at-grade crossings with full priority	✓✓	✓	✓✓	N/A	✓	×	×	×	×
ROW B longitudinally-separated									
Pedestrian crossings[456]	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Public transport gates / Bus-only links	✓	✓	✓	N/A	✓	×	×	✓	✓
Separation measures (kerbs, fencing etc.)	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Side running transit	✓	✓	✓	N/A	✓	×	×	✓	✓
Transit in the median	✓	✓	✓	N/A	✓	×	×	✓	✓
Transit malls	✓✓	✓	✓✓	N/A	✓	×	×	✓	✓

Source: Author's assessment, based on Table E.1 and Table 2.7 (from Chapter 2)

1. ✓ indicates where a strategy may likely help to legitimise a measure in a *car-centric city*, ✓✓ indicates where it is likely required.
2. × indicates that a particular strategy is unlikely to be possible, and N/A indicates where it has no relevance.

Table E.4 shows that *Pragmatic Strategies A1, A2, A3* and *B2*[457] are broadly applicable to all space priority measures in ROWs A and B. *Pragmatic Strategy B*3: *subservient priority* is unlikely to be a

456 Pedestrian crossing treatments include automatic gates, bedstead barriers, swing gates, Z-fencing.

457 *Pragmatic Strategy B1. Grade-separation* is, of course, only applicable to creating a ROW A.1 operating environment.

practical way of creating ROW A or ROW B operating environments, which is more likely to be successful if it involves *B2: building new capacity* in the form of new rights-of-way or road widening. However, the introduction of *pedestrian gates* or upgrading an existing longitudinally-separated ROW to have better *separation measures* (such as *kerbing and/or fencing*) may be forms of *B3: subservient priority* that can better isolate an existing ROW B transit facility, and therefore allow greater speeds or reliability, without having any impacts on other traffic.

Pragmatic Strategy C1: bottom-up and incremental appears to be impractical for implementing ROW A facilities. It may, however, have some relevance to transit priority measures that seek to improve conditions for transit operating in ROW B environments. For example, *automatic gates*, *bedstead barriers*, *swing gates* or *Z-fencing* might be progressively introduced along a ROW B transit line, thereby reducing conflict between pedestrians and transit vehicles at *pedestrian crossings* and allowing higher operating speeds or improve reliability. Likewise, the implementation of *separation measures*, such as *non-mountable kerbing* or *fencing*, might be something that can be achieved through the bottom-up actions of project managers, transit operators and designers as incremental improvements on a site-by-site basis or as part of other programs[458].

Pragmatic Strategies C2: pop-ups and *C3: trials* appear likely to be broadly applicable to all types of space priority measures in ROW B. However, it appears unlikely that pop-ups or a trial could be used for creating a ROW A environment, as fully-separated and grade-separated transit facilities imply a certain permanence that likely cannot be undone if a pop-up or trial proves unsuccessful.

E.2.3 Space priority measures in ROW C

Table E.5 (see next page) shows an assessment of the relevance of each of the *pragmatic strategies* to the implementation of space priority measures in ROW C.

Again, *Pragmatic Strategies A1, A2, A3, B2, C2 and C3*[459] appear to be broadly applicable to all space priority measures in ROW C. However, *Pragmatic Strategy B3: subservient priority* appears to be only possible for *speed hump modification*, *bus use of shoulders*, and a few other space priority measures that have very limited impact on other traffic.

[458] As per the examples from the Melbourne tram network that were discussed in Section 10.5.1 and reported in Reynolds et al. (2018).

[459] *Pragmatic Strategy B1. Grade-separation* is, of course, only applicable to creating a ROW A.1 operating environment.

Table E.5 Relevance of *pragmatic strategies* to implementing space priority measures in ROW C

Transit priority measure	A1: Technical enquiry	A2: Transport planning	A3: Public processes and/or hearings	B1: Grade-separation	B2: Building new capacity	B3: Subservient priority	C1: Bottom-up and incremental	C2: Pop-ups	C3: Trials
ROW C mixed traffic									
Bypass lanes	✓	✓	✓	N/A	✓	×	×	✓	✓
Elimination or restriction of parking	✓	✓	✓	N/A	✓	×	✓	✓	✓
Pedestrian malls (shared with transit)	✓✓	✓	✓✓	N/A	✓	×	×	✓	✓
Preferential freeway entry	✓	✓	✓	N/A	✓	×	✓	✓	✓
Queue jump lanes (intersections)	✓	✓	✓	N/A	✓	×	✓	✓	✓
Road closures (side streets and driveways)	✓✓	✓	✓✓	N/A	✓	×	✓	✓	✓
Speed hump modification	✓	✓	✓	N/A	✓	✓	✓	N/A	N/A
Transit / Tram / Bus lanes	✓	✓	✓	N/A	✓	×	×	✓	✓
Bi-directional transit lanes	✓	✓	✓	N/A	✓	×	×	✓	✓
Bus use of road shoulders	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Centre running or median lanes	✓	✓	✓	N/A	✓	×	×	✓	✓
Coloured pavement treatment	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Contraflow lanes	✓	✓	✓	N/A	✓	×	×	✓	✓
High Occupant and Toll (HOT) lanes	✓	✓	✓	N/A	✓	✓	×	✓	✓
High Occupant Vehicle (HOV) lanes	✓	✓	✓	N/A	✓	✓	×	✓	✓
Interior bus lanes	✓	✓	✓	N/A	✓	×	×	✓	✓
Intermittent or Flexible lanes / Dynamic fairway	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Lanes separated using mountable kerbs	✓	✓	✓	N/A	✓	×	×	✓	✓
Linemarked lanes	✓	✓	✓	N/A	✓	×	×	✓	✓
Kerb side transit lanes	✓	✓	✓	N/A	✓	×	×	✓	✓
Part time transit lanes	✓	✓	✓	N/A	✓	✓	×	✓	✓
Part time shared transit lanes	✓	✓	✓	N/A	✓	✓	×	✓	✓
Reversible lanes	✓	✓	✓	N/A	✓	×	×	✓	✓
Transit lanes shared between buses and trams	✓	✓	✓	N/A	✓	×	×	✓	✓
Transit lanes shared with trucks, bikes or taxis	✓	✓	✓	N/A	✓	×	×	✓	✓
Wider lanes	✓	✓	✓	N/A	✓	✓	✓	✓	✓

Source: Author's assessment, based on Table E.1 and Table 2.7 (from Chapter 2)

1. ✓ indicates where a strategy may likely help to legitimise a measure in a *car-centric city*, ✓✓ indicates where it is likely required.
2. × indicates that a particular strategy is unlikely to be possible, and N/A indicates where it has no relevance.

Pragmatic Strategy C1: bottom-up and incremental similarly appears to be limited to what types of space priority measures can actually be implemented *incrementally*. For example, implementing a *bus-only link* in ROW B or a *pedestrian mall (shared with transit)* in ROW C is unlikely to be possible through *bottom-up and incremental* action alone. Both a *bus-only link* and a new *pedestrian mall (shared with transit*) implies either new construction (*Pragmatic Strategy B2*) or a non-incremental change involving closing a road to general traffic. However, many other types of transit priority imply smaller changes that might be progressively implemented across a network primarily through *bottom-up* actions by project managers, planners and engineers. Similarly, the incremental *elimination of parking* along a transit route operating in ROW C might be something that a local traffic engineer could achieve **one space at a time** with limited risk of widespread opposition posing a threat to legitimacy.

Bus use of shoulders and *intermittent or flexible lanes / dynamic fairways* appear to be possible to implement using all of the strategies B2 to C3. These provide a way of creating a transit lane with minimal impacts on other traffic (Martin 2006; Currie & Lai 2008). This contrasts to the challenges that might be faced when implementing other forms of transit lanes that are either non-*subservient* or unlikely to be deliverable on an incremental basis.

E.2.4 Turn and movement restriction and stop-based priority measures

Table E.6 shows the relevance of each of the *pragmatic strategies* to transit priority measures that involve turning and movement restrictions, or transit stops.

Table E.6 Relevance of *pragmatic strategies* to space priority measures: turning and movement restrictions and stop priority

Transit priority measure	A1: Technical enquiry	A2: Transport planning	A3: Public processes and/or hearings	B1: Grade-separation	B2: Building new capacity	B3: Subservient priority	C1: Bottom-up and incremental	C2: Pop-ups	C3: Trials
Turn and movement restrictions									
Hook turns	✓✓	✓	✓✓	N/A	N/A	✓	✓	✓	✓
Transit vehicle exemption from turn restrictions	✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Elimination of cross traffic	✓✓	✓	✓✓	N/A	N/A	×	✓	✓	✓
Elimination of left turns (left hand drive)	✓✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Elimination of right turns	✓✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Elimination of through traffic	✓✓	✓	✓✓	N/A	N/A	×	✓	✓	✓
Stop treatments and relocation									
Boarding islands	✓	✓	✓	N/A	✓	×	✓	✓	✓
Bus bays	✓	✓	✓	N/A	✓	×	✓	✓	✓
Kerb extensions	✓	✓	✓	N/A	✓	×	✓	✓	✓
Far side stops	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Platform stops	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Run-ins and run-outs	✓	✓	✓	N/A	✓	×	✓	✓	✓
Skip-stop operation	✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Stop consolidation	✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Stop lengthening	✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Stop priority	✓	✓	✓	N/A	N/A	×	✓	✓	✓
Stop relocation	✓	✓	✓	N/A	N/A	✓	✓	✓	✓

Source: Author's assessment, based on Table E.1 and Table 2.7 (from Chapter 2)

1. ✓ indicates where a strategy may likely help to legitimise a measure in a *car-centric city*, ✓✓ indicates where it is likely required.
2. × indicates that a particular strategy is unlikely to be possible, and N/A indicates where it has no relevance.

Table E.6 shows that *Pragmatic Strategies A1, A2, A3*, C1, C2 and C3[460] are broadly applicable to all turn and movement restriction or transit stop-based priority measures. *Pragmatic Strategy B3*: *subservient priority* may not be possible if transit is to be prioritised through *elimination of cross traffic* or *elimination of through traffic*. These two types of movement restrictions appear likely to have a significant impact on general traffic. However, it may be possible to *eliminate left* or *right turns* while avoiding significant impacts on other traffic if other *reasonable* routes are available. Similarly, *Pragmatic Strategy B3*: *subservient priority* may not be possible for some types of transit stop treatments and relocations. *Boarding islands*, the conversion of existing road space to create *bus bays* or provide *kerb extensions*, or additional length for *run-ins and run-outs* at bus stops may have significant impacts on other road users. *Stop priority* has previously been identified as source of conflict between traffic and transit (Korve et al. 1996; Currie & Reynolds 2010) and is the opposite of *subservient priority* as general traffic is required to halt while passengers cross to / from the kerb.

[460] *Pragmatic Strategy B1: grade-separation* is, of course, only applicable to creating a ROW A.1 operating environment. *Pragmatic Strategy B2: building new capacity* does not apply to the installation of *turning movement restrictions*, and are only relevant to constructing new *transit stops* or *widening roads* to accommodate *bus bays*, *kerb extensions* or other forms of stop priority.

E.2.5 Other priority measures

Table E.7 shows the relevance of each of the *pragmatic strategies* to other types of transit priority.

Table E.7 Relevance of *pragmatic strategies* to other priority measures

Transit priority measure	A1: Technical enquiry	A2: Transport planning	A3: Public processes and/or hearings	B1: Grade-separation	B2: Building new capacity	B3: Subservient priority	C1: Bottom-up and incremental	C2: Pop-ups	C3: Trials
Education, enforcement and encouragement									
Traffic control enforcement	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Public education campaigns	✓	✓	✓	N/A	✓	✓	✓	✓	✓
Traffic engineering and land use planning									
Junction incursion bans	✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Land use cell connectivity and subdivision permeability	✓	✓	✓	✓	✓	✓	✓	N/A	N/A
Pedestrian accessibility	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pedestrian crossing locations	✓	✓	✓	✓	✓	✓	✓	✓	✓
Road and intersection alignment	✓	✓	✓	✓	✓	✓	✓	N/A	N/A
Road profiles	✓	✓	✓	✓	✓	✓	✓	N/A	N/A
Road pricing	✓	✓	✓✓	N/A	N/A	×	×	×	✓
Traffic calming	✓✓	✓	✓✓	N/A	N/A	×	✓	✓	✓
Transit planning and operations									
Automatic Vehicle Location (AVL)	✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Fare payment changes	✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Transit vehicle changes	✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Route design	✓	✓	✓	N/A	N/A	✓	✓	✓	✓
Private vehicle design									
Automated vehicle control systems (future)	✓	✓	✓	N/A	N/A	×	✓	✓	✓

Source: Author's assessment, based on Table E.1 and Table 2.8 (from Chapter 2)

1. ✓ indicates where a strategy may likely help to legitimise a measure in a *car-centric city*, ✓✓ indicates where it is likely required.
2. × indicates that a particular strategy is unlikely to be possible, and N/A indicates where it has no relevance.

The applicability of each of the *pragmatic strategies* to these other types of transit prioritisation and facilitation measures is not as clearly distinguishable. However, in general it appears that some form of *A1: technical enquiry*, *A2: transport planning* process or *A3: public process and/or hearings* might be used to build the legitimacy of transit prioritisation through all types of other measures. For example, a push to increase the amount of *traffic control enforcement* of *bus lane* restrictions might be legitimised by a *technical enquiry* that identifies that *bus lanes* are regularly being used by other traffic, by enforcement levels set in a *transport plan*, or through a *public process of decision-making* to allow the use of *automated detection equipment*. However, it appears unlikely that *road pricing* could be introduced without a public process to enact the necessary legislation, and this does not appear to be politically possible in many places at the current time (Hensher & Bliemer 2014).

Pragmatic Strategy B1: grade-separation or *B2: building new capacity* may provide novel solutions to problems involving lack of *land use cell connectivity and subdivision permeability*, *pedestrian accessibility* or lack of *pedestrian crossing locations*. These may also provide ways to avoid poor *road and intersection alignments* or steep *road profiles* that are incompatible or challenging for transit operations. However, these would only appear to be an issue in particularly hilly cities or under other special circumstances. Most of the 'other' types of transit priority and facilitation measures shown in Table E.7 are likely to have little impact on other traffic, and so their implementation would likely fit the definition of *Pragmatic Strategy B3: subservient priority*. Implementing *junction incursion bans*, and improving *road and intersection alignments* or *road profiles* may in fact benefit other traffic, as well as transit. However, the implementation of *road pricing* and *traffic calming* for the purposes of transit prioritisation appear to likely to significantly impact on other traffic, and so are not *subservient priority.* Likewise, any potential future *autonomous vehicle control systems* that automatically move private vehicles out of the way of a bus, streetcar or tram as a form of transit priority is not *subservient priority*, and unlikely to be popular with motorists.

Pragmatic Strategies C1, C2 and C3 appear to be generally applicable to most of the ‘other’ types of transit priority and facilitation measures. However, it appears unlikely that *road pricing* could be delivered from the *bottom-up* or as a *pop-up* under the current laws in most jurisdictions.

This section has outlined some of the evidence from the cases and other examples on selecting and combining *pragmatic strategies* for transit priority implementation. Table E.3 to Table E.7 provide an initial assessment of which *pragmatic strategies* might work for which types of priority measures. However, there is little hard evidence as of yet. A challenge for practitioners and future research may be to see how the various *pragmatic strategies* perform in the real world, and whether this is consistent across different contexts and types of priority.

Some real world examples of *tactical transit lane* implementation in North America have recently been reported on in Garcia and Wall (2019) and UCLA Institute of Transportation Studies (2019). These implementations, in general, appear to be adopting a small-scale and quick-build approach, which is reminiscent of the *B3: subservient priority*, *C1: bottom-up and incremental* and *C2: pop-up* strategies. This may help to make these implementations less vulnerable to delegitimation as they tend to be lower cost, have limited impacts on other vehicles, and adopt a more experimental approach that responds to public feedback and concerns after measures have been implemented. In comparison, the *B1: grade-separation* or *C3: trial* strategies imply a larger change from the status quo, and so possibly more risk, while the *A1, A2 and A3 pragmatic strategies* that are based around *building legitimacy before implementation* may risk getting stuck in the pre-implementation phase.

Regardless, there appears to be much that can be done by practitioners to build legitimacy before or through implementation, or to limit the potential for delegitimation by avoiding impacts on other road users. The suggestion of this research, therefore, is that practitioners consider how they might **build legitimacy in the *general public and political policy arenas* for the long-term retention of their transit priority measures as part of their implementation efforts**. Building legitimacy or avoiding delegitimation may be as important, or perhaps even more important, than the technical performance of a transit priority measure or system. Existing research and practice have already addressed the latter. Hopefully the *pragmatic strategies* outlined in Chapter 10 may help practitioners who are seeking to address the former.

List of abbreviations

ACF	Advocacy Coalition Framework
AHP	Analytic Hierarchy Process
APPUC	*Assessoria de Pesquisa e Planejamento Urbano de Curitiba*
AVL	Automatic Vehicle Location
BCR	Benefit Cost Ratio
BHLS	Bus with a High Level of Service
BRT	Bus Rapid Transit
CATS	Chicago Area Transportation Study
CBD	Central Business District
CMA	Census Metropolitan Area (Canada)
DDA	Disability Discrimination Act (1992) (Australia)
EIA	Environmental Impact Assessment
GPS	Global Positioning Satellite
GTA	Greater Toronto Area
GTHA	Greater Toronto and Hamilton Area
HOV	High Occupancy Vehicle
HOT	High Occupant and Toll
IAU	International Architect Union
ICC	International Criminal Court
LATM	Local Area Traffic Management
LRT	Light Rail Transit
NCHRP	National Cooperative Highway Research Program http://www.trb.org/NCHRP/NCHRP.aspx

NIMBY	Not In My BackYard
NOP	Network Operations Planning / Network Operations Plan
PPTN	Principal Public Transport Network (Victoria, Australia)
PTUA	Public Transport Users Association (Victoria, Australia)
RIT	*Rede Integrada de Transporte* (Curitiba)
ROW	Right-Of-Way
TCRP	Transit Cooperative Research Program http://www.trb.org/TCRP/TCRP.aspx
TIA	Transportation / Traffic Impact Assessment
TSP	Transit Signal Priority
TTC	Toronto Transit Commission
UFPR	Federal University of Paraná
UITP	International Association of Public Transport (*Union Internationale des Transport Publics)*
UK	United Kingdom
UN	United Nations
URBS	Urban Development Agency of Curitiba
USA	United States of America
VBZ	Verkersbetreibe Zürich, transit operator in the City of Zürich
VCAT	Victorian Civil and Administrative Tribunal
ZVV	Zürich Verkehresverbund, regional transportation authority for Zürich

Glossary of terms

This thesis uses a number of terms from *public policy analysis* and other fields that are not commonly used in the transportation and engineering fields. Some of these words and phrases have slightly different or broader meaning when used in common parlance. Lack of precision in terms and language is a noted issue in *public policy analysis* and other research fields relevant to this thesis[461].

The following list defines various terms that are used often in this thesis as they are meant to be understood **within this thesis**. This is provided both as an aid to the reader and to provide clarity as to the precise meanings adopted in this thesis. These terms are generally shown in *italics* throughout the thesis. Similarly, other terms that have special meaning, such as bus *lane*, *transit signal priority* (*TSP*) and other names for transit priority measures, are also shown in italics.

bounded rationalism / boundedly rational	See *rationalism, bounded*
conditional normative legitimacy	See *legitimacy, conditional normative*
fully rational / full rationalism	See *rationalism, full*
garbage can model	A *public policy analysis* model that describes how decisions and policy changes emerge from the combination of problems looking for solution*s*, *solutions* looking for problems, and people. These are combined into a metaphorical *garbage can*, from which emerges a decision or new policy. Once the decision and policy-making is over (i.e. the problem is solved) the team disbands, and anything left over in the *garbage can* is 'thrown out'. A key point of the model is that any subsequent decision or policy-making starts afresh with a new team of people and new potential solutions. The evaluation methods, ideas, and experience built during the first decision-making process have already been lost, and so have little to no influence on the outcomes of the second, or any subsequent, decision-making process.
incrementalism	A concept suggesting that policy advances through a series of small changes from the status quo, in which only a narrow range of alternatives are considered. This was introduced by Lindblom (1959), and then later refined by the same author's description of *simple*

461 For example, see the discussion by Pierson (2000, p. 252) of problems relating to a lack of rigour or clarity, and fluctuations between the broad and narrow definitions of *path dependence* in that area of research.

incrementalism, *disjointed incrementalism*, *strategic analysis*, and '*no longer fiddling'* in Lindblom (1979).

incrementalism, simple	Policy change as a series of small changes from the status quo*,* in which only a narrow range of alternatives are considered. In *simple incrementalism* policy change is not directed by any overall long-term goals, vision or objectives. Hence, policy may change only to later change back or move in the opposite direction. See Lindblom (1979)
incrementalism, disjointed	Policy change as a series of small changes from the status quo, but guided by an overall long-term vision or loosely defined goal that sets the direction for each and every step. See Lindblom (1979)
institutionalism	Referring to institutions, or institutional ideas that are taken as unchallengeable. Institutionalism was an early approach to public policy analysis that focused on how organisations set policy and made decisions.
institutionalism, new / institutionalism, organisational	*New institutionalism* and *organisational institutionalism* represent a return to the study of institutional structures in public policy analysis and related fields, after a period in the latter part of the 20th century when researchers focused more on individuals and behavioural aspects of policy analysis.
legitimacy	Defined in the Oxford Dictionary (2018a) as "1 Conformity to the law or to rules....2 Ability to be defended with logic or justification; validity." However, *legitimacy* has a broader meaning in *public policy analysis* as "Politicians and authorities are constantly trying to legitimise their decisions and actions or the structures of political power in general. If successful, legitimacy assures that political rule is more than merely the raw power of coercion or the strategic force of inducement." *(Netelenbos 2016, p. 1)*
legitimacy, normative	Where an institution or individual "has the right to rule" (Buchanan & Keohane 2009, p. 29). In this thesis the term *normative legitimacy* is used to refer to an organisation or individual having the legal authority and power to make a decision, undertake an action, or otherwise having the right to do (or not do) something.

legitimacy, sociological	Where an institution or individual "is widely *believed* to have the right to rule" (Buchanan & Keohane 2009, p. 29). In this thesis the term *sociological legitimacy* is used to refer when there is widespread belief an organisation or individual **should** do (or not do) some action, make some decision, or otherwise act (or not act). While an organisation or individual may have wide ranging *normatively legitimate* powers and authority, these are often constrained by *sociological legitimacy*. For example, in Australia the Governor-General has various and wide-ranging powers under the constitution (i.e. *normative legitimacy*) as the direct representative of the head of state. However, many of these are either taken only on the advice of ministers or are reserve powers that are constrained by convention, common law or historical precedent as to what the Governor-General should or should not do. Some things that are *normatively legitimate* may not be *sociologically legitimate*. For example, laws that restrict the maximum speeds of vehicles on public roads are regularly flouted by drivers, who believe that driving faster than the limit **should** be acceptable, or at least acceptable for them to do in some circumstances.
legitimacy, conditional normative	Where the legitimacy of a normative rule, law, behaviour or similar is conditional on circumstances or a person's perspective. For example, the legitimacy of a (*normative*) law on the maximum speed of a vehicle on a public road may be conditional on circumstances, such as how a driver might obey a roadworks speed limit only when workers are visible at the site.
NIMBY, *NIMBYism*	*Not In My BackYard* (*NIMBY*) is a term used to describe protests against a proposal that are made due to the its proximity to or impacts on the protestor, rather than the content of the proposal itself. A *NIMBY* is someone who may claim to be neutral or in favour of an initiative, but insist that it is implemented somewhere else or applies only to others (Macquarie Dictionary 2017).
normative	"Establishing, relating to, or deriving from a standard or norm, especially of behaviour. 'negative sanctions to enforce normative behaviour'" (Oxford Dictionary 2018b).
normative legitimacy	See *legitimacy, normative*

normative model	A model or framework that states what a process, procedure or policy should be. These are typical used to guide engineering practice, for example see the formal steps and processes used in the preparation of an environmental effects statement (e.g. (VicDELWP 2018)). *Normative models* may be outcomes of research as a statement of a process or how a task should be undertaken or is undertaken under best practices. For examples see the SmartRoads process (Wall 2007), the Analytic Hierarchy Process (AHP)(Vaidya & Kumar 2006) and the conceptual model for the 'state of the art' in on-road public transport priority design (Currie 2016a, p. 492)).
rational	"based on or in accordance with reason or logic" (Oxford Dictionary 2018c) and typically referring to a process that searches for the 'best' solution.
rationalism bounded / rational, boundedly	Similar to other forms of *rationalism*, but without considering all available options. Under this approach to decision-making the minimum necessary requirements would first be determined. Options would then be searched for and immediately compared against the minimum requirements. As soon as an option that meets the minimum requirements is located it is selected, and no further options are considered.
rationalism, full / rationalism, pure / rational, fully /	Decision-making or policy analysis that involves a comprehensive search for the 'best' possible alternative. All possible options are first identified. The options are then compared using some form of evaluation or analysis technique. The option that is the best performing is selected for implementation.
ROW A	*Fully-separated* transit, such as a metro, subway or *grade-separated busway*.
ROW B	*Longitudinally-separated transit* where transit is divided from other traffic with substantial barriers such as fences or non-mountable kerbs, but still has *at-grade crossings* or intersections.
ROW C	Where transit operates in *mixed traffic*.
satisficing	See *rationalism, bounded*
sociological legitimacy	See *legitimacy, sociological*

strategic analysis (incrementalism)	Policy change or decision-making as a series of small changes from the *status quo*, but guided by a defined objective or target that sets the direction for each subsequent step. Policy moves in the direction of the target until it is reached. See Lindblom (1979).
techno-rationalism / techno-rational	*Techno-rationalism* suggests a perspective on decision-making and policy in which it is assumed that the 'best' solution can be found and implemented through the application of sufficient technology and rational thought. It comes from *techno-* ("relating to technology or its use") and *rational* ("based on or in accordance with reason or logic") (Oxford Dictionary 2018c, 2018d).