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Delivering Integrated Transit, Land Development and Finance

A Guide and Manual with Application to

TRACKLESS TRAMS

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SBEnrc Project 1.55 Integrated Cities: Procuring Transit Infrastructure through Integrating Transport, Land Use and Finance

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Preface

The Sustainable Built Environment National Research Centre (SBEnrc), the successor to Australia's Cooperative Research Centre (CRC) for Construction Innovation, is committed to making a leading contribution to innovation across the Australian built environment industry. We are dedicated to working collaboratively with industry and government to develop and apply practical research outcomes that improve industry practice and enhance our nation's competitiveness.

We encourage you to draw on the results of this applied research to deliver tangible outcomes for your operations. By working together, we can transform our industry and communities through enhanced and sustainable business processes, environmental performance and productivity.

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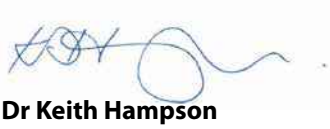

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Further Information

The project video can be viewed at the SBEnrc official YouTube channel:

https://www.youtube.com/watch?v=iqz9GXJuakU&t=4s (10 minute video)
https://www.youtube.com/watch?v=bzJttLpFN1M&feature=youtu.be (short summary video)
https://vimeo.com/290106133 (The Trackless Tram: Fixed or Flexible? Reflections on a Visit to China)
Project webpage: *http://sbenrc.com.au/research-programs/1-55/*

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Executive Summary

Most cities want more and better public transport along with more lively, productive and sustainable centres, especially in the suburbs. Most cities want to integrate this transit and land-use. But how? This report shows how transit-land development integration has been happening around the world using funding and finance as the glue. This is the core idea of our research on how to procure transit in cities in the 21st century, with a focus on Australian cities and within the context of rapidly changing technology especially the Trackless Tram.

Traditional transit planning does the transport engineering first and then adds the land use planning as a supplement after finding government funding; the approach being presented here starts with the land development planning and then does the transport engineering after achieving the funding/ financing from the land development potential (Figure ES1).

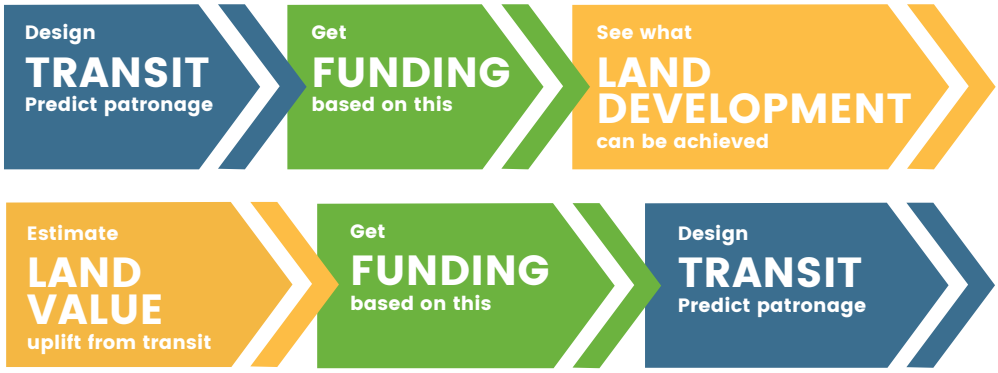

Figure ES1. *Two approaches to transit planning: Top: Conventional, based on transit engineering; and Bottom: Integrated transit, finance and land development, based on land value uplift potential.*

In this report, four different models of integrated transit, finance and land development are identified and described (see Figure ES2 below), using four different proportions of public to private funding to generate the finance needed to build the integrated transit system and its associated Transit Oriented Developments (TODs). Each of the four models has different procurement tools to help generate the private funding:

1. Full Public Sector Capital: the Land-based Levy Model.
2. Some Private and Substantial Public Capital: the Tax Increment Finance Model.
3. Some Public and Substantial Private Capital: the Special Improvement District Model.
4. Full Private Capital: the Entrepreneur Rail Model.

The more private funding can be involved, the more possibilities of transit-land use integration there are. This is because greater value is created by the earlier involvement of private developers who understand urban markets and have the expertise and access to superannuation funds and other private funding sources. By integrating higher value into land development within cities, rather than having further land development on the urban fringe, there are significant public and private benefits that vastly outweigh the costs. Some Benefit Cost Ratio (BCR) calculations have seen a simple light rail project with a BCR of 1.5 increase to around 7 because of the increased land development. This not only saves public money in infrastructure costs (usually 1.5 times as much as redevelopment) but also provides transport time savings for those living in the TODs (based on all transport usage). Thus, it is important to ensure land value increases are integrated into the full transit and land system upgrade process.

Examples from around the world illustrating the four models are outlined below and considered more closely within the report.

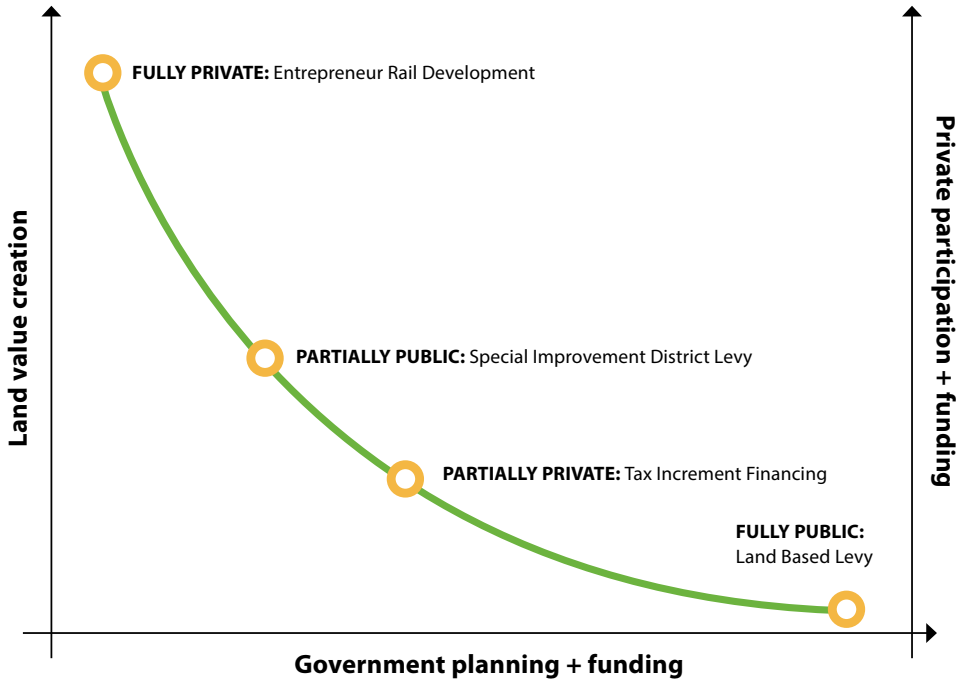

Figure ES2. *The Four Models for integrated transit, finance and land development with their primary procurement tools.*

1. Full Public Sector Capital: the Land-based Levy Model

Most cities in Australia, Latin America, Africa, the Middle East, Asia (apart from Japan and Hong Kong), Europe and North America, have built public transport with full public capital investment for most of the past century and largely continue to do so. However, many cities in these regions are now witnessing a new demand for better transit integrated with TODs and that private funding can help make this happen. Many are trying to add private funding after a rail line or other infrastructure has been funded; for example, by building an additional station or precinct; but the only real mechanism left for bringing in private capital at this stage is a land-based levy, whether it is a business levy, developer levy or parking levy. This can have the effect of driving away developers rather than attracting them, and hence making integrated transit, finance and land development difficult. The Crossrail project in London appears to be working well based around private investment in stations and a business levy. By contrast, the Perth MetroNet project is not likely to be able to attract more than a developer levy, as it is primarily a transport project with some land development added afterwards.

2. Some Private and Substantial Public Capital: the Tax Increment Finance Model

In the US and Canada, a number of rail projects have been partially funded by private money through the mechanism of Tax Increment Financing. This takes the land tax revenue from various levels of government, which increases due to land value uplift from the new railway, and hypothecates it to help pay for the railway, meaning that the money cannot be spent on other uses. There are risks with this mechanism as it involves considerable capability in estimating potential land value increases and the revenue is only collected well after the project is completed.

3. Some Public and Substantial Private Capital: the Special Improvement District Model

In some North American cities, a substantial increase in private funding has been attracted to enable new rail lines based on land development opportunities created in partnership with owners and developers along a corridor. They are partnered in a consortium set up by local governments along the corridor. This procurement mechanism is called a Special Improvement District, or SID, based on the similar idea of tapping private investment in Business Improvement Districts for urban regeneration projects. A SID can involve a consortium seeking bids to develop each station and the surrounding TOD, whilst contributing to the rail cost itself. The new Hyderabad Metro has been built on a similar model. The Tsukuba Express in

Tokyo is another form of partly public railway and was delivered by a specially constituted company, as a result of an identified need by government planning. It is a private company, with local and regional governments owning a substantial share of its equity. This mechanism can involve substantially more land development-based funding and financing than the previous two models.

4. Full Private Capital: the Entrepreneur Rail Model

The Entrepreneur Rail Model (ERM) is historically how tram and train lines were built as real estate developments from the 1840s to the 1940s in Western Australia (WA). The model is being rediscovered and applied in a number of places including a new train and urban regeneration system in Florida called Brightline. Hong Kong has been using this approach for decades and Japan, with the biggest urban rail system in the world, has also switched to this model with privatised rail companies who find private investment in land for extensions and station upgrades. Even China is using real estate to pay for their massive Metro systems in all their major cities. The CLARA (Consolidated Land and Rail Australia) bid in Australia for High Speed Rail is also based on this model. The ERM model guarantees integration of transit and land use, as without this the financial success of the rail and land development will not eventuate.

Of the four models, this report concludes that Models 3 and 4 are the best ways to make transit, finance and land development integration work. Both will not only build new rail lines but will also ensure viable urban regeneration projects with the required density and mixed use TODs. They will also enable high value urban development through partnerships when governments do not have sufficient funding to do this alone.

If a private consortium is formed and provides an Unsolicited Bid, or a Market-led Proposal as they are called in WA, then a much higher proportion of land value increase can be incorporated into the transit cost. This mechanism can be facilitated using Model 3 or 4, but has many more of the steps conducted by the private sector. Such steps can integrate transit, land development and finance in various organic ways.

The role of government in this new model will change but is still critical to ensure public good outcomes. These roles are outlined in terms of the assessment, procurement and institutional arrangements that can enable high value outcomes as well as integration with the rest of the transit and land development system. Such entrepreneurially-financed projects will need partnerships between all levels of government, between government and the private sector (owners and developers) who will be contracted to share in the investment, and between all of these and the community. A set of guidelines is presented (in Box 10) on how community can become involved in a positive way. Such government-industry-community partnerships are increasingly being called City Deals. The Federal Government have guidelines for such projects and in particular, how to provide financial risk management through backing private investors after a detailed assessment process by Infrastructure Australia and the Infrastructure Projects Financing Authority.

Three Australian case studies are presented to demonstrate how integrated transit finance and land use could be used through a more entrepreneurial rail procurement process.

Finally, an overview is provided of new technology that should improve the prospects of these integrated transit, finance and land development projects. The smart technology being developed to enable demand-responsive 'local shared mobility' systems is seen to be ideal for the 'last mile/first mile' linkage around stations, broadening the catchment area for the train and reducing the need for parking in the station precinct and surrounding TOD. This effectively saves AUS$20-$40,000 for every car parking space which enables more affordable housing and more affordable living. Of even more significance, is the application of new autonomous and electric vehicle technologies to what we have termed a Trackless Tram (TT) and which is considered by the report to be a 'game-changer' for integrated transit, finance and land development. The TT has the character of a light rail, especially the

Figure ES3. *The Trackless Tram.*

ability to attract private development around stations, which need to be fixed in place for recharging the TT's electric batteries and feeding in people through pedestrian flows and local shared mobility vehicles. However, the TT is significantly cheaper, easier to build locally and quicker to deliver than conventional light rail, as it does not need road re-construction (see Figure ES3).

Demonstrations of real integrated transit, finance and land development projects are likely to occur now, as the need and the demand are there. It will all depend on whether cities can create the partnerships to deliver such projects for Trackless Tram projects and urban regeneration involving new technology and new governance systems. To help with this, a step-by-step Manual is provided as an Appendix, along with a stylised flowchart, showing how the procurement process could deliver such projects. This is based on the kind of process that is emerging in Perth and a series of other cities across Australia, using either a City Deal or an Unsolicited Bid to deliver such projects. Figure ES4 presents a stylised summary of the Manual.

A summary of the comparative benefits of having a Trackless Tram (TT) or (Autonomous Rail Rapid Technology - ART) instead of a Bus Rapid Transit (BRT) or Light Rail Transit (LRT) is given in Table ES1.

Characteristic	BRT	LRT	ART OR TT
Speed and capacity	✓	✓✓	✓✓
Ride quality	X	✓✓	✓✓
Land developers potential	X	✓✓	✓✓
Cost	✓	X	✓
Disruption in construction	✓	X	✓✓
Implemenation time	✓	X	✓
OVERALL	✓	✓✓	✓✓✓

Table ES1. *Comparing BRT, LRT and ART on Trackless Tram. Source: P.Newman, The Conversation 26 Sept 2018.* *https://theconversation.com/why-trackless-trams-are-ready-to-replace-light-rail-103690*

Figure ES4. *A stylised summary flowchart of the 50 Steps in the Manual for delivering an entrepreneurially-financed transit-activated corridor.*

01

The Problem

Not Enough Public Funding for Urban Rail and Not Enough Integration of Land Development and Transit

The growth in demand for new urban rail lines in the 21st century has been dramatic in all parts of the globe, especially in China and India but also in most developed cities[1]. The patronage of existing urban rail systems has seen a significant rise in this period suggesting there is now a major market for urban rail. Whilst traditionally these projects have been predominantly government-funded across the globe they are now struggling to meet the required finances to cater for transit demand. The conventional loan and subsidy-based public investment has been unable to meet the demand. Urban rail agencies have attempted to recover operational and capital costs through farebox revenue, whilst at the same time undertaking network expansion, operation and maintenance. But agencies have significantly struggled to even recover operating costs, as farebox revenue is inherently limited due to recognition that public transport is part of the economic infrastructure of cities and equity demands[2]

The fiscal challenge for urban rail has prompted cities to find alternative funding and seek different governance frameworks to implement rail projects. The political and economic driver in creating new urban rail is not just dealing with transport problems but in providing for the demand in the associated transit-oriented urban fabric: Transit Oriented Developments (TODs). Cities are recognising the potential of urban rail in creating economic value through its multiple non-transport benefits that form the basis for the creation of TODs: its impact on land values and thus its potential for influencing more intensive land development and hence urban regeneration with its associated liveability benefits [3]

The gains in land value due to urban rail are widely documented and can be managed through land value capture tools to help finance urban rail[4]. The kind of focused land development which is fostered

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1 Newman, P., & Kenworthy, J. (2015). The end of automobile dependence: Moving beyond car-based planning. Washington, DC.: Island Press.

2 Jillella, S. S. K., Matan, A., Sitharam, T. G., & Newman, P. (2016). Emerging value capture innovative funding and financing: A framework. In B. U. Rai (Ed.), Handbook of research on emerging innovations in rail transportation engineering, (pp. 130-145), Hershey PA: IGI Global.
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3 Banister, D., & Thurstain-Goodwin, M. (2011). Quantification of the non-transport benefits resulting from rail investment. Journal of Transport Geography, 19(2), 212-223. Doi: https://doi.org/10.1016/j.jtrangeo.2010.05.001
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Newman, P., Davies-Slate, S., & Jones, E. (2017a) The Entrepreneur Rail Model: Funding urban rail through majority private investment in urban regeneration. Research in Transportation Economics. DOI: http://dx.doi.org/10.1016/j.retrec.2017.04.005
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Sharma, R., & Newman, P. (2018b). Does rail increase land value in emerging Cities? Value uplift from Bangalore metro. Transport Research A: Policy and Practice, 117(10), 1016 DOI: 10.1016/j.tra.2018.08.020. Glaeser, E. (2011). Triumph of the city: How our greatest invention makes us richer, smarter, greener, healthier, and happier. New York: Penguin Press.

4 Anantsuksomsri, S., & Tontisirin, N. (2015). The impacts of mass transit improvements on residential land development values: Evidence from the Bangkok Metropolitan Region. Urban Policy and Research, 33(2), 195-216. DOI: http://dx.doi.org/10.1080/08111146.2014.982791.
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McIntosh, J., Trubka, R., & Newman, P. (2013). Can value capture Work in A car dependent City? Willingness to pay for transit access in Perth, Western Australia. Transportation Research: Policy and Practice, 67, 320e339. http://dx.doi.org/10.1016/j.tra.2014.07.008.
Medda, F., & Modelewska, M. (2009). Land value capture as a funding source for urban investment: The Warsaw Metro system. London: UCL QASER Lab.
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Sharma, R., & Newman, P. (2018a). Can land value capture make PPP's competitive in fares? A Mumbai Case Study. Transport Policy, Transport Policy 64 (2018) 123–131. https://doi.org/10.1016/j.tranpol.2018.02.002.
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by this process is a major economic benefit both in the agglomeration economies and the savings in alternative more scattered urban forms that it replaces[5] . The replacement of land development on the urban fringe with land development in the inner and middle areas creates significant public and private benefits that vastly outweigh the costs. Some Benefit Cost Ratio (BCR) calculations have seen a simple light rail project with a BCR of 1.5 increase to around 7 because of the increased land development. This not only saves public money in infrastructure costs (usually 1.5 times as much as redevelopment) but also provides transport time savings for those living in the TODs (based on all transport usage). The land development is also an important parameter in operational efficiencies for urban rail systems, as TODs have significantly lower car dependence and enable two-way flows of people along corridors, minimising peak loading issues[6]. These factors now need to be included in all BCR's for the models outlined in this report showing how to do land development and transit simultaneously.

The project life cycles of urban rail systems with their associated land uses, are generally longer than any road-based system and hence can attract private investment as there are long-term financial and economic benefits when the transit, land use and finance are integrated[7].

We suggest that this three-factor integrated development approach can simultaneously meet the demand for urban rail and for focused, well-located urban redevelopments. This approach can trigger a space for various levels of private sector investment and involvement in urban rail projects, from entrepreneur models that are predominantly private investment through to traditional land value capture that is predominantly government-based, though the most value creation is done where the highest private sector involvement is involved[8]

The underlying rationale for more urban rail and the need for greater integration of land use are set out in many publications[9] and films produced by the Curtin University Sustainability Policy Institute (CUSP) – *www.curtin.sustrainability.edu.au* .

The problem we face with delivering more urban rail and having it integrated with land development opportunities around railway stations, is the way we think about and plan such projects. In Figure 1 the conventional approach to transit planning is presented, showing how transport engineering has pride of place at the start of the whole process. It designs a transit line down a corridor in the most direct way between A and B and estimates potential patronage from the land use that is there and how buses and cars are presently being used. The patronage estimates are then used to generate funding from government to upgrade to a better system. Finally, land development options may be added, though this is generally an afterthought and invariably leaves parking added, as park and ride, as the main land use.

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5 Cervero, R., Ferrell, C., & Murphy, S. (2002). Transit-oriented development and joint development in the United States: A literature review. TCRP research results digest, (52). Retrieved from onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rrd_52.pdf
Noland, R. B., Ozbay, K., DiPetrillo, S., & Iyer, S. (2014). Measuring Benefits of Transit Oriented Development (No. CA-MNTRC-14-1142). Retrieved from transweb.sjsu.edu/PDFs/research/1142-measuring-TOD-benefits.pdf
Trubka, R., Newman, P, & Bilsborough, D. (2010). The Costs of Urban Sprawl—Infrastructure and Transport. Environment Design Guide, 83, 1-6. https://www.crcsi.com.au/assets/Resources/b6e1625f-d90b-433d-945a-6afeff2e42f6.pdf.

6 Noland, Ozbay, DiPetrillo & Iyer, op. cit.
Cervero, R. (2004). Transit-oriented development in the United States: Experiences, challenges, and prospects (Vol. 102). Washington DC: Transportation Research Board.

7 Giuliano, G. (2004). Land use impacts of transportation investments. In S. Hanson & G. Giuliano (Eds.), The Geography of Urban Transportation (3 ed., pp. 237-273). New York: Guilford Press.
Bowman, C., & Ambrosini, V. (2000). Value capture versus value capture: Towards a coherent definition of value in strategy. British Journal of Management, 11, 1–15. https://doi.org/10.1111/1467-8551.00147.
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Sharma, Newman & Matan, op. cit.

8 Newman, Davies-Slate & Jones, op. cit.
Mathur, S. (2014). Innovation in Public Transport Finance: Property Value Capture. Farnham: Ashgate.
Zhao, Z. J., Das, K. V., & Larson, K. (2012). Joint development as a value capture strategy in transportation finance. Journal of Transport and Land Use, 5(1), 5-17. Doi: 10.5198/jtlu.v5i1.142.

9 Newman and Kenworthy, 2015 has the most recent coverage of the global cities database and how car dependence is reducing rapidly.

Figure 1. *Conventional transit planning: transport engineering followed by seeking funding/financing from patronage estimates followed by land development as an afterthought.*

The approach that is set out in this document is designed to turn this process on its head. It first examines the potential for land redevelopment by estimating land value uplift along a corridor if a quality transit system was to be provided through such an urban area. Then it uses this to seek the potential funding/financing related, if such private land development were to be unlocked by a transit system. Finally, the transit design and delivery, the transit engineering, is done but it brings in a whole new corridor of land development as an integrated part of the patronage and of the design.

This package, as set out in Figure 2, ensures that the integration of land development and transit engineering is firmly embedded, because the funding/financing depends on it being totally connected.

Figure 2. *The new model: Integrated Transit, Land Development and Finance model.*

This document has been prepared as a guide to those interested in pursuing innovative approaches to delivering rail infrastructure and its integration with land development through financial investment. Towards the end we show that a Trackless Tram is likely to be the new 'rail' system for cities as it does all the things light rail does but costs one tenth of it. This low cost makes it possible for entrepreneurial developers to build such systems as it will unlock their developments. The guide provides background on the entrepreneurial model, its historical base, and the rediscovering of the model. This is followed by an outline of the various mechanisms that can be applied based on global experience, as well as case studies on how to procure this integrated model and how to create a suitable governance system to manage it for the common good. The technological changes that hold some prospects for making the integrated model work better (especially the Trackless Tram) are discussed in the light of this integrated model. In an Appendix we set out a step-wise Manual, a flow chart summary of the processes suggested here, on how to deliver this model though there are many organic mixes emerging of how to integrate transit, land development and finance using a Trackless Tram.

02

The Solution

Bringing in Private Funding for Urban Rail through Integrating Land Development

The impact of urban rail on land value is well documented. There is a large variation in how much land value increases; this is expected as the factors that cause land value to increase include: the extent to which a station precinct is now connected to an improved transport system that can save time; how much local amenity is improved around the station; and, probably most influentially, whether other economic opportunities are created through the TOD with its access to the train line[10]

Land value gain is generally estimated through quantitative price modelling. Hedonic price models have revealed the land value increase with respect to distance from stations at about 16% of the land value up to 1 km from the urban rail station in Izmir, Turkey; up to an 11% increase in land values in lots within 750 m of a station in Helsinki, Finland; 17% increase in land values within 800 m in San Diego, USA; 10% increase in land values within 800 m in Massachusetts, USA; 7% increase in land values within 1 km in Warsaw, Poland[11].

Land value gain has been estimated in Australian cities. In the case of Perth, Australia, the Southern Railway increased land values within the 500 m around stations by 42% over 5 years after the announcement of the rail service and on the older heritage lines there was an 18% increase in residential value and 48% increase in commercial value around stations compared to those areas not near a station[12]. Sometimes this value increase is ascribed to a simple shifting of value from one place to another, however it is also possible to see that increased value occurs in ways that would not occur without the new integrated transit and land development[13]. Such increases are described as agglomeration economies. This was illustrated in Bangalore, India, where the value increased by 25% in the area between 500 m and 1km around Metro stations and more significantly a 'before' and 'after' from the commencement of the metro rail operations shows a price uplift of 4.5% across the whole city; this indicates a major agglomeration economic event resulting in a substantial economic value increase of US$306 million from the metro rail's accessibility[14].

The traditional approach to building urban rail based on top down supply of funding without much orientation to land development options provides benefits for the landowners (both government institutions and private) without the owners making any direct investment in the rail. The increased desirability of that urban rail-accessible land stimulates changes in land use, zoning and development intensification, resulting in economic improvement which can be of significance across the city.

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10 Anantsuksomsri & Tontisirin, op. cit.
Armstrong & Rodriguez, op. cit.
Cervero (2003), op. cit.
Du & Mulley (2007), op. cit.
Garrett, op. cit.
Laakso, op. cit.
Medda & Modelewska, op. cit.
Mulley, op. cit.
Sharma & Newman (2018b), op. cit.
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11 Freeman III, A.M. (1979). Hedonic prices, property values and measuring environmental benefits: a survey of the issues. The Scandinavian Journal of Economics, 81(2), 154–173. Retrieved from http://www.jstor.org/stable/3439957.
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12 McIntosh, J., Trubka, R., & Newman, P. (2015). Tax increment financing Framework for integrated transit and urban renewal projects in car dependent cities. Urban Planning and Research, 33(1), 37e60. http://dx.doi.org/10.1080/08111146.2014.968246.
Sharma, R., & Newman, P. (2018b). Does rail increase land value in emerging Cities? Value uplift from Bangalore metro. Transport Research A: Policy and Practice, 117(10), 1016 DOI: 10.1016/j.tra.2018.08.020

13 Newman, Davies-Slate & Jones, op. cit.

14 McIntosh, Trubka & Newman, op. cit.
Sharma & Newman (2018b), op. cit.

However, the full value creation is mostly lost to the land-owners and developers who did very little to deserve such a windfall gain but happen to be in the right place to receive it. It is not hard to see why attempts are therefore made to try and capture some of that value to help pay for the rail infrastructure[15].

Another perspective is that by driving a rail project by government transport engineering rather than prioritising land development opportunities, the result will be a much lesser project in terms of land development and hence transport construction can diminish the chances of creating urban regeneration and instead enable greater urban sprawl.

The Entrepreneur Rail Model developed as part of research at the Curtin University Sustainability Policy Institute (CUSP), Australia, starts from the premise there is a greater need to bring together skills from financing, land use and transport.

Around the world and in Australia there is a history of entrepreneurial rail building from the late nineteenth and early twentieth centuries, now being rediscovered. The next section outlines how this was in fact the standard way of building railways around the world and many places still do it as their major approach to building public transport infrastructure.

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15 Bowes, D. R., & Ihlanfeldt, K. R. (2001). Identifying the impacts of rail transit stations on residential property values. Journal of Urban economics, 50(1), 1-25. DOI: http://dx.doi.org/10.1006/juec.2001.2214.
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03

How did we do it?

The History of Integrating Transit, Land Use and Finance - We All Did It Once

Land value capture has long been applied to recover the windfall of land value uplift to fund public infrastructure[16]. The earliest documented implementation dates back to the days of the Roman Empire when the citizens, to gain benefit from the infrastructure, were charged with the construction and maintenance of public roads and aqueducts. This practice was also followed by other civilizations the world over[17]. The literature on land value capture tools is large; some of the recent contributions on such tools are highlighted in the footnote[18].

Historically, private entrepreneurs have initiated what we now call 'public' transport in cities. The USA's first omnibus service was started in New York City in the 1820s by private operators who then laid down rails (in the 1860's) to replace the horse-drawn carriages. The first private rail projects began in the 1840s in the UK and the earliest in the US dates back to the Pacific Railroad Act of 1862, under which government provided land grants, 400-foot rights of way plus ten square miles for every mile of track built, for the construction of the transcontinental railroad[19].

These projects are similar to what is now known as 'Unsolicited Bids' or 'Market Led Bids' from the private sector and the processes for private sector funding of infrastructure are well established in energy, water and parts of transport such as aviation and shipping, but not for public transport.

While the practice of entrepreneurial rail building mostly ended in Europe and America during the period after the Second World War, several Asian countries have continued the practice in developing their rapidly-expanding cities. The practice is well-matched with the corporate-led development model of those countries. In Tokyo, the railway network is a complex mix of public, private and privatised railways. Several companies have used railways to enable new town developments on the outskirts, with a large number of lines branching off the Yamanote Line to the west of the city. This was pioneered in the early 20th Century by the Hankyu Railway Company in Osaka. Hankyu struggled to profit on railway fares alone, and so began building housing estates and later office towers along their railways.

The land into which Tokyo expanded was often broken up into a large number of farming lots, creating a complication to land assembly. The solution that evolved to deal with this issue is known as land readjustment. Under this model, land owners would contribute their land to the development project and in return would receive a smaller portion of land back, but with services added and a new railway connection. The original land owners were also placed on a committee that oversaw the urban design outcomes that occurred as part of the new developments.

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16 Chapman, op. cit.
Gihring, T. A. (2009). The Value Capture Approach to Stimulating Transit Oriented Development And Financing Transit Station Area Improvements. Victoria Transport Policy Institute. Retrieved from http://commongroundorwa.org/TOD-ValCap_wp%201_VTPI.pdf.
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Zhao, Das & Larson, op. cit.

17 Smolka, op. cit.

18 Chapman, op. cit.
Connolly, C., & Wall, A. (2016). Value capture: A valid means of funding PPPs? Financial Accountability & Management, 32(2), 157-178. DOI: 10.1111/faam.12083.
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Levinson, D. M., & Istrate, E. (2011). Access for value: financing transportation through land value capture.
Mathur & Smith (2012), op. cit.
Mathur, op. cit.
Suzuki, H., Murakami, J., Hong, Y.-H., & Tamayose, B. (2015). Financing transit orientated developments with land values: Adapting land value capture in developing countries [urban development series], international bank for reconstruction and development. Washington DC: The World Bank Group.
Vadali, S. (2014). Value capture state-of-the practice examples (United States): highways. TRB 5th International Summer Finance Conference. http://onlinepubs.trb.org/onlinepubs/conferences/2014/Finance/11.Vadali,Sharada.pdf.
Zhao, Das & Larson, op. cit.
Zhao, Z., Iacono, M., Lari, A., & Levinson, D. (2012b). Value Capture for Transportation Finance. Procedia - Social and Behavioral Sciences, 48, 435–448. DOI: 10.1016/j.sbspro.2012.06.1023.

19 Glaeser, E. L. (2012). Urban public finance (No. w18244). National Bureau of Economic Research.

Interestingly, one of the pioneering companies was Tokyu Corporation, originally a town planning firm, and whose founder was inspired by Ebenezer Howard's vision of a series of garden cities for the working population. It was Tokyu's reputation as an ethical business that enabled it to gain the trust of the farmers when seeking to redevelop their land[20]. Tokyu is now developing a city to Perth's north (Yanchep) around an entrepreneurial extension to the northern suburbs railway, although the rail extension is still publicly planned and delivered.

In Hong Kong, the Mass Transit Railway Corporation (MTRC) is a semi-public, semi-private organisation, being listed on the Hong Kong Stock Exchange, but majority-owned by the government. The MTRC receives land from the Hong Kong Government at pre-rail prices and then builds the railway infrastructure and develops the land in partnership with private developers. This model is known as Rail + Property. Property rental and management is a large part of the MTRC's business, accounting for more of the company's operating profits than its heavily-patronised transport operations. Property-related businesses operating in Hong Kong accounted for 57% of total operating profit on average between 2012 and 2016, as set out in Figure 3[21].

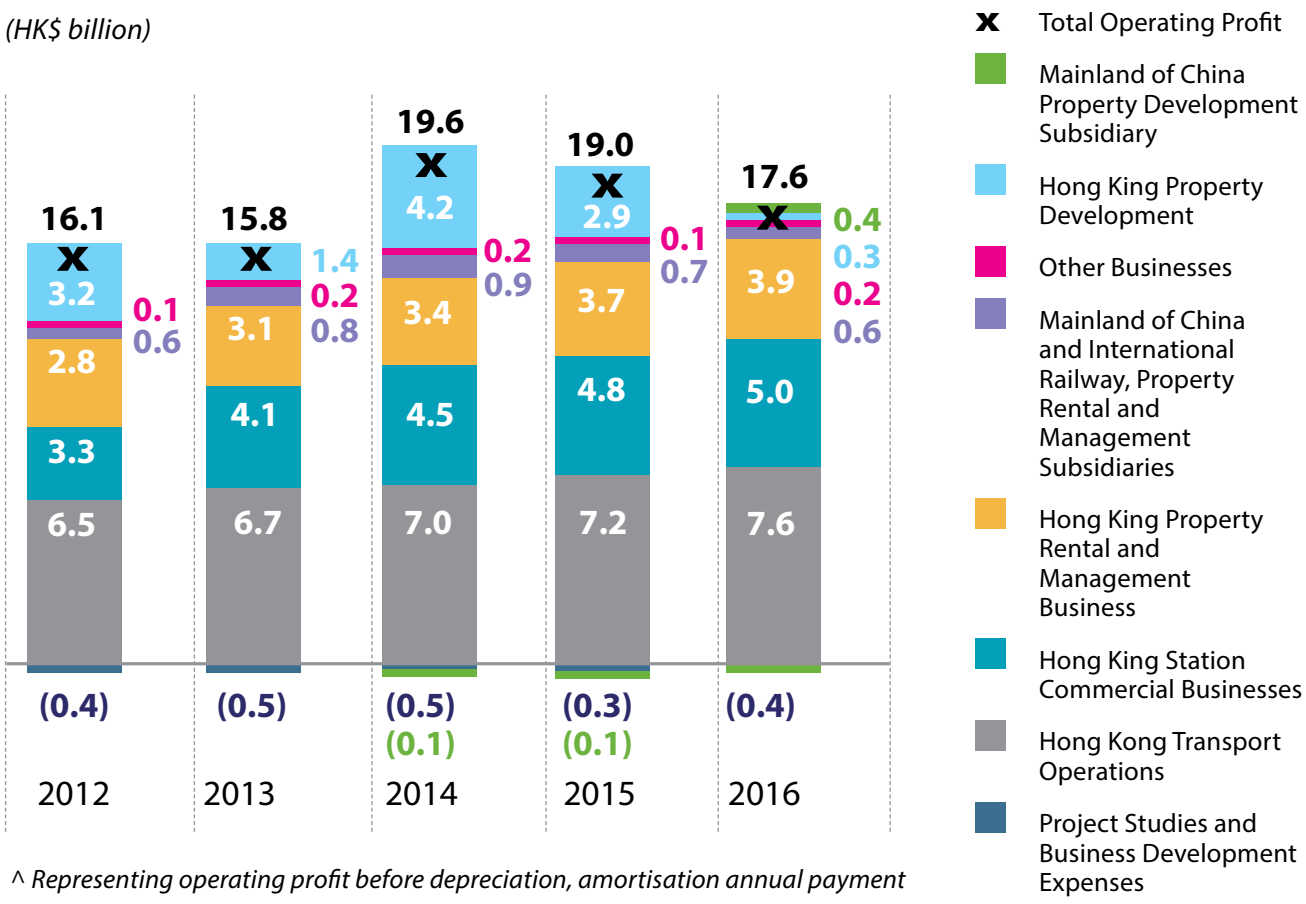


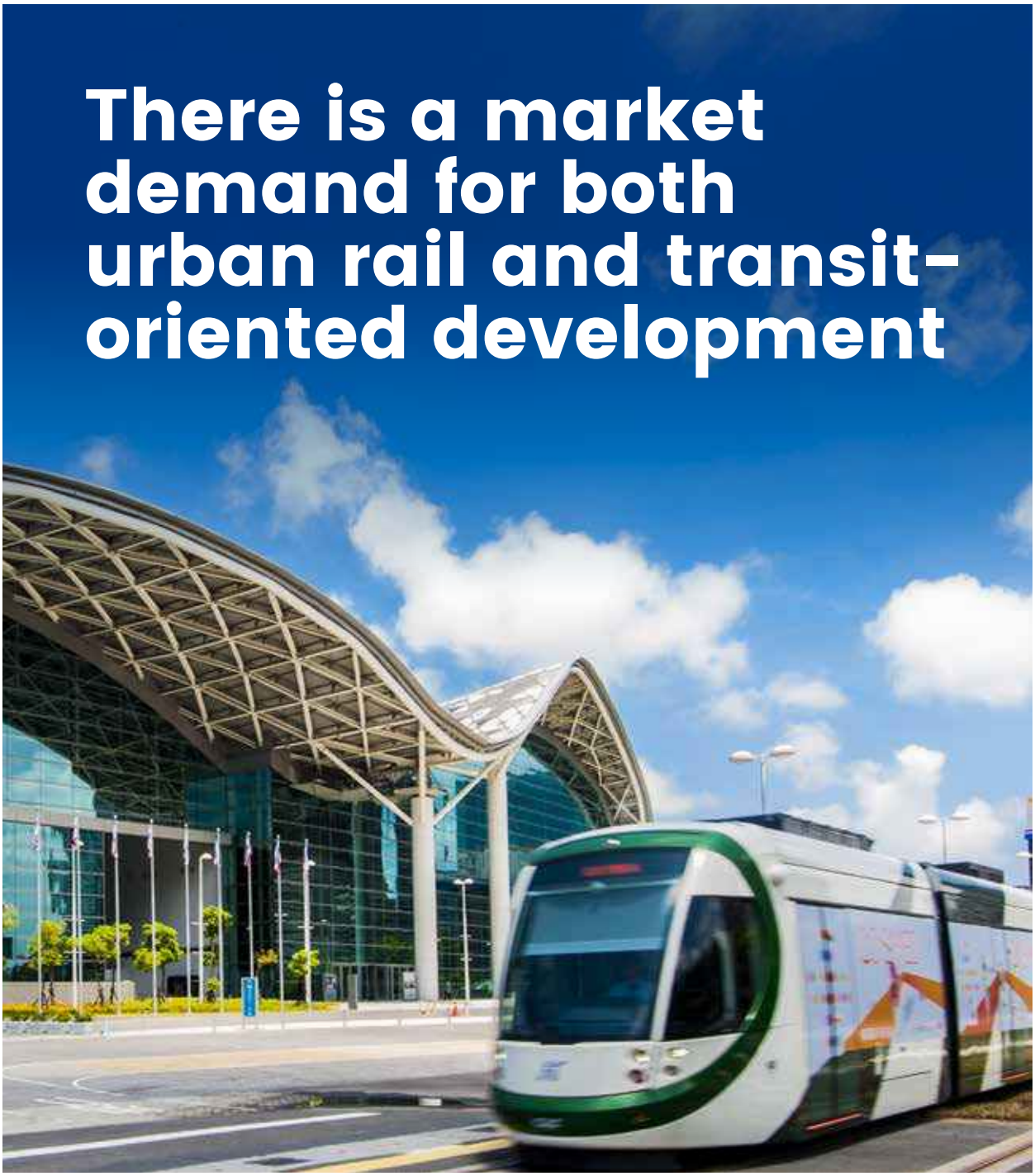
Figure 3. *The proportion of funding from private land development in the Hong Kong rail system. Source: MTR Corporation, 2018*[22]

20 Cervero, R. (1998) The Transit Metropolis - A Global Inquiry. Washington DC: Island Press. Page 194.

21 Author's calculation based on financial data from MTRC. http://www.mtr.com.hk/archive/corporate/en/investor/profit_en.pdf

22 MTR Corporation Limited (2018) Operating Profit Contributions. Accessed 20 July 2018. http://www.mtr.com.hk/ archive/corporate/en/investor/profit_en.pdf.

There is a market demand for both urban rail and transit-oriented development



Western Australia had a history of entrepreneurial rail building in the late nineteenth and early twentieth centuries, now being rediscovered as mechanisms for funding and financing infrastructure are being re-assessed. The case of Perth Electric Tramways Limited is outlined in Box 1, highlighting two notable development projects that it was associated with: Nedlands Park Tramway Estate and Osborne Park Estate, covering a swathe of Perth's western and northern suburbs. These lines were funded and financed from private money, with land development the ultimate source of funding. Box 2 outlines the Great Southern and Midlands Railways which were the basis of rural development in WA.

This illustrates that WA certainly did know once how to integrate transport infrastructure within finance and development, as did most cities and regions around the world at that time. Can this be rediscovered now there is a market demand for both urban rail and Transit Oriented Development?

BOX 01

Perth Electric Tramways Limited

An early example of entrepreneurial rail-building was undertaken in Perth, Western Australia. Perth, now largely a highway-dominated city, once had an extensive tramway network (Figure 4), much of it built by a private company, the Perth Electric Tramways Limited. The system began operation in 1899 and was nationalised in 1913 and progressively closed down during the 1950s.

The individual lines were built under a well-established regulatory framework, often combined with real estate ventures, as in the Nedlands Park and Osborne Park developments.

In the case of both projects, an agreement was struck between the local authorities and the tramway company, with the authorities receiving a share of the tramway revenue, some public realm improvements and new amenities, and often land donated for public open space. Once this agreement was reached, the company would approach the state government for approval from the Commissioner for Railways, which would then be ratified by Parliament.

The Commissioner's approval was based on guidelines laid out in a previous Act of Parliament, which provided the regulatory framework for the tramways, and conditions were imposed in terms of such things as track gauges, minimum service frequencies, construction standards, maximum construction timelines and the rights of state infrastructure agencies to interfere with the tramways, if required for them to perform their proper functions.

Figure 4. *Perth's early tramways and transit-oriented development. Source: Battye Library, https://slwa.wa.gov.au/*

BOX 02

Great Southern and Midland Railways

In addition to the urban tramways, there were two privately developed regional railways funded using land in Western Australia: the Great Southern Railway, from Beverley to Albany (completed 1886), and the Midland Railway (completed 1894), from Midland Junction, to Walkaway, near Geraldton (see Figure 5). The Midland Line was developed by the Midland Railway Company, and Great Southern Line by the West Australian Land Company, both of them headquartered in London.

Both of these railways were delivered through the Land Grant System, under which the Government granted the companies 12,000 acres for every mile of track constructed (approximately 3,000 hectares per kilometre). This land was undeveloped and the companies sold the land on in small parcels as town site lots, as undeveloped parcels, and as ready-made farms, the latter being particularly prevalent on the Midland Railway.

This system addressed two issues facing the Government at that time: the desire to develop the colony and expand its population, but with the railways being beyond the Government's limited financial means at the time. The Land Grant System achieved both of these goals, with the companies both raising private capital in London, and advertising the land to potential immigrants. The companies also provided finance to their purchasers.

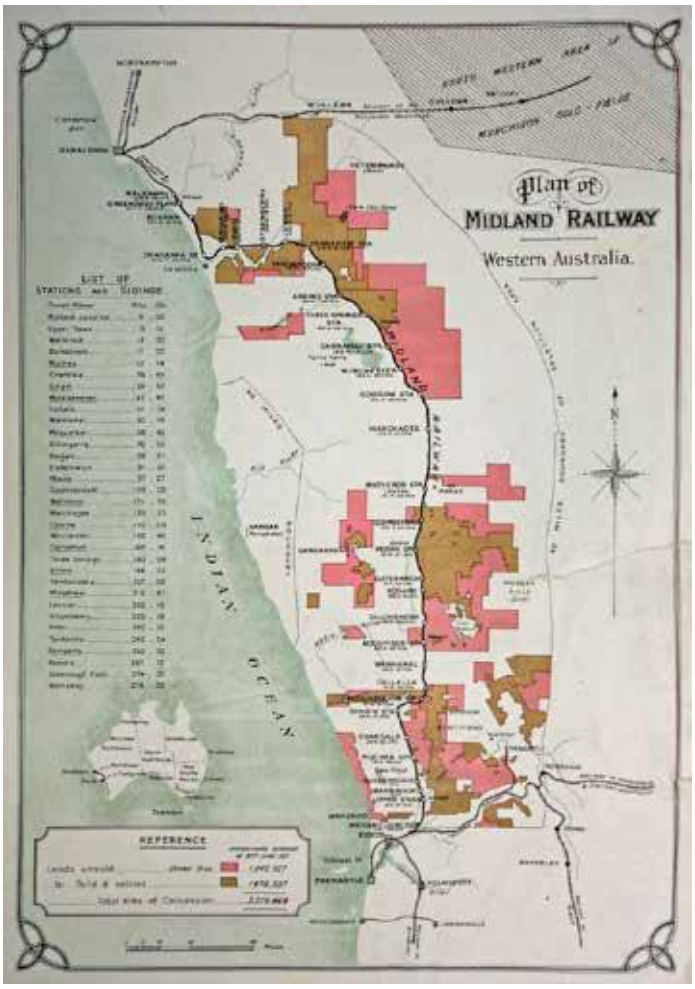


Figure 5. *Map of Midland Railway Western Australia.*
Source: Carnamah Historical Society, https://www.carnamah.com.au/midland-railway

04

How do we do it now?

The Rediscovery of Integrated Transit, Finance and Land Development
- four delivery models

Approaches to Funding Urban Rail[23]

There are a range of potential options for funding and delivering public transport infrastructure, with differing degrees of private sector involvement:

- Full public sector capital;
- Some private and substantial public capital;
- Substantial private and some public capital; and
- Totally private capital

Most transport infrastructure (both road and rail) in the latter half of the 20th century and still today is delivered under the first model – full public sector capital – although detailed design and construction work is contracted out under public oversight. All four models are likely to be used in 21st century transport infrastructure but the latter two seem best able to deliver urban regeneration as well as urban rail in a world where government capital for transport funding is constrained. The reason for this is explained in terms of land value creation.

Full Public Sector Capital

In this model, public transport infrastructure is delivered wholly by public sector funding as a largely welfare-based approach, though with productivity benefits as the justification. The public sector performs all network and regional planning and oversees the detailed design work that is performed by private sector engineers. The public sector also oversees construction that is usually contracted out.

As most national, state and city governments' finances are constrained and there are other growing demands on public budgets, especially health and education, it is likely that new sources of funding will be required to deliver significantly more new transit infrastructure. One way to do this is by recycling assets; for example in Sydney three new rail lines are being built by the New South Wales government using full public sector capital from the proceeds of selling the Port of Botany.

There is a range of potential mechanisms for raising revenue from the increase in land values created by public transport infrastructure, which are collectively known as value capture. This hypothecates government revenue that has been generated by the increase in land value flowing through to rates and taxes at all three levels of government (meaning that the money cannot be spent on other uses). The US uses this approach and recently the UK has started to do this also. One recent Australian example of this is the Gold Coast Light Rail, which was partially funded by a levy on all Gold Coast properties, though many people live nowhere near the railway so it's a very blunt value capture instrument rather than targeting the main beneficiaries of the railway. Similar blunt funding is done through sales taxes in American cities.

Despite being described as an alternative funding model, value capture is still generally a full public sector capital model for funding urban rail[24]. Perhaps the biggest failing in this model is that there is no guarantee that urban regeneration will occur and that the density of activity around the train stations will be facilitated. There are often reactions from local communities and local governments to any increases in density near stations. As well, transport planners frequently use the highly attractive

23 The report uses rail to represent heavy rail, light rail and trackless trams (as discussed later) which do not have a rail track but do have an optically guided track that means it is like a rail track. It is a 'fixed' system as opposed to a 'flexible' transport system that applies to cars, buses, bikes and walking.

24 McIntosh, J., Trubka, R., Kenworthy, J., & Newman, P. (2014). The role of urban form and transit in city car Dependence: Analysis of 26 global cities from 1960 to 2000. Transportation Research: Transport and Environment, 33, 95e110. http://dx.doi.org/10.1016/j.trd.2014.08.013.
McIntosh, Trubka & Newman (2015), op. cit.

London Crossrail station

and contested spaces around stations as park and ride for cars. Thus, this full public sector approach, if dominated by transit planners, may not facilitate the productivity benefits of a TOD. To overcome this potential shortfall, active facilitation and coordination with land use planners and development interests is essential.

Some Private and Substantial Public Capital

This approach seeks help from private sources through land development, but primarily raises government capital through a mixture of sources such as parking levies, tolls on associated private traffic, developer contributions, an increase in registration fees or some other form of tax hypothecated to the rail project. This could include a new levy on the land value uplift associated with a new project, especially if it is targeted to the land-owners around new stations.

A successful example of this approach is London's Crossrail. Crossrail is an underground heavy rail project joining up major parts of the city, with substantial contributions from developers and the Business Rate Supplement (BRS), an increment on the rates paid by London businesses. Of the £14.8 billion funding for Crossrail, £4.1 billion is sourced from London businesses through various mechanisms, including the BRS. Financial contributions from key private investors include a £70 million contribution from the operator of Heathrow Airport, which Crossrail will serve, and £150 million from Canary Wharf Holdings, a developer, towards the cost of the new station at Canary Wharf. Canary Wharf Holdings will also design and build the station.

This model is providing some new urban regeneration value through private investment, but in general the value is achieved in linking the city to achieve major agglomeration benefits (Benefit Cost Ratio went from 1.5 to 3 after including agglomeration economies) and these therefore justify major public investment through value capture.

Artist's impression of Valley Line in Edmonton, a public-private partnership with substantial private funding. Source: TransEd Partners (2016)

Substantial Private and Some Public Capital

In this model, substantial private capital can be supplemented by some government capital. The government's expected land value-based tax flow-on could be hypothecated to cover their contribution. This approach would have government playing a key role in ensuring that the rail (or fixed track system) project is still generating all the capital required, though only some would be from public sources at the three levels of government.

At the network level, this model can combine wholly private lines with publicly-funded ones where there is a compelling argument for the project to be built. Such reasons could include providing an improved service to a particular community, or for a particular major event, or to enable major urban productivity advances in a particular corridor.

In the USA, the Portland tram built to the Pearl District was funded substantially by private sources to unlock urban regeneration potential, as was the Vancouver Canada line and its Olympic Station that was privately funded along with the Vancouver City Council to develop land around the station.

In February 2016, in Canada, the Edmonton Valley Line was awarded to a consortium based around Bechtel and Bombardier to build a CAN$1.8 billion Light Rail Transit (LRT) system over 13 km. The private sector contractor is responsible for designing, building, financing, operating and maintaining the new LRT project over a 30-year period. While the ultimate source of funding for the Valley Line is public, financing and associated risk is the responsibility of the private partner, the TransEd consortium. TransEd is required to raise the capital for project construction, gaining a return from the 30 years of concession payments. This is perhaps one of the first lines in a car-based city to have created urban rail down a whole new corridor using 'substantial private funding'. The role of land development in the Edmonton project is not clear.

Totally Private Capital

A fully funded private urban rail will only happen if there is substantial TOD-based urban regeneration at its heart. In this approach, government's role would be kept to in-kind activity to ensure land assembly and land acquisition, zoning and other transport planning integration is fully covered, perhaps with assistance in the risk management side of the procurement process. The fully private approach depends on sufficient land being available to generate the capital and on-going operations; the land development thus must be fully integrated with the rail building and operations to generate the necessary private investment. It would mean that the project could be off balance sheet and hence would help with government credit ratings. We have described such a system in our publication The Entrepreneur Rail Model and along with the 'substantial private funding' approach, will be the main focus of this report[25].

The Hong Kong MTRC is a government-majority business enterprise that makes substantial profits and invests new capital based on land development. The MTRC is required to operate on commercial principles, and is listed on the Hong Kong Stock Exchange, with a significant portion of private ownership; the intention is that it behaves as a private company, albeit with government oversight. In this way, it can be seen as a totally private rail model as there is no cash contribution from government though its risk management is assisted by government backing.

Probably the only place where a totally private funding model is followed regularly is in Japan, where the rail system is fully privately run and a substantial part of any profit and capital for new lines is obtained through land development[26]. A market for urban rail has been well established in Japan for many decades and it does suggest that it may work in other cities that are now reaching the stage where a market process can work.

25 Newman, Davies-Slate & Jones, op. cit.

26 Suzuki, Murakami, Hong & Tamayose, op. cit.

A project in Florida called the Brightline High Speed Rail Project is perhaps the first fully private rail and TOD-based project in North America. The company is in the fortunate situation of owning a whole rail corridor through its freight business but has now created an integrated approach to building a series of TODs between Orlando and Miami; this has attracted a major source of finance from a US hedge fund. This funding, together with the farebox returns, will enable a fast urban rail service along the South East Florida urban conglomeration. The system will began operation in 2018. The need for cross connections of light rail is now being investigated to provide a truly integrated urban-TOD rail system.

Regional transport network planning was required in the Brightline project and would need to change everywhere under this model of public transport delivery, as private capital would be attracted to corridors where there are development opportunities, rather than following public sector transport planning criteria. However, the two are generally the same, as land development is primarily a private sector function. If land is zoned for high density activity centres it does not mean these will happen unless the amenity is there to unlock the private investment. Thus, the public role needs to address how to facilitate this amenity and a new urban rail line can do that. The value of land around stations is created when such partnerships are established.

Transit network integration can still be a required part of any private rail project and would be needed for both public and private benefit in achieving new activity centres around rail stations. This transit-land use integration is not easily achieved, but whenever land-related benefits are being sought the private financing will ensure it is fully integrated or the consortia involved would not achieve their necessary returns. Of course, there is a risk for government if they do not ensure through the public-private partnership process that all the necessary public good outcomes in terms of quality design, integration of services, fares and affordable housing, are clear.

Summary

All four models are essentially points along a continuum and need to be assessed for any urban rail project to add to a city's reduced automobile dependence and hence to help create more enduring productivity gains. Without this growth in fixed track transit systems and associated land development, any city will just continue building completely car-dependent urban sprawl which will significantly add to its congestion problems[27].

The various funding models that underlie the four models above are outlined in Figure 6 emphasising the difference between value creation, value capture and general tax approaches, and are discussed below.

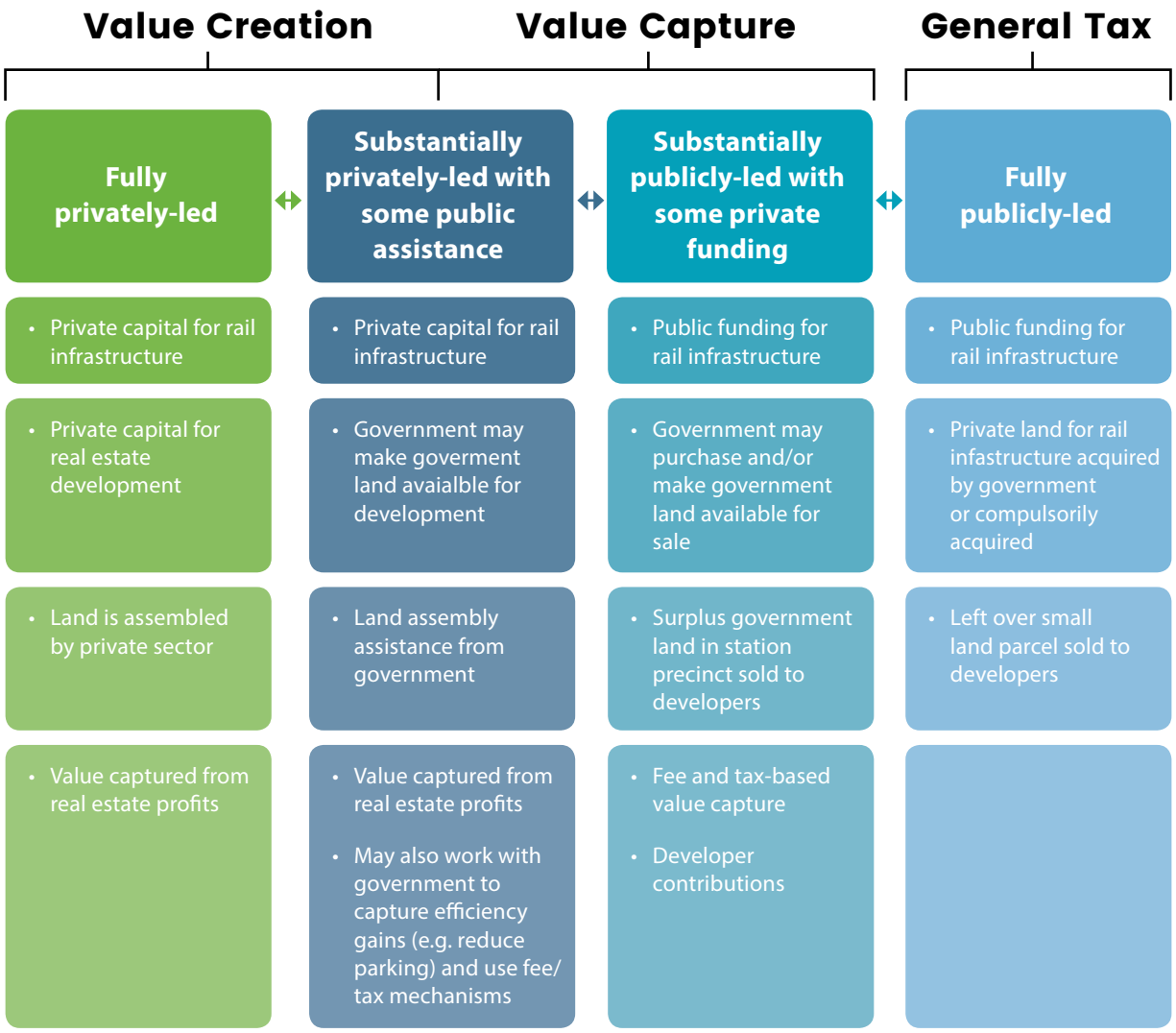


Figure 6. *Funding models that involve value creation, value capture and general tax approaches. Source: Evan Jones, Responsive Environments, as appearing in Newman et al. (2017b)*

27 Newman & Kenworthy (2015), op. cit.

As discussed in the sections above there is an important role for the private sector in enabling the best partnerships that create the most value. If projects are fully planned and delivered by governments without involving private land development in investment partnerships, they will leak value and the opportunity to capture it will be minimal. It is not enough just to see value capture simply as a way of taxing windfall gain after it has happened. The full financial, social and political capital is not achieved in such projects. Thus we are proposing that we seek after land value creation rather than just land value capture.

The land value creation tools are therefore set out under four groups that move from Fully Public through to Fully Private with two groups in between that are Partially Private or Partially Public. The four groups are shown in Figure 7 to illustrate the extent to which they create economic value.

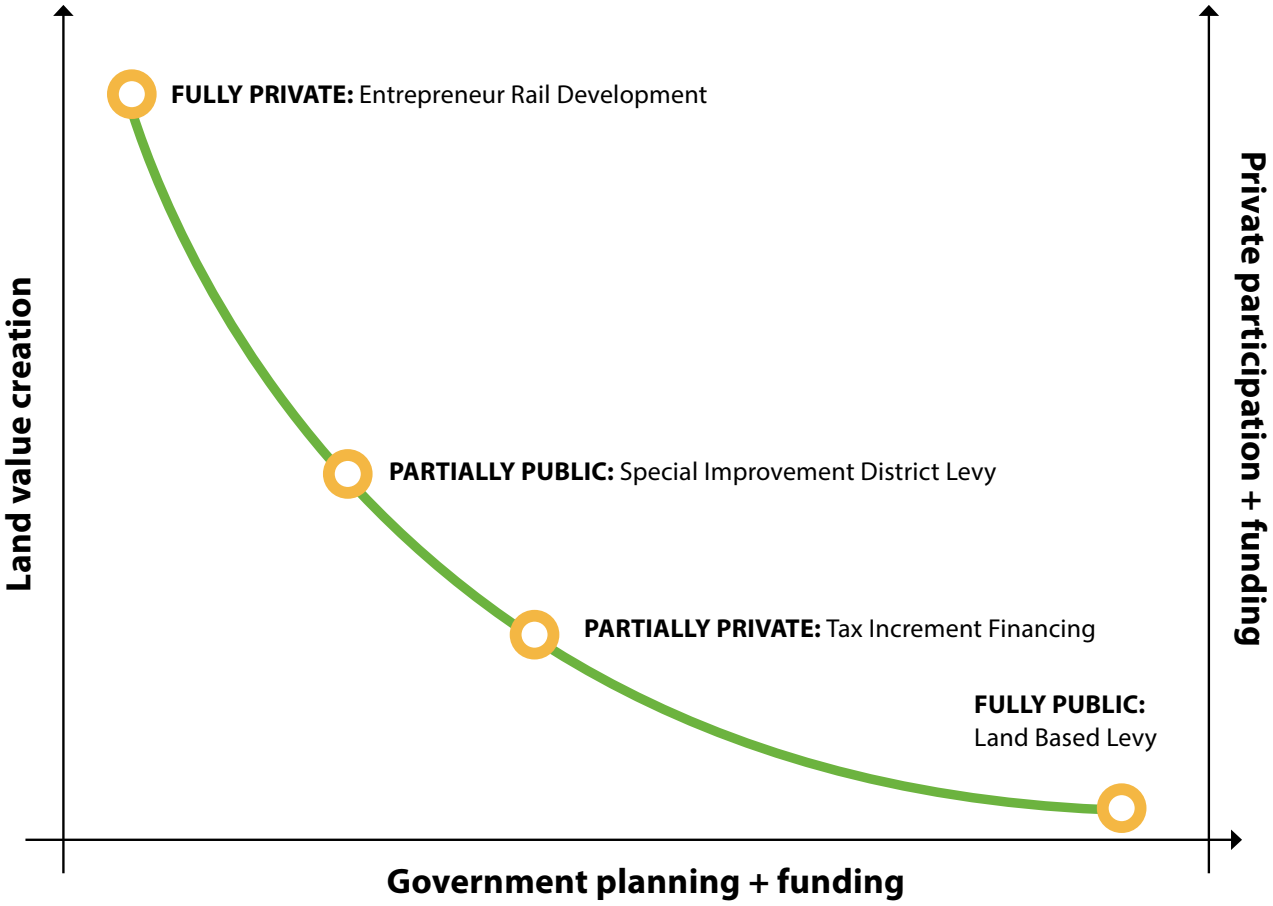


Figure 7. *How land value creation varies with the extent of private involvement in transit partnerships. Source: Sharma and Newman (2018a)*

05

Mechanisms for Integrated Transit, Finance and Land Development

Mechanism 1. Purely Public: Land-based Levies

This is the traditional planning and procurement approach but now governments are trying to add in a value capture component on top of the approach where they control all of the rail project. There are very few land value capture tools left once this happens and because of this, many governments are loathe to consider value capture as very useful. It is, however, important to still try and integrate land development as much as possible into the transit system even though much of the economic value may have leaked. Land value creation is found when the other mechanisms involving more private investment are considered.

Governments are mostly only able to set up land-based levies to begin recouping value increases due to infrastructure construction once they have announced a funded rail project and showed exactly where it will be going. The tools used include a Business Levy, Developer Levy, Special Area Levy and/or Parking Levy.

1. A Business Levy is used in various countries such as France ('Le Versement Transport' tax), Austria ('Dienstgeberabgabe' tax), the USA (employer/employment tax) and the UK ('Business Rate Supplement' tax) to fund transit.

The Le Versement Transport tax is paid by public or private companies in France when the company has nine or more workers located within a 10,000 inhabitant urban transport zone to fund public transport services[28].

In the United Kingdom, the Business Rate Supplement (BRS) tax is used by local authorities to impose a levy on business taxpayers to help finance local projects that can promote economic development like urban rail. The BRS is a temporary tax imposed for a period to cover the full cost of the infrastructure. The development of Crossrail in the Greater London Area is financed partially by the BRS. The BRS is expected to fund GB£4.1 billion of the £14.8 billion project by 2038. The tax is proposed to be increased by 15% in revaluations to take place every five years. In the first financial year 2010-11, collection surpassed the projected amount[29].

2. A Developer Levy is charged to land developers to fund the public infrastructure gap created due to the new development.

In the US, the Impact Fee is collected from the land developer as a form of developer levy. The Impact Fee is a one-time charge levied on development projects during the issue of building permits to fund new public infrastructure and services associated with new development[30].

In Latin American countries, developers are either asked to mitigate any shortage in supply of public services caused by their private project (such as in Colombia, Guatemala and Argentina), referred to as an 'in kind payment', or are simply offered additional development rights against a 'cash payment' (as in Colombia and Brazil)[31].

3. The Special Area Levy is used by governments to charge all land owners in a specific area to fund local transport services. These are imposed by governments rather than being partnerships, as explained later in the Mechanism 3 section.

Two examples of Special Area Levies and rail projects are in Milan, Italy and the Gold Coast in Australia. In Milan, such a levy was imposed on properties located up to 500 metres from local transit stations.

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28 Banister, D. (2002) Transport Planning. Revised and enlarged 2nd edition. London: Routledge.

29 Roukouni, A., & Medda, F. (2012). Evaluation of Value Capture Mechanisms as a Funding Source for Urban Transport: The Case of London's Crossrail. Procedia - Social and Behavioral Sciences, 48, 2393-2404. DOI: http://dx.doi.org/10.1016/j.sbspro.2012.06.1210
Medda, F., & Cocconcelli, L. (2013). To tax or not to tax: The case of London Crossrail. Retrieved from https://www.ucl.ac.uk/qaser/pdf/publications/starebei5

30 Vadali, op. cit.

31 Smolka, op. cit.

The levy was proportional to the windfall gains on the land value, to help fund the construction of the subway system[32]. In Australia, a Transport Improvement Levy of AU$111 per year for every rateable property (245,687) in the Gold Coast City was introduced to fund the Gold Coast Light Rail[33]. In both cases, most of the funding was coming from other government sources and in the case of the Gold Coast, with its very wide area, the imposed levy did not help with TODs.

Betterment Contribution charges are a form of special area levy that has been widely documented in statutory documents in the UK, Latin America, India and Australia. The overall application of a Betterment Contribution has, however, been poor except in a few Latin American countries. The Indian city, Nagpur, has not been able to implement its legal Betterment Contribution charge since 1936, due to the lack of an implementation strategy and framework[34]. It is understood that the most successful cases of Betterment Contributions seem to rely on rather arbitrary technical shortcuts to keep the levying manageable[35].

4. The use of Parking Levies as a government charge on parking spaces in a designated area have been used to fund transit.

The Parking Levy is based on the notion of discouraging the use of cars as well as providing funds to support an alternative transit mode. These parking levies can be just imposed, but if done with the involvement of community and businesses, they enable more effective economic value to be created. The Western Australian Government uses the Perth Parking Levy to fund the local transit, pedestrian and cycling infrastructure system and has significant community and business support as it minimises car dependence. Perth is funding 'free' local transit through this levy[36]. Similar levies are imposed in Sydney (the Parking Space Levy), Melbourne (Congestion Levy) and Adelaide (Transport Development Levy).

Land-based levies are fully government-based tools, through which specific public infrastructure services are funded without private participation. If the levies are imposed, they may adversely affect development, should the developer be driven away due to reduced profits. However, the nearby infrastructure to be built through the levy should make the site more attractive for developers and those who own the land stand to reap substantial windfall gains. The levy system does not necessarily translate into a more substantial or higher quality development, as the developer/owner has no responsibility or interest in integrating the transit and land use closely. The result will be less economic value in the TOD but it is still better than doing nothing and continuing with car dependence.

A land-based levy system is thus seen as having the lowest economic value creation potential of the four proposed mechanisms, as it does not create the kind of partnerships needed for optimal value capture. However, such levies are also probably the simplest set of tools to implement, as they do not require much change to transport and town planning agencies; the levy generates some funds for the rail and the governance remains un-integrated and does not need partnership development. Indeed, it is quite possible that developers will not seek to be involved once a station and its rail line are fully planned, as the land-owners may no longer want to sell at a reasonable price but prefer to wait until even higher value accrues.

For a TOD to be more integrated into the planning and delivery of a rail line, the governance systems require another kind of process that can include private finance and expertise from the beginning rather than just imposing a levy. It also requires community and business partnerships. Fully public land value capture tools that impose a land-based levy are not full partnerships with the private

32 Ridley, T. & Fawkner, J. (1987) Benefit sharing: the funding of urban transport through contributions from external beneficiaries. 47th International Congress of the International Metropolitan Railways Committee, Lausanne.

33 SGS Economics and Planning (2015). Innovative Funding Models for Public Transport in Australia.

34 Nagpur Improvement Trust (2013) Revenue Estimation Report – Transit Orient Development for Nagpur Metro.

35 Smolka, op. cit.

36 Government of Western Australia (2014) Hansard Parliamentary Debates, page 7073.

sector, as described in this paper, as the finance is not able to provide the integration and the land development opportunities around the station are more than likely diminished.

Mechanism 2. Partly Private and Mostly Public: Tax Increment Financing

Tax increment financing (TIF) is a tool used to fund redevelopment projects (infrastructure and community projects) based on forward hypothecation of property tax due to prospective land value increase. It simply requires governments to set up a Treasury Fund that hypothecates funding from a specific area, where government rail investment is improving the area resulting in land-based rates and taxes going up[37].

US cities use TIF extensively for redevelopment and infrastructure provision in urban 'blight' areas. Blighted areas are usually characterised by dilapidated infrastructure, low incomes, unsanitary conditions and a high rate of tax delinquency[38]. TIF has also been used to fund rail extensions and station area projects in several American cities such as Chicago and Portland. TIF is considered a 'self-financing' tool as local governments do not need to put up additional fees or increase existing tax rates. In terms of private sector involvement, TIF is less likely to drive away private investment as the normal taxes are used to collect the increased value and they are simply hypothecated in later years. The land-based levies described earlier begin immediately in order to pay back government loans, but TIF waits until the developments are completed and value has seeped through the land-based taxes into Treasury. It is therefore likely to create more economic value as market forces are not impeded but are tapped in the same way they are in any other part of the city.

TIF has enabled cities to issue project-specific TIF bonds to raise the capital costs of a project. A US$2 billion subway extension project (to Hudson Yards) in New York City is being financed by raising funds through municipal TIF bond sales. The city of San Francisco uses a tax increment financing approach to fund transit and local development[39].

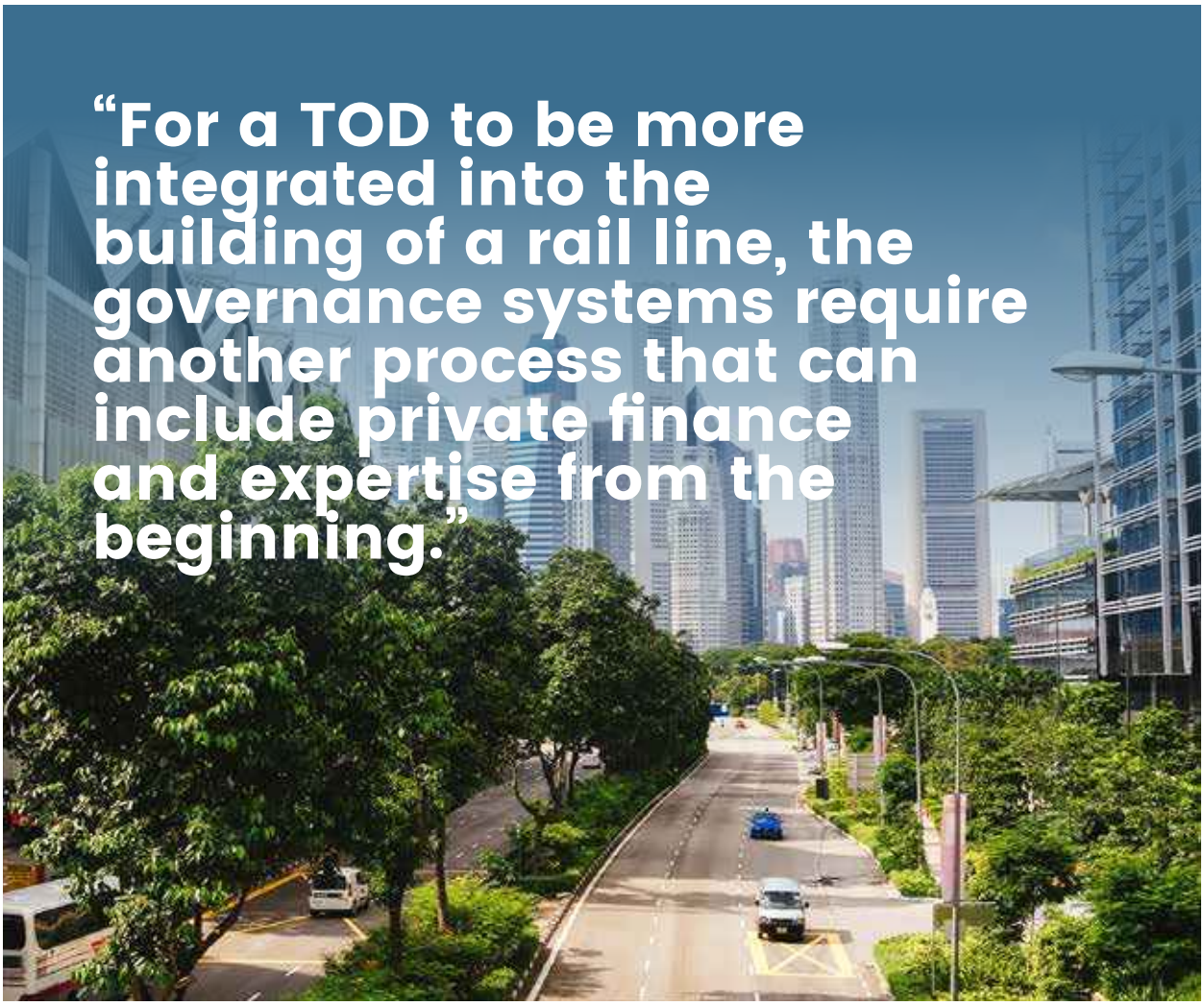
TIF is a fully government-controlled land value capture tool, where no extra private investment is required directly into the infrastructure. It also does not need to involve partnerships with community and businesses to enable it to happen. However, TIF does eventually flow into the infrastructure pool controlled by Treasury and can be re-used for other projects. Because the infrastructure is targeted to enable urban regeneration it is better at value creation as it is attempting to invite more private investment into the precinct being targeted and thus there is an integrative force linking transit building to urban regeneration. TIF tools thus are targeting broader economic gains from specific areas, though they are somewhat remote from the process of TOD building and could indeed be marginalised in the focus on building the rail system, as has happened in many cities.

One other flaw in TIF is that revenue streams are not always stable and predictable due to fluctuations in real estate values. It is possible for governments to suspend or cancel TIF districts due to budget deficits or according to local and political circumstances, as in the case of California and Chicago. TIF also requires significant institutional capacity to implement due to assessment, planning and compliance processes at local levels; however, this is a necessary part of any attempt to create urban economic value.

37 McIntosh, Trubka & Newman (2015), op. cit.

38 Mathur & Smith (2012), op. cit.

39 Demause, N. (2015). Get ready for the MTA's $2 Billion subway station. Retrieved from www.villagevoice.com/news/get-ready-for-the-mtas-2-billion-subway-station-7312417
Clark, G., & Mountford, D. (2007). Investment strategies and financial tools for local development. Glasgow: OECD.
Schlickman, S. E., Snow, J., Smith, J., Zelalem, Y., Bothen, T. (2015). Transit value capture coordination: Case studies, best practices and recommendations. Chicago IL: Urban Transportation Center, University of Illinois.



Another way of bringing together private and public funding that is largely controlled by government is developing through the use of government companies and ‘Unsolicited Bids’ that are designed to make money for the company. Unsolicited bids are generally used by private companies, but in the two cases below (Boxes 3 and 4) they are being used by government companies. In a way, this is like a TIF as the money to repay the financing is being provided by the government company (instead of Treasury being refunded from its own tax generation).

The first example is from a superannuation company, the Canadian pension fund La Caisse de Depot et Placement du Quebec, in Montreal. Similar to the Hong Kong MTR Corporation, the Caisse is publicly owned but was established to undertake investments on commercial principles, mimicking a private company. Box 3 has details of the Caisse’s first project and the investment model. The company makes profits from land development and farebox returns that go back into the rail system to pay back its financing. This is more like Model 4 than any other, except it is being driven by a company established by government and hence is being linked to Model 2.

The Caisse intends to export its procurement model and such a project is currently under consideration in Auckland. The Caisse has partnered with the NZ Super Fund to make an unsolicited proposal to the New Zealand Government to deliver two light rail lines, which are being considered by the Government at the time of writing. See Box 4 for more detail.

The role of Unsolicited Bids will be examined further in Chapter 9 as they can help deliver the kind of partnerships needed to integrate transit, finance and land development, as suggested in Boxes 3 and 4.

BOX 03

Réseau Express Métropolitain, Montreal

The Réseau Express Métropolitain (REM) is a planned new urban rail transit line in Montreal, Quebec, which will be partly funded by an institutional investor, who is also the proponent. The proponent is a Quebec provincial superannuation fund called La Caisse de Depot et Placement du Quebec (the Caisse), who would be providing financing and partial funding for the project (approximately half of the capital cost). Planning and delivery are all managed by the Caisse's infrastructure subsidiary, CDPQ Infra, which puts out construction to tender. The Caisse has called this model a 'public-public partnership'. The CDPQ Infra business model is presented in Figure 8.

The proposed rail line will be 67 km long, with 26 stations, which branches into three spur lines at one end of the line. The line is to be automated and headways on the line will be as low as 2.5 minutes (or 16 trains per hour), depending on the time of day and location on the line. The REM will connect with several existing lines. The project website describes the system as light rail, but capacity will be 600 passengers per vehicle, which is more like heavy rail as it is at the upper end of what is generally considered the capacity for light rail. Construction is due to begin in 2018.

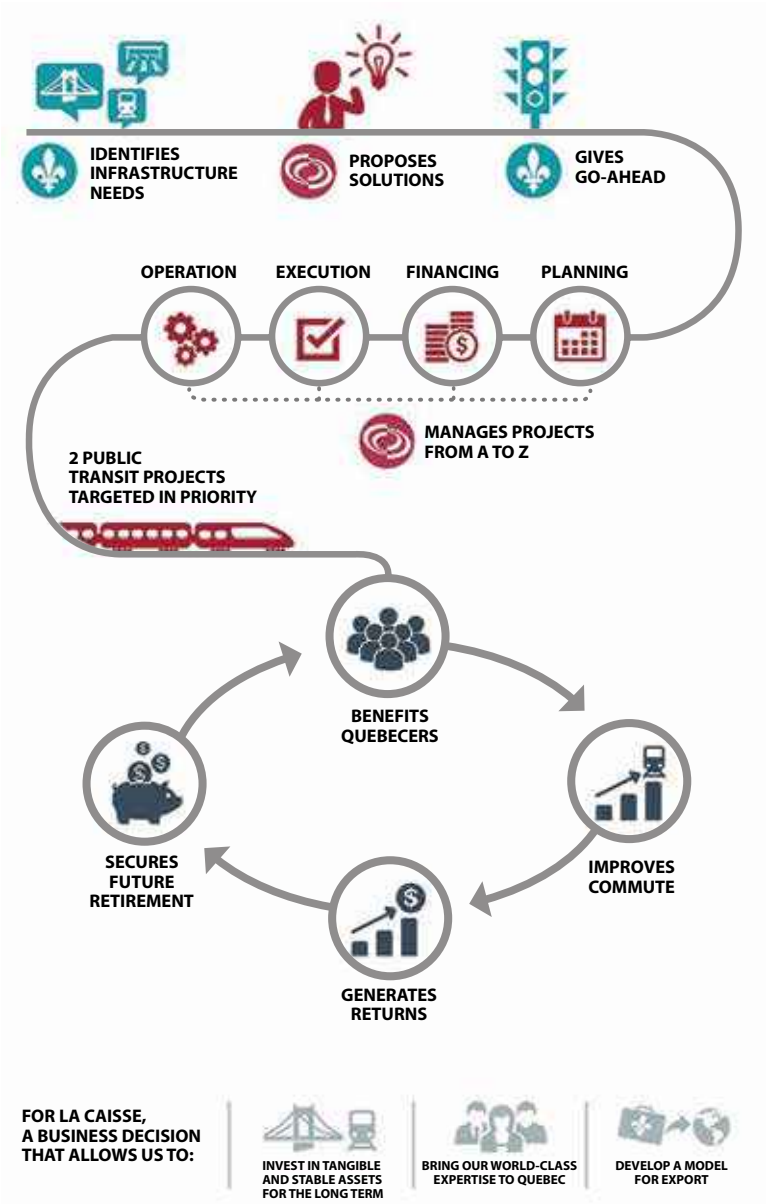


Figure 8: *La Caisse Infra business model. Source: CDPQ Infra, https://www.cdpqinfra.com/en/the-model*

BOX 04 Auckland Light Rail Unsolicited Proposal

Auckland Transport and the New Zealand Transport Agency are in the process of planning two new light rail lines for Auckland, to ease congestion, and "to help make Auckland a more modern, sustainable, connected, progressive, globally-competitive city". (Auckland Transport, 2017).

Transport infrastructure has traditionally been funded from general government revenue in New Zealand, but the government-owned pension fund NZ Super Fund has submitted an unsolicited proposal to the New Zealand Government to form a consortium to fund and deliver the project. This offer was to assess the project for commercial investment (NZ Super Fund, 2018).

Writing in the media, NZ Super Fund's Acting Chief Executive stated that infrastructure is a good investment and that the light rail project would be entered into on prudent commercial terms. He also stated that the project had the potential to unlock land for residential and commercial development (Whineray, 2018). This would be similar to the Hong Kong MTR Corporation model. The MTR is a majority government-owned company, delivering public infrastructure on prudent commercial principles, and does not rely on cash subsidies from the Hong Kong Government (MTR Corporation Limited, 2014). NZ Super Fund have not made it clear if their proposal would involve similar land development as their source of funding, but this is more than likely as farebox returns are not enough, even in Hong Kong. The proposal uses the same model as the CDPQ Infra model, and CDPQ Infra is named as one of the partners in the consortium, bringing light rail expertise (Whineray, op. cit.). CDPQ Infra had planned to export its model (see the bottom of Figure 8 in Box 3) and the Auckland proposal may be an early attempt.

At the time of writing, the New Zealand Transport Agency is currently undertaking a process to explore possible options to finance, procure and deliver the project, working with the Ministry of Transport and the Treasury. The Government had announced a 10-year Auckland transport plan, with NZ$1.8 billion for the light rail network (Robertson and Twyford, 2018). It has not been made public whether this funding would be made available to NZ Super Fund's consortium, but the Government did acknowledge the need for private investors to require a commercial return.

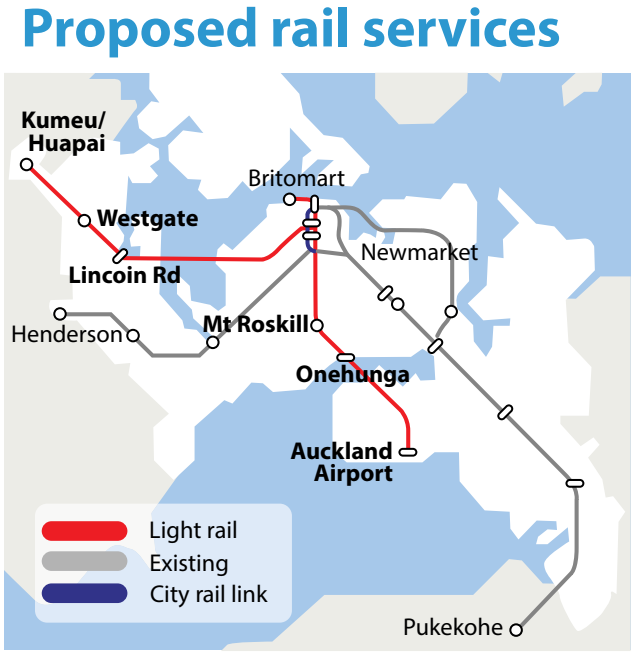


Figure 9. *Auckland Proposed Rail Services. Source: NZ Herald*

Mechanism 3. Mostly Private and Partly Public: Special Improvement District Levies

Special Improvement District (SID) levies come historically from a local amenity-based levy, set up where an area needs improving and private interests initiate or are willing to contribute a levy to improve the amenity of an area. Businesses are encouraged to *tax themselves* for the good of the infrastructure or amenity that they create together. Local governments simply collect the funds and manage the procurement of the disbursement to enable the improvements. This can be for security, for heritage conservation or simply providing better spaces that attract people to stay and hence create value in the area. SID levies are now being extended into whole corridors to create urban rail and urban regeneration in TODs[40].

SID levies are called various things in various parts of the world. In America, Special Assessment District (SAD) fees have begun to be used in Los Angeles and Seattle to fund new rail lines. The SADs are known as Benefit Assessment Districts (BADs) in Los Angeles and Local Improvement Districts (LIDs) in Washington DC, whilst in Australia they are Business Improvement Districts (BIDs).

To implement a SID, SAD, BAD, LID or BID fee, governments identify specific special districts which can benefit from the planned public infrastructure in terms of land value uplift, though the motivation for doing this is most likely to have begun from a local community. The identified area usually comes out of a partnership from the bottom up, where businesses, local governments and communities recognise the need for urban regeneration. In the transit development case it would be where communities – residents, business and local governments – recognise the need for a new urban rail line and a new set of TODs that could be unlocked by this. Through negotiations, a partnership is established where a SID levy is agreed across a whole corridor of local governments, businesses and communities, which can enable the whole process of urban rail and urban regeneration to proceed[41]. This is different to the land-based Levies often used in value capture work and which are seen now to significantly under- value the potential of a partnership. SID's involve the private sector from the beginning and they are worked out in partnership, based on the redevelopment potential that is assessed to be unlocked by the private investment enabling the infrastructure build and the urban regeneration to proceed together. They are not imposed from a remote agency and hence they are more likely to create goodwill about urban development among the private and community partners, which can contribute significantly to value creation. A SID can also include special area levies and parking levies as set out in the fully-government land value capture tool, but only if they are worked out in partnership with business and community to enable more significant economic value possibilities.

In the case of the South Lake Union Streetcar project in Seattle, a SID fee from 760 land parcels was estimated to provide 52 percent of the total project cost. The City of Seattle issued government bonds to raise capital and linked them with a SID fund. The city assessed a SID fee in 2004 and land-owners of the SID area approved it in 2005; the streetcar project became operational in 2007. The assessed SID fee was based on estimated land value uplift for various land uses. The land owners were provided an option to pay a SID fee up front or in 18 years at a 4.4% interest rate. In this case, the use of SID was considered as low-risk as it was applied in an established urban area with a strong real estate market[42].

In San Francisco, their SID began with the establishment of a local committee by the district's residents, business owners, tenants, schools and developers. The committee prepared a local development proposal including a financial plan and sought approval from local government authorities. The district residents were charged with elevated property taxes to fund the infrastructure. The involvement of developers in the committee from the early stages was notable as they were perceived as a catalyst for the investment[43].

40 Matan, A. & Newman, P. (2016) People cities: The life and legacy of Jan Gehl, Island Press, Washington DC.

41 Mathur & Smith (2012), op. cit.

42 Matan, A. and Newman, P. (2016) People cities: The life and legacy of Jan Gehl, Island Press, Washington DC.

43 Clark & Mountford, op. cit.

Business Improvement Districts (BID) are common in the US and Australian cities for small area improvements. A BID is a non-profit organisation for a designated commercial area involving the local land-owners and is used to enhance infrastructure and services of the commercial area to help improve local business. BID services are funded through an additional charge on land-owners. There are about 72 BIDs in New York City serving 84,000 business[44]. The potential to turn a BID into a larger SID with urban rail and TOD outcomes remains as a real option in many cities, as the BID processes are well understood and trusted.

The only examples found so far that use the SID model for urban rail and urban regeneration are in Portland and Seattle though there are signs that new projects are emerging elsewhere in the US (see Box 5).

BOX 05 Light Rail Projects in the Pacific North West, US

Portland Light Rail. The Portland MAX light rail was a fully government funded project from the 1980s and was so successful that various other communities wanted to have a similar urban regeneration process in their area. One old industrial area was the Pearl District and the businesses and residents of this area lobbied to have a modern street car link them to the city centre. The Portland Streetcar opened in 2001 and is owned by the City of Portland and managed by Portland Streetcar Incorporated, a non-profit public benefit corporation whose board of directors report to the city's Bureau of Transportation. The project was funded by local, state and federal funds as well as a SID or as they called it, a Local Improvement District levy on local businesses which covered around 10% of the costs. The project has been highly successful and local businesses have made far more money from the regeneration of the Pearl District than they or the city ever considered possible. Hence, other cities have followed the model including Seattle with a bigger proportion of SID funding.

Seattle Light Rail. A project called the South Lake Union Streetcar was instigated by community and business interests over several years. The prospect of urban regeneration being unlocked by a light rail service was generated by a range of businesses and residents who lobbied for the return of the historic tramcar service. The South Lake Union Streetcar project was able to attract the interest of local, state and federal governments who worked out how to fund the project with the local business community. A SID fee from 760 land parcels was estimated to provide 52 percent of the total project cost. The City of Seattle issued government bonds to raise capital and linked them with the SID fund. The city assessed a SID fee in 2004 and land owners of the SID area approved it in 2005; the street car project became operational in 2007. The assessed SID fee was based on estimated land value uplift for various land uses. The land-owners were provided an option to pay a SID fee up front or in 18 years at a 4.4% interest rate. In this case, the use of SID was considered as low-risk as it was applied in an established urban area with a strong real estate market (Mathur and Smith, 2012). Only 12 of the affected property owners formally objected to the proposed Local Improvement District tax. The South Lake Union Streetcar is owned by the City of Seattle and operated and maintained by a transit agency with representation from the local community.

44 City of New York (2016) Business Improvement Districts. Retrieved from www1.nyc.gov/site/sbs/neighborhoods/bids.page

In Tokyo the Tsukuba Express is a new rail line that substantially fits the SID model in that local governments along a corridor are part of the company that planned, built and operate the rail and TOD-based system. This project is explained in Box 6.

BOX 06

Tsukuba Express, Tokyo, Japan

One example of a semi-private rail project is the Tsukuba Express (TX) project in Japan. The TX opened in 2005, and runs for 58.3 km, from Akihabara Station in central Tokyo, to Tsukuba, a regional city to the north-west. This included 25.5 km of track on viaducts, 10.2 km on bridges and 16.3 km in a tunnel.

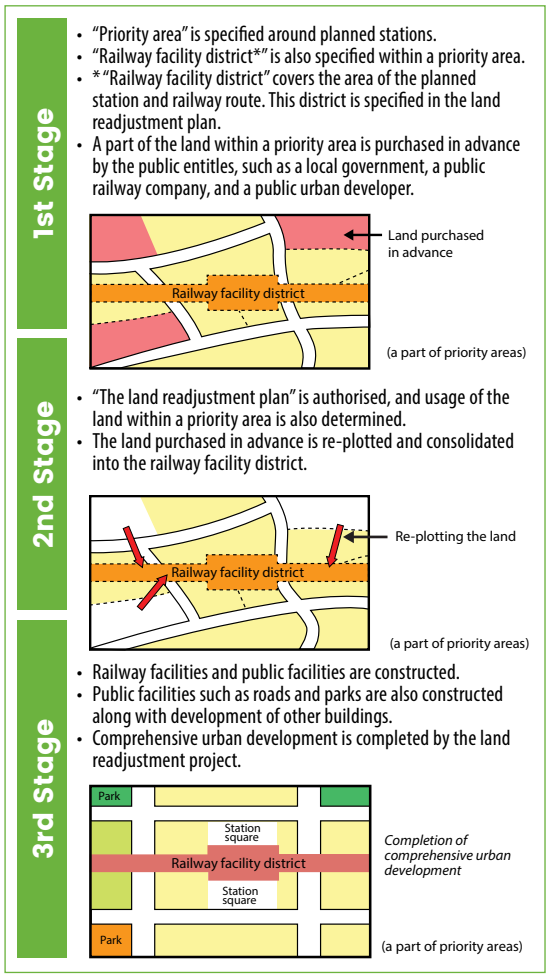


Figure 10. *Land readjustment – conceptual diagram based on Tsukuba Express plan, Tokyo. Source: Kurosaki and Ogura (2013)*

This project was delivered by a specially-created company, the Metropolitan Intercity Railway Company, which is jointly owned by city, prefectural and metropolitan governments along the route, and 189 private companies. Real estate sale, leasing and management is part of the project and undertaken by the company (Metropolitan Intercity Railway Company, 2017). The company has a number of other side businesses as well.

Land assembly was undertaken through land readjustment, a well-established Japanese process for assembling land for infrastructure and redevelopment. The total land readjustment area was approximately 3,000 ha. Individual redevelopment areas ranged in size from 9 ha in central Tokyo, to 485 ha.

Land readjustment was undertaken using the Integrated Development Law, a law passed to better co-ordinate railway construction and land readjustment. This involved buying up parcels of land in the vicinity of the rail infrastructure and station development areas. These parcels are then 're-plotted': re-arranged into regular shapes, with the remaining land owners in the area swapping their land for a smaller area, but of higher value due to the regular shape and installation of service infrastructure. The Integrated Development Law requires that only the public entities delivering the project can re-plot land to the area required for the tracks and station infrastructure (Kurosaki and Ogura, 2013).

Government financial support was provided in the form of concessional finance, with 80% of the company's financing coming from non-interest-bearing loans from the Japan Railway Construction, Transport and Technology Agency (Metropolitan Intercity Railway Company, undated).

The early SID transit and TOD projects in the US are now leading to a range of more financially independent projects including the Brightline rail project in Florida which is 100% privately funded but has significant partnerships with the local and county governments and the local community[45]. A new project in Los Angeles is called Eco-Rapid Transit which is being funded partly from a sales tax passed in the November 2016 elections. However, it is also looking at how to raise funds in a SID-type exercise along the corridor. Eco-Rapid Transit is a 'joint powers authority', whose board has representatives from the 12 local governments along the route, plus the Burbank-Glendale-Pasadena Airport Authority, which operates Bob Hope Airport along the corridor.

As BIDs are common in Australian cities for small area improvements, their application to providing transit infrastructure already has a governance history, though not yet in something as big as a mechanism proposed by the Federal Government, a so-called City Deal (discussed later).

The following are the characteristics of a BID or SID that enable it to be expanded into a City Deal for integrating transit, land use and finance:

1. A BID is a non-profit organisation for a designated commercial and residential area involving the local land-owners and is used to enhance the infrastructure and services of the commercial area to help improve local business.
2. Community groups can help drive the community benefits in any BID.
3. BID services are funded through a special charge on land-owners.
4. BIDs can manage finances through a local Board/Committee and the right structure for an alliance of partners.

No BID or SID tool has ever been used to create an urban rail project in Australia but they could be used in the new City Deal process outlined later or as part of an Unsolicited Bid.

45 Newman, Davies-Slate & Jones, op. cit.

Mechanism 4. Purely Private: Entrepreneur Rail Development

The Entrepreneur Rail model was created out of the need to truly integrate transit and land use through finance to create the highest value outcomes. However, it is not as though it is entirely new, as historically this is how tram and train lines were developed as outlined above; also 'joint development' has been used for building urban rail since the 1980s wherever a major TOD was considered as a joint outcome[46]. These joint developments were set up to supplement government money through land development, but they can also be used to go further and create a fully private approach[47].

The Entrepreneur Rail model emphasises the important role of involving private sector expertise and approaches to redevelopment in the early stages of any new urban rail project, otherwise it is not going to be possible to generate private investment or to create the economic value that is sought from developing urban regeneration-based TODs.

Thus, the tools in this section are based on formal public-private partnership arrangements designed to implement infrastructure projects through risk-sharing but all or most of the funding comes from private investment. These PPP arrangements where the private sector pay for most of the infrastructure and make money out of the value created, are common in mining, energy, ports and airports but are not yet very common in many parts of the world like Europe, America and Australia for transit projects. They are, however, common in Japan and Hong Kong. In our view, this Land Value Capture tool is likely to create the most economic value.

Fully private capital and operational funding with minimal government in-kind support can be illustrated from case studies where this approach has been used, including the Brightline project in Florida, Rapid Rail in Gurgaon, India and Tokyu Den-en-toshi Line in Japan. A new high-speed rail project in Australia, CLARA (Consolidated Land and Rail Australia), is also using this approach (see Box 7).

46 Newman, P., & Kenworthy, J. (1999). Sustainability and cities: Overcoming fossil fuel dependence. Washington DC: Island Press.

47 Newman, Davies-Slate, & Jones, op. cit.

BOX 07

Consolidated Land and Rail Australia

The Consolidated Land and Rail Australia (CLARA) group have proposed a high-speed rail link between Melbourne and Sydney. The proposal is notable for the group's public declaration that they do not require any government funding support to deliver this project. Instead, CLARA's plan is to build cities along its route as its ultimate source of funding. The group has already gained control of the land on which it plans to build these cities, which is currently rural. This land asset will be used to repay the debt on the railway and city infrastructure. CLARA states on its web page that it should not need public funding.

The proposal is for eight cities along a corridor between Sydney and Melbourne, with the first stage involving either running from Sydney to Canberra, with three new cities, or Melbourne to Greater Shepparton, with two new cities. This implies that it could be some time before the Melbourne to Sydney route is complete. CLARA envisages higher-density, mixed use cities, as a means to promote non-car transport modes and use infrastructure more intensively.

Figure 11. *Proposed CLARA high speed rail line in Australia, with proposed city sites marked. Source: Consolidated Land and Rail Australia Pty Ltd* http://www.clara.com.au/

It is intended that each city would have a major anchor tenant, ideally a technology company, which would provide a core of 5,000 to 10,000 jobs. The workers in these jobs would then generate demand for local services and CLARA estimate that 10,000 such jobs would result in a resident population of 25,000 people. This size of population would be sufficient to attract a critical mass of government and private sector services to the city, making the new cities more attractive to further residents. The long-term goal is for cities of 400,000 people within 35 years.

Other potential employment within these new cities could be as the hub of an express parcel delivery service. Freight is already being delivered on high speed rail networks in countries including France, Germany and China. In these markets, attracting a sufficient volume of parcels is crucial to the operation of high-speed freight trains (Liang et al, 2016). Liang et al (2016) found that night trains are more appropriate for mail and parcel deliveries, noting that express delivery businesses often operate on overnight flights, when there is spare capacity at airports. Similarly, the old private tramways were used for both passengers and freight (Culpeffer-Cooke, et al, 2010), increasing utilisation of the fixed rail asset.

CLARA's new high speed rail lines would connect to the CBDs of Sydney and Melbourne, with significant tunnelling included in the project's budget. The group views rapid travel times to the major cities as critical to the new cities attracting residents; hence the preparedness to budget for extensive tunnelling work (Cleary, 2018).

Despite being a major undertaking, this project did not originate in a government process, but was originally presented as a proposal as a private initiative. The Australian Government subsequently asked for proposals under a process set out in its Faster Rail Prospectus. CLARA then made a submission and has been short-listed in the early stages of the project, and funding has been provided by the Government to complete a detailed business case. The group views this project as a city development project, rather than a transport project, with the transport infrastructure enabling the development of new cities in the regions (Cleary, ibid.). There are plans to include a Trackless Tram in each of the new towns that would connect the urban developments to the high speed rail station and to other urban services clustered around the station. Such innovation would make car ownership significantly less and hence save money for residents and reduce development costs.

CLARA plans to procure the rail infrastructure from an international provider, under a design, construct, finance, own, operate and transfer contract. Financing is expected to be provided on a long-term loan, and at a low interest rate. There is significant competition between Chinese, Japanese and Korean providers of high speed rail technology and a willingness to provide financing support. The loan would be backed and serviced with the land asset that has been acquired for the alignment. A financing guarantee would be one means for the federal government to support the project, in addition to necessary regulatory approvals. The transfer of the asset could be back to government, rather than to CLARA, and government could choose to re-privatise the asset at that time.

Artist's impression of Miami's Brightline inter-city rail service.
Source: All Aboard Florida, https://miamicentral.com/brightline/stations/

Brightline is a privately owned inter-city rail service and TOD project linking Miami to Fort Lauderdale and West Palm Beach using a relatively fast train (160 km/hr). Phase 1 of the Brightline project was opened in late 2017. The project utilises an existing freight rail line of 312 kilometres and plans to add 64 kilometres to Orlando after the first stage has been established. Project finance was raised through a mixture of debt, bonds and equity. Private developers have not had to seek public subsidies or grants other than federal low-interest private activity bonds which provide a risk guarantee. Such a private sector financing structure has been made feasible through the establishment of TODs at each of the four rail stations[48]. Brightline's economic study notes that in the timeframe from 2014 to 2021 the project will result in an economic impact of approximately US$6.4 billion comprised of $3.4 billion from Rail-line Construction, $887 million from Rail-line Operations, $1.8 billion from TOD Construction and $284 million from TOD Operations. In the same timeframe, the project will add US$653 million to Federal, State & Local Tax revenue, $945 million from rail and $235 million from TODs. Therefore, Brightline is showing significant value creation through private investment and expertise in land development[49].

In the case of Gurgaon in India, the urban rail project is fully privatised under a Design Build Finance Operate Transfer (DBFOT) agreement with a 99-year concession period. The private developer financed the project through private loans and equity raising. The government provided an existing right of way for the rail line; however, access to the station and transport interchange facilities as well as land acquisition for stations was undertaken by the private developer. Project revenue sources include farebox collection, advertisement and leasing of shops within the station area; however, no land development was involved. The private developer conducted an aggressive advertising campaign which resulted in 61% of the total revenue in 2014-16 through the auctioning of the naming rights for the stations (even before the stations were opened) and advertising space on the inside and exterior of the train coaches[50]. The private developer operates 'free' feeder bus services to adjacent industrial hubs from stations in order to increase farebox revenue. The feeder service benefits the commuters by

48 Renne, J. L. (2017). Make Rail (and Transit-Oriented Development) Great Again. Housing Policy Debate, 27(3), 472-475. DOI: 10.1080/10511482.2017.1298213

49 The Washington Economics Group. (2014). Economic Impacts of the All Aboard Florida Intercity Passenger Rail Project. Retrieved from allaboardflorida.com/docs/aaf/project-details/all-aboard-florida-economic-impact-full-report.pdf?sfvrsn=2

50 Deloitte Haskins & Sells. (2015). Rapid metrorail Gurgaon limited: Financial statement 2014-15. Retrieved from http://www.itnlindia.com/application/web_directory/Annual%20Reports/2015/RAPID%20METRORAIL%20GURGAON%20LIMITED.pdf

Hyderabad Metro in India. Source: The Hindu Business Line

providing comfortable last mile connectivity. This case shows that full private participation results in innovative revenue strategies and greater public benefit; however, it is very unusual not to have used land development opportunities and it remains to be seen whether the project can survive without this.

Hyderabad Metro is another Indian case, but this one does involve significant land development. It is built on a DBFOT agreement wherein a private developer was provided about 10% of the capital cost as a grant (equity) from the federal government of India and the state/provincial government granted air-rights for commercial development of about 12.5 million sq. ft. over the three depots and 6 million sq. ft. at the 25 selected stations. The private developer has raised capital through loans and equity. The private developer's concession period is for 35 years and the project was operational in mid-2017. The private developer started renting the spaces before the rail was operational. This case shows the private sector's active approach towards enhancing revenue streams.The semi-private, semi-government owned Hong Kong Mass Transit Railway (MTR) Corporation has to run as a private corporation, undertaking significant land development with private sector partnership to turn a net loss in the 1980s into a profit worth US$2 billion in 2015. The key to MTR's financial success was starting the land development based finances before the actual rail line operation[51]. Such an entrepreneur approach is required in urban rail projects which necessitate private involvement.

Japan has historically used something more like the Entrepreneur Rail Model development in order to fund and build urban railways. They amalgamate irregularly formed properties that result in smaller but fully serviced urban neighbourhoods and sell 'extra' land to fund the associated railways. The government, as in-kind support, enables land consolidation and acquisition. This approach is known

51 Cervero & Murakami, op. cit.
Mass Transit Railway. (2016). MTR Corporation: 2015 Annual results. https://www.mtr.com.hk/archive/corporate/en/investor/MTR_2015%20Annual_Eng%20analyst%20(slide)%20Final.pdf
Zhao, Das & Larson, op. cit.

as land assembly or land readjustment. In the case of the Tokyu Den-en-toshi Line in Tokyo described earlier, in addition to land adjustment, the private company purchased land before announcing their plan to build the rail line and on some land parcels they co-developed the land with land-owners. A private developer promoted the development by selling land, constructing housing, and attracting shopping centres and schools. This project was mainly implemented on a greenfield area[52]. The economic downturn in Japan in the last few decades has resulted in additional strategies for value capture, such as strategic infill urban development around train stations. Private companies have been able to raise equity from the stock market for rail projects in Japan to avoid interest on loans[53].

The Entrepreneur Rail model development cases show a larger value creation potential than other models, through extensive private participation enabling comprehensive and integrated development of TODs. The cases show that urban rail projects require early private involvement to enable active and entrepreneurial approaches for creating innovative ways for higher value and revenue.

The integrated transit, land development and finance process as outlined so far is clearly best suited to the approach of Models 3 or 4 (or perhaps 2 if developed as an Unsolicited Bid). In the next section we examine how a much greater proportion of private funding can be attracted to entrepreneurially financed transit and land development than is currently the case in an Australian context, through the procurement process. The next two chapters also show how common good outcomes can be integrated into this process through planning and governance systems.

52 Bernick, M., & Cervero, R. (1997). Transit Villages for the 21s' Century. New York: McGraw-Hill.
Sanders, J. (2015). Linking station node- and place functions to traffic flow: a case study of the Tokyu Den-En Toshi line in Tokyo, Japan. Masters thesis. University of Twente. http://essay.utwente.nl/67082/1/200150515%20Master%27s%20Thesis%20Joran%20Sanders%20%20Linking%20station%20area%20node%20and%20place%20functions%20to%20traffic%20flow.pdf

53 Metrolinx (2013). Land Value Capture Discussion Paper. http://www.metrolinx.com/en/regionalplanning/funding/Land_Value_Capture_Discussion_Paper_EN.pdf

06

Procurement of Integrated Transit, Finance and Land Development

Considering the different value capture tools in the previous sections, there must be joint public private partnership approaches in all of the models, especially the ones that create the most value. Significant private involvement in transport infrastructure is thus necessary to create new economic value through bringing innovations in the planning and administration of transport infrastructure, new technology and, most of all, in creating the best market-oriented development potential in the land areas around stations. These conditions are really only found in Models 3 and 4: the Fully Private model or the Mostly Private model. These two enable the highest value creation and will be the focus of how to procure a transit project as well as considering how Unsolicited Bids can be included as these can also integrate transit, finance and land development and can be variable in the extent to which they involve public assets and funding.

The Limits of Government Land Value Capture Tools

The fully-government land value capture tools are rigid in terms of their application to fund a specific infrastructure element and will make some development around stations less attractive for investment. Value capture can occur in land-based levies and tax increment financing tools to help government fund urban rail, but this capture may not lead to enough further private investment and wider value creation to enable the full economic potential of the infrastructure and its agglomeration opportunities. Fully government-led projects also tend to face problems in co-ordination between land use and transport planning as they are often operating in organisational 'silos' that follow linear decision-making processes rather than following in partnerships that are directed to building the city not just the transit system.

As shown in the previous chapter if government agencies continue to plan and fund urban rail without establishing early partnerships with private funders and community groups, they will have fewer and fewer opportunities to create sustainable transport and high value TODs. If governments seek greater involvement of the private sector from the start of projects, then by competitive transparent bidding

it is possible to achieve greater and wider public and private economic goals through economic value creation. There is therefore much more likelihood of achieving the transit outcomes and the land development outcomes being sought by cities around the world.

When there are true private partnerships, with finance as a link between transit and land development, the private participation, and more so wholly private projects, can create additional value and then capture this value. This is what is happening in the case studies showing entrepreneurial opportunities that have been created, such as in the case of Brightline and many rail projects in Japan. Therefore, the optimal tools seems to be Models 3 and 4, due to their private sector participation and comprehensive development for wider economic gains, or an Unsolicited Bid that brings a strong land development component into the project from the beginning.

The fully private approach, the Entrepreneur Rail Model, is the best in theory but may be hard to do when a city is not used to any involvement of private funding opportunities for building transit systems. Some cities are taking this approach but are using government companies to create the opportunities in land development in order to minimise the risk. The same can apply to the Special Improvement District Levy approach (Mechanism 3) where private and community partnerships that help drive the rail and TOD planning and delivery, are created in specified corridors.

The development of a clear procurement process can help mainstream this more entrepreneurial approach to provide integrated transit, finance and urban land development. If governments manage this approach in partnership, then significant value creation can occur and risk can be minimised. The other approach is to use Unsolicited Bids to generate the kind of partnerships required. These can involve public funding and other assets like government land but are still part of a process guided by government – see more in Box 8 in the next chapter.

The tools outlined in Mechanisms 1 and 2 are able to deliver urban rail but may not achieve much in the way of value creation in the associated TODs. Thus, the next sections deal only with Models 3 and 4, as well as Unsolicited Bids.

A New Approach to Planning

Effectively integrating transit, land development and finance requires that urban rail infrastructure be planned and delivered on commercial principles – funded by land development and built, owned, operated and financed by the private sector. It is based around the notion of land value creation and is designed to produce public good through delivering necessary fixed track transit system infrastructure, as well as achieving urban regeneration goals and equitably distributing the economic value generated by such quality transit infrastructure.

So, how do we change our planning approach in this more entrepreneurial mode of transit delivery, as it is based on finding a new market for the combination of urban rail and land development? It cannot be done simply by government planners thinking as they always have, as land development is mostly a private enterprise activity. This was as shown the historic process of how tram and train lines were originally built and it needs to be rediscovered again within transport and land use planning.

Proponents need to provide an estimate of private capital to be contributed by combining land redevelopment potential and patronage potential for capital and on-going costs, then (and only then) should the transport planners produce transit patronage and cost numbers along with detailed routes and urban regeneration plans.

This is instead of the conventional business-as-usual approach of predicting the number of people who could use a railway line based on present land use and the best potential transit route based on the least resistance and least costs. This method then seeks government funding and only then

begins to look at how land development may be facilitated. Generally, this last step is not successful as the route is not determined to optimise land development but to optimise the route for transport planning. The new model allows for a more entrepreneurial approach to transit delivery than traditional procurement models, based on building partnerships and creation of value rather than a predict-and-provide approach (Box 8).

The importance of reversing the order (as in Figures 1 and 2) is because it guarantees transit and land use integration through the necessity of delivering a return to the source of the financing. This return could not be generated from the separate building of a rail line by itself or by the separate development of urban regeneration without the increased amenity provided by a rail spine to the land involved. Rail infrastructure generates significant positive externalities through increased land values and improved business productivity and thus the model seeks to find the best partnerships that can enable integration of the rail and land development functions in urban economic development.

If built under the old model – a welfare model – then existing land-owners or investors come in and take windfall profits from the land around stations, thereby capturing much of the economic value.

It is an unearned transfer of wealth, from ordinary taxpayers to a fortunate few owning land around the new transport facilities. As well, the opportunity to link land development into rail stations is an afterthought. It is therefore rare and difficult. By contrast, in the Entrepreneur Rail Model, activity centre development can be built into the project, and indeed it is imperative.

The Entrepreneur Rail Model would diminish the public financial burden of providing rail infrastructure and services and enables finance from groups like superannuation funds to provide the investment. It would also radically change how our cities are planned and shaped. Currently, cities are mostly built to central government plans – for land use and activity centres, transport networks, water and power, among others. Under an integrated model of rail delivery, a city's rail network would instead be shaped much more by the value of urban regeneration and land value creation in the urban economy.

Cooperation between National, State and Local Governments will need to be developed to make this model work but most of all new ways of working with the private sector in planning a rail line will be required. Only in this way will the true agglomeration benefits, amenity and accessibility gains associated with this land value creation be obtained across the whole city. There is evidence that this value creation is not just shifting land value increases from one area to another but is creating value for the whole urban economy that would not have been created without such investment[54].

This Guide and Manual sets out the concepts behind such a funding model, supporting the benefits of private sector involvement in urban rail, and proposes a procurement process and governance system to enable this to happen.

54 Sharma & Newman (2018b), op. cit.

BOX 08

An Entrepreneurial Approach to Transit

Adapted from work by Daniel Conley, University of Adelaide.

The study of entrepreneurship is a growing discipline with initial efforts focused on individual start-up style approaches with a lack of consensus on the definition and practice of the knowledge in the field (Hitt et al, 2011; Rauch et al, 2009). There is general agreement however that a core feature of the practice of entrepreneurship is value creation, often to obtain private wealth (Hitt et al, 2011). There have been efforts to extend this value creation approach to societal progress with the concept of 'Entrepreneurial Governance' (Link, Link, 2009; Olsson et al, 2015; Link, Siegel, 2007). In the context of public transport, the ERM uses entrepreneurial approaches to deliver a solution that not only attracts private investment but also catalyses greater investment in land development – moving from 'value capture' to 'value creation' (Newman et al, 2017).

Creating partnerships from the start: According to Sarasvathy (2009), effectuation is a logic used by 'expert' entrepreneurs during new venture creation under conditions of uncertainty and it involves starting with what is available, co-creating futures with customers as partners and stakeholders through collaboration, then finally minimising risk and dealing effectively with uncertainty. This is done by building a group of partners and stakeholders from the beginning, reducing uncertainty and risk as a co-created vision is developed between all parties and is realised through collaboration (Sarasvathy, 2009).

Begin with available means rather than pre-determined ends: A key principle of effectuation is to 'begin with a set of available means, rather than predetermined ends' (Sarasvathy, 2009). This means that entrepreneurs do not decide on a 'final product' and then assemble the required resources, but instead begin with what is available to them, giving preference to actions which harness available resources or networks. The traditional approach to public transport planning involves first estimating transit numbers based on current development, then setting the route based on least resistance and least costs, and finally seeking to secure government funding. Underdeveloped lands are largely overlooked as they don't currently generate transit numbers. Instead, the entrepreneurial approach suggests that government should not define the route but just a broad corridor where a transit-activated set of developments are likely to occur.

Creating rather than predicting: In practice this means entrepreneurs focus on the controllable aspects of an unpredictable future rather than acting based on predictions of an uncertain future (Sarasvathy, 2009). For instance, currently transit corridors are assessed based on predicting the number of people who would potentially use a new mass transit system under present land use and travel patterns, and seeking to finance this through public funds or additional rents and rates. Transport planners have struggled with prediction, particularly for road networks, due to the principle of induced demand which causes unexpected behaviour from commuters when new travel options become available (Levinson et al, 2017). The approach that comes out of this principle is the need to focus on creating opportunities for new land use investment, made viable through integration with transit services, which will generate revenue to invest in the infrastructure. It is in this way that the entrepreneurial approach 'creates new markets' that government planners cannot achieve on their own.

How Can Private Funded Rail be Procured and Governed for the Public Good?

There is already significant private involvement in infrastructure delivery in Australia. Public-private partnerships are commonplace in delivering energy, transport, water and building construction, maintenance and servicing[55]. In Western Australia, transport projects have not kept pace to the same degree, with design and construct contracts being the norm, such as was used for the Forrestfield Airport Link, NorthLink WA and Gateway WA projects.

Delivery of a new integrated transit, land development and finance project, is proposed through a DFBOOM (Design Finance Build Own Operate Maintain) model. If sufficient land for redevelopment can be made available through land assembly and all the other issues about zoning and design are resolved, it should be possible to fund a rail line entirely with private capital. This can be determined through a transparent bidding process or through an Unsolicited Bid process managed through government checking off that all key issues have been resolved. As suggested before, other levels of government funding and support can also be used but where possible it is best to use a market-based approach through the land value creation process if a fully integrated set of land use outcomes are desired.

Two procurement processes appear to have emerged from the research on how to integrate transit, land development and finance: one is through Unsolicited Bids and the other is through City Deals.

Procurement through Unsolicited Bids

Integrated land development and rail projects may result from Unsolicited Bids by a private proponent. A substantial parcel of private land may be assembled for redevelopment by a private consortium or major private company backed by a financing such as a superannuation company. Such privately initiated railways will require a range of government approvals to develop their project. It is unrealistic to assume there will be no public land or infrastructure affected by a private railway proposal, even if this is limited to connections to the existing public network. The government approvals process will be complicated by the following likely requests or proposals:

1. Access to the existing publicly-owned rail and bus network. This may become complicated if the proponent requests a guarantee of a minimum service standard from connecting government bus or train services;
2. An exclusive right-of-way over a public road or other land, to build the new tracks;
3. Sale of land or development rights, including air rights, over land or infrastructure that is currently publicly-owned. In the case of an Unsolicited Bid, there may be the need to offer the same land to other potential proponents;
4. A land subsidy from government; or
5. A cash subsidy from government.

In Box 9 the outline of how WA intends to do Unsolicited Bids is outlined. They are called Market-led Proposals. The application to new transit projects funded through land development as outlined in this report is obvious.

The procurement of an integrated transit, land development and finance project through an Unsolicited Bid will still require a step-wise approach and in Appendix 2 a Manual has been created to show the kind of approach that would enable this to happen though such a process is likely to involve more private work in the early stages.

55 Three recent examples of more innovative public-private partnerships in Western Australia are:
- The 140 William Street development, integrated with Perth Underground Station;
- The Cathedral + Treasury project, also known as the Old Treasury Buildings, and the State Buildings; and
- The Perth Stadium project.

BOX 09 Unsolicited Bids or Market-led Proposals

The WA Department of Premier and Cabinet (DPC) is calling unsolicited bids Market-led Proposals (MLPs), with a draft policy on these released. There are comparable policies in force in all other Australian states and territories.

The WA approach is to be a whole-of-government process, superseding existing processes for specific types of MLPs (e.g. the sale of crown land). It is intended to create a single portal for MLPs in all situations. The process will be run by the MLP Unit, within DPC. The MLP policy excludes proposals seeking to obtain industry assistance or a grant.

There is a three-stage evaluation process (plus pre-qualification review).

- **Pre-qualification meeting and review** – To determine if the MLP is within scope and has a reasonable prospect of meeting criteria.
- **Stage 1: Concept evaluation** – Evaluation of the proposal at a concept level to justify preparation of a detailed business case.
- **Stage 2: Business case evaluation** – Proponent prepares detailed business case, in consultation with lead agency, for evaluation against criteria.
- **Stage 3: Negotiation of Final Binding Offer** – Outstanding issues negotiated with a view to entering a binding agreement should the Government accept the offer.

There are two pathways for evaluation:

- An interagency MLP Steering Committee is formed where multiple agencies are needed. An MLP Steering Committee-led process involves Cabinet decisions at Stages 1 to 3.
- All proposals that do not meet the above criteria are evaluated by the lead agency and the decision-maker is the relevant minister.
- In both cases, there will be an Evaluation Panel providing advice to the lead agency/MLP Steering Committee.

Evaluation criteria are as follows:

- Strategic Alignment – The proposal is aligned with government policy objectives and priorities.
- Public Interest – The proposal has significant social, environmental, economic or financial benefits for Western Australians.
- Value for Money – The proposal represents value for money for Western Australians and is affordable in the context of budget priorities. This includes indirect costs over the life of the project.
- Commercially feasible and capable of being delivered by proponent – The proposal is feasible (including financially) and the proponent has the financial and technical capacity, capability and experience to deliver the outcome successfully.
- Risk – Any financial, reputational and/or security risks to government from the proposal are acceptable and there is an appropriate allocation of risk between the proponent and government. Important to note that it is accepted that there could be some risk to government.
- Justification for exclusive negotiation – The proposal delivers outcomes that are not likely to be obtained using standard competitive processes within acceptable timeframes and therefore justifies exclusive negotiations with government. The land value escape argument is relevant here.

All information taken from
https://www.dpc.wa.gov.au/ProjectsandSpecialEvents/Market-led-Proposals/Pages/default.aspx.

Procurement through City Deals

The Australian Federal Government has begun a new approach to funding urban rail; they create a partnership called a City Deal where they provide financial risk guarantees for major partnership projects involving the private sector[56]. This approach showing the various roles in a City Deal is set out in Figure 12 and Figure 13. The approach is similar in the steps involved, as set out in the Manual, but has a more obvious role for the three levels of government.

The integration of all the necessary policies for a complex transit and urban regeneration project is possible if governments at all levels set up partnerships with:

1. Private financing (especially superannuation companies looking for long term investments);
2. Developers (who understand markets and innovation in urban development); and
3. Communities (who know what they want for their precincts and neighbourhoods for the long term).

The partnerships enable the best economic value creation by facilitating social capital, financial capital and political capital[57].

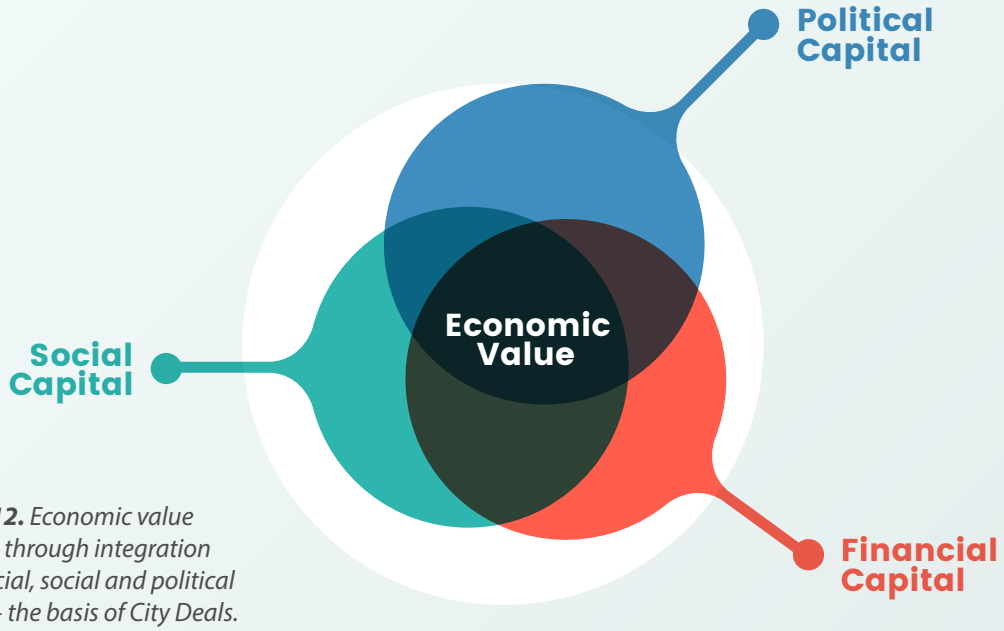


Figure 12. *Economic value creation through integration of financial, social and political capital – the basis of City Deals. Source: Sharma and Newman, 2017*

This kind of partnership which integrates, rather than doing urban development based on separate silos of professional practice and sectoral advice, has been rapidly growing across the world[58]. This is particularly important for the kind of urban developments outlined here involving new ways of bringing the partnerships together that use private funding to help with the big capital costs of transit building[59].

56 Many governments reacted by saying they would prefer the traditional approach of being given cash for projects. However, this misses the point that with financial risk guarantees significant numbers of new projects can be built but they require a new approach with various levels of land value creation tools and partnerships with community and private expertise and investment.

57 Sharma, R., & Newman, P. (2017). Land Value Capture Tools: Integrating Transit and Land Use through Finance to Enable Economic Value Creation. Journal of Planning Education and Research. (Submitted).

58 Clark, G., & Clark, G. (2014). Nations and the wealth of cities: A new phase in public policy. London: Centre for London.

59 Newman, Davies-Slate & Jones, op. cit.

These City Deals follow the approach taken by the UK, but with more specific requirements to enable:

- Partnerships with three levels of government that set out the plan for the City Deal;
- Community support for the projects; and
- Private involvement in the financing through integration of land development and transit, backed up with some funding from Local and State government and a risk guarantee from the Federal Government developed for the partnership with the new Infrastructure and Projects Finance Authority in the Department of Prime Minister and Cabinet[60].

The partnerships are set out in Figure 13.

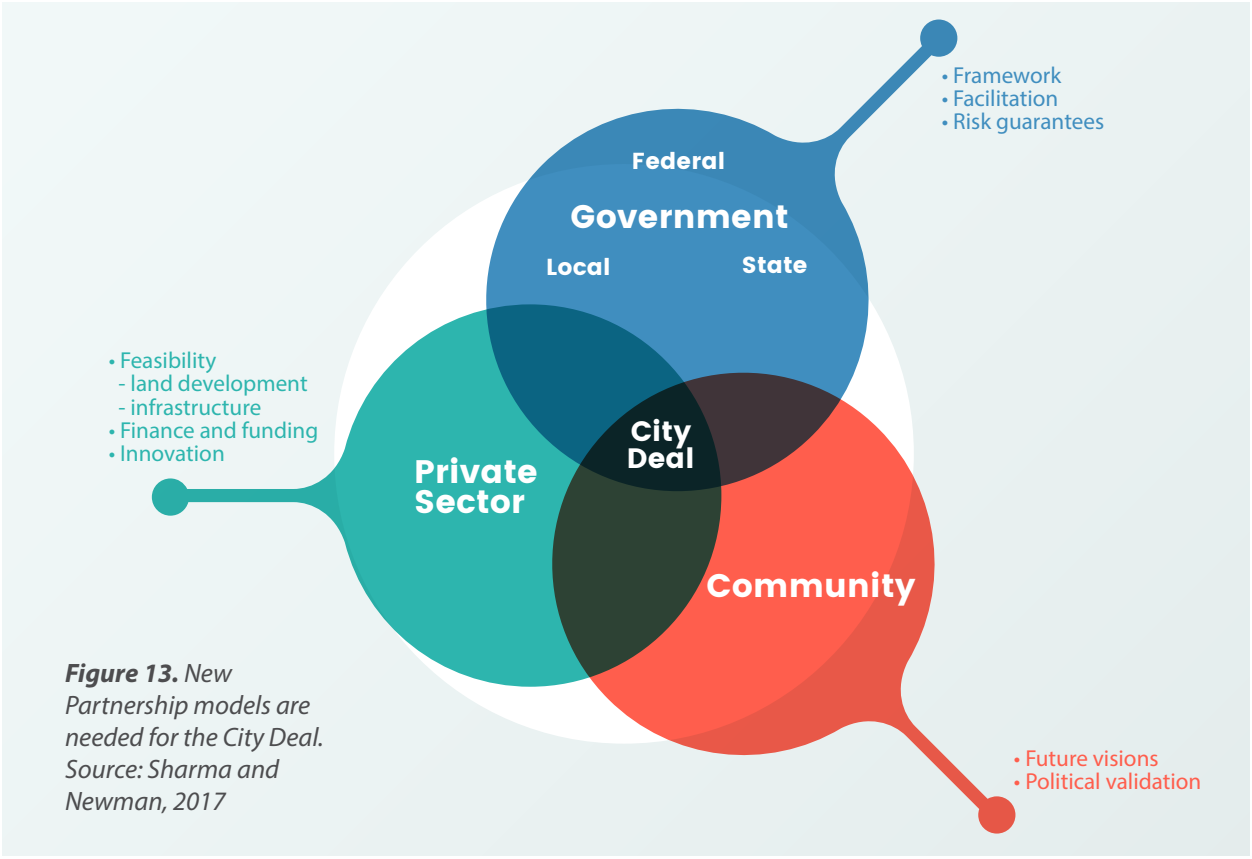


Figure 13. *New Partnership models are needed for the City Deal. Source: Sharma and Newman, 2017*

The outcomes of the City Deals need to show transformational urban development with clear provision of affordable housing, innovation and sustainability objectives such as commitments to decarbonising development. Affordable housing is incorporated through the AUS$1 billion National Housing Infrastructure Facility. Such City Deals put urban planning firmly on the national agenda and demonstrate how the city of the future can be created[61].

The question then remains how do we do the procurement for this new model? What are the best ways of enabling such City Deals?

City Deals mean that cities must create partnerships between the three levels of government and be based around partnerships with private investors who provide the capital that they can return through TOD and urban rail activity. City Deals also require multiple urban outcomes for inclusive, smart and sustainable cities, as well as being clear about community goals (https://cities.dpmc.gov.au/city-deals). The land value capture tools can all provide some help, but the Fully Private and the Partially Public tools are likely to be the only ones that can create a City Deal. Such approaches are increasingly occurring around the world[62].

60 This is based on the UK's Infrastructure and Projects Authority which has attracted several billion pounds of private funding into British infrastructure over the past two years.

61 Commonwealth of Australia (2016) City Deals https://cities.dpmc.gov.au/city-deals

62 Clark & Clark, op. cit.

Considering different land value capture tools is dependent on what is needed most in the particular city. The fully-government tools are rigid in terms of their application to fund a specific infrastructure element and will make some development around stations less attractive for investment thus driving away potential value gains, so a mixture of private sector funding is best done from the beginning of the project.

A key advantage of City Deals is that they can be tailored to particular circumstances. This allows for innovation and experimentation, rather than a standard procedure applied regardless of circumstances; the "one size fits all" approach.

As shown before, if government agencies continue to plan and fund urban rail alone they will create very little value and even less that can be captured to help pay for it. There will be 'value leakage' as set out in Figure 14 below.

The Conventional Land Use and Transport Model

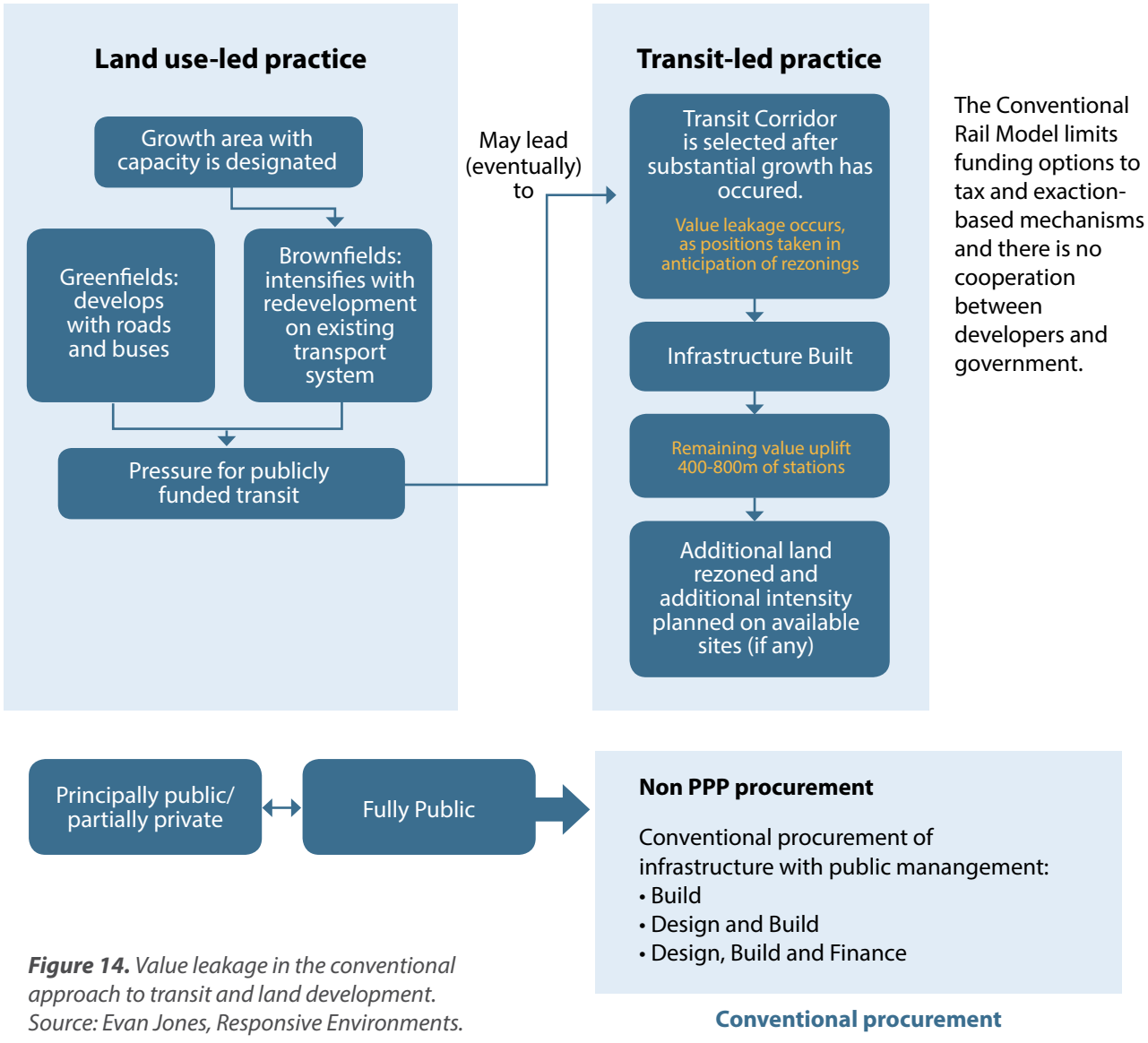


Figure 14. *Value leakage in the conventional approach to transit and land development. Source: Evan Jones, Responsive Environments.*

Cities that only use this conventional approach will have fewer and fewer opportunities to create sustainable transport and high value TODs and thus will not be transformative. If governments seek greater involvement of the private sector from the start of projects, then by competitive transparent bidding it is possible to achieve greater and wider public and private economic goals through economic value creation[63]. The main conclusion from this report is that the more the private sector is involved in the investment and the process of developing a project, the more value creation is likely, though the need for community values to be integrated is a necessary part of the process as well (see Box 8).

If an alliance was to be established using the historical example of BIDs in Australia to help deliver a City Deal, it would need to have the powers to establish legal contracts with the ability to contract and deliver multiple revenue streams. This structure needs to be further elaborated.

The potential to develop an alliance through a SID with urban rail and TOD outcomes could be a real option in many cities as the BID processes are well understood and trusted. No BID or SID tool has ever been used to create an urban rail project in Australia but these could be used in the new City Deal process and this is what is outlined below in the case studies.

An alliance will need to be formed through partnerships between the local authorities along the line, local communities and businesses and to place this all into a state and federal government approved City Deal. Thus, the key issue is to see how a SID can be structured to enable new infrastructure and local urban regeneration to be unlocked through partnerships.

Most of the SID-based tools are structured as public private partnerships involving community participation, sometimes called PPPCs. In this partnership, property owners and businesses self-impose a fee, in partnership with the government and community, for perceived land value gains due to the improved benefits in access or multiple non-transport services in TODs. Thus, the financial commitment can be primarily borne by the beneficiaries of the project, but as suggested in the structure of the City Deal, the financial risk can be covered by the Federal Government. This is an opportunity that cannot be missed, but will not happen unless the bottom-up processes that create the partnerships are fully developed and can enable and validate the social capital, the political capital and the financial capital for the City Deal.

This Guide therefore suggests that for a City Deal procurement process the SID mechanism is probably the best way forward for delivering transit with TODs in a way that can attract private funding though an Unsolicited Bid can still be drawn into a City Deal. The implementation process is not straightforward; it will require significant dialogue between community, private and public sectors. Three case studies are given later in this report to provide some perspective. The projects are: in Perth the Curtin/Canning to Stirling Light Rail and the Bayswater and Success Hill Heavy Rail TODs, and in Melbourne the Lillydale-Cave Hill-Mooroolbark TODs. All are set out to show how a SID could be used to create the projects as part of a City Deal.

Each of the case studies could also be procured as Unsolicited Bids, though in all cases the same steps would be needed in developing the private finance to ensure the necessary viability of the projects from land development. These steps are set out in the Manual in Appendix 2.

63 The theory behind this is outlined in Sharma and Newman, 2017.

Development Context

The available case studies suggest that different procurement models may work better in different development contexts.

Instances of fully private railways seem to occur more often in connecting new green field sites to the existing urban area. This was the case with many of the Japanese private railway ventures, the early London Underground lines, much of the Perth tram network, and is the basis of the current CLARA proposal. This is an intuitive result, as inexpensive rural land is converted to urban uses with significant value uplift.

Based on this logic, retrofitting transit infrastructure to the existing developed area would be more likely to require government support in some form, and so be more suited to mechanisms 1, 2 and 3. The examples of La Caisse in Montreal and NZ Super in Auckland support this assertion as they are government companies but may not be receiving government direct funding. Established urban areas typically have highly fragmented land tenure which increases the transaction costs associated with land assembly, as there are a larger number of landowners with whom to negotiate[64]. The need for government processes such as a City Deal or an Unsolicited Bid process can enable this land assembly and simplify the opportunities for partnerships.

One contra-example, however, is the Miami Brightline, which connects up several major cities and was based on investment in urban regeneration around stations. This project did not need a strong government process, though it did develop partnerships around each station. In this case, the company already owned the rights of way and existing freight rail infrastructure, meaning their upfront capital costs were likely less. The project's proposed extension to Orlando International Airport will, however, require new tracks to be laid.

Another factor to consider is the size and rate of growth of the city in question. Davies-Slate and Newman[65] suggest that the rate of growth of a city may be key to the greenfield, privately-led model of rail development and indeed to unlocking value in redevelopment as well.

This chapter has shown that governance is critical to unlocking the new opportunities that private-public transit-land development-finance projects offer and to enabling common good outcomes. These will be further developed in the next chapter.

64 Buitelaar, E., Witte, P. & Spit, T. (2012) Understanding the costs and benefits of land development: An empirical analysis into the financial effects of location features. ASRE research papers, Issue 21. Amsterdam School of Real Estate.
Eckart, W. (1985) On the land assembly problem, Journal of Urban Economics, 18, pp. 364-378.

65 Davies-Slate, S. & Newman, P. (2018) Partnerships for Private Transit Investment – The History and Practice of Private Transit Infrastructure with a Case Study in Perth, Australia. Urban Science, 2(3), 84-104, doi:10.3390/urbansci2030084

07

Planning, Design and Governance Considerations

An integrated transit, finance and land development rail model cannot work without active and engaged government at all levels. In particular, several functions need to be creatively applied by government if both private and public goals are to be achieved in urban rail and in urban regeneration. These are:

- A broader understanding of externalities, especially benefits received by land-owners in excess of what they contribute to new transport infrastructure;
- Land assembly, especially after private bids have shown the need for it;
- Accommodative zoning for land use changes, so as not to prohibit re-development;
- Urban design and building standards;
- Network coherency and integration;
- New assessment tools;
- New institutional arrangements; and
- New risk management approaches.

These are explained in more detail below in terms of the new roles for town planners and transport planners as well as new governance.

Active creation of 'Public Good' externalities

Civil society, with investors and developers are the three main components of the project. If any one of these components is not well engaged, the project will not reach its maximum economic potential. Traditional rail development models generally assume that the 'public good' benefits largely equate with access to public transport.

Civil society needs to be engaged in the co-design of the project, particularly given that new rail projects will change neighbourhoods. Generally, communities are concerned about changes at the street level, alteration to the fine grain look and feel of the street, large variations in the socio-demographic mix of the locality and loss of equity.

Uncertainty about these issues is often worked through in NIMBY[66] conflicts over planning-related questions of height, bulk and density, because these are the only areas the traditional planning system gives communities the opportunity to have input into the decision making process. In this context it is important that the project takes the additional step and involves the community in the design process so it can understand and own the changes in its identity. See Box 10 for the ten principles of community co-design.

Ideally, a project should identify opportunities for enrichment of the community through a better quality public realm, more opportunities for enterprises and a more equitable and just community. Engaging the community in the co-design of the project needs clear sustainability objectives and can bring multiple inputs to the design process. There are a range of different sustainability frameworks for this examination, such as One Planet Living or EcoDistricts[67].

These frameworks ask simple, but profoundly challenging, design performance questions and challenge a project to:

- make the locality more fun and safer to live in;
- make the locality greener and softer with less impact on the biosphere;
- enhance the socio-cultural mix of the community;
- improve the community self-reliance and mutual support;
- produce an increase in local economic activity and the number of local jobs and services.

66 NIMBY means Not In My Backyard

67 See https://www.bioregional.com/oneplanetliving/ ; https://ecodistricts.org/

BOX 10

Ten Principles of Community Co-design

David Galloway, Ferart Design

1. From consultation to co-design with civil society – Consultation is often, at the best, seeking ratification of or minor modification to previously made engineering and economic decisions. At the worst, it is about providing information about the decisions that have been made. This approach often generates NIMBY responses. Early and realistic engagement with the community in the design process (see 3 below) creates opportunities for multiple benefits for both the community and the project.

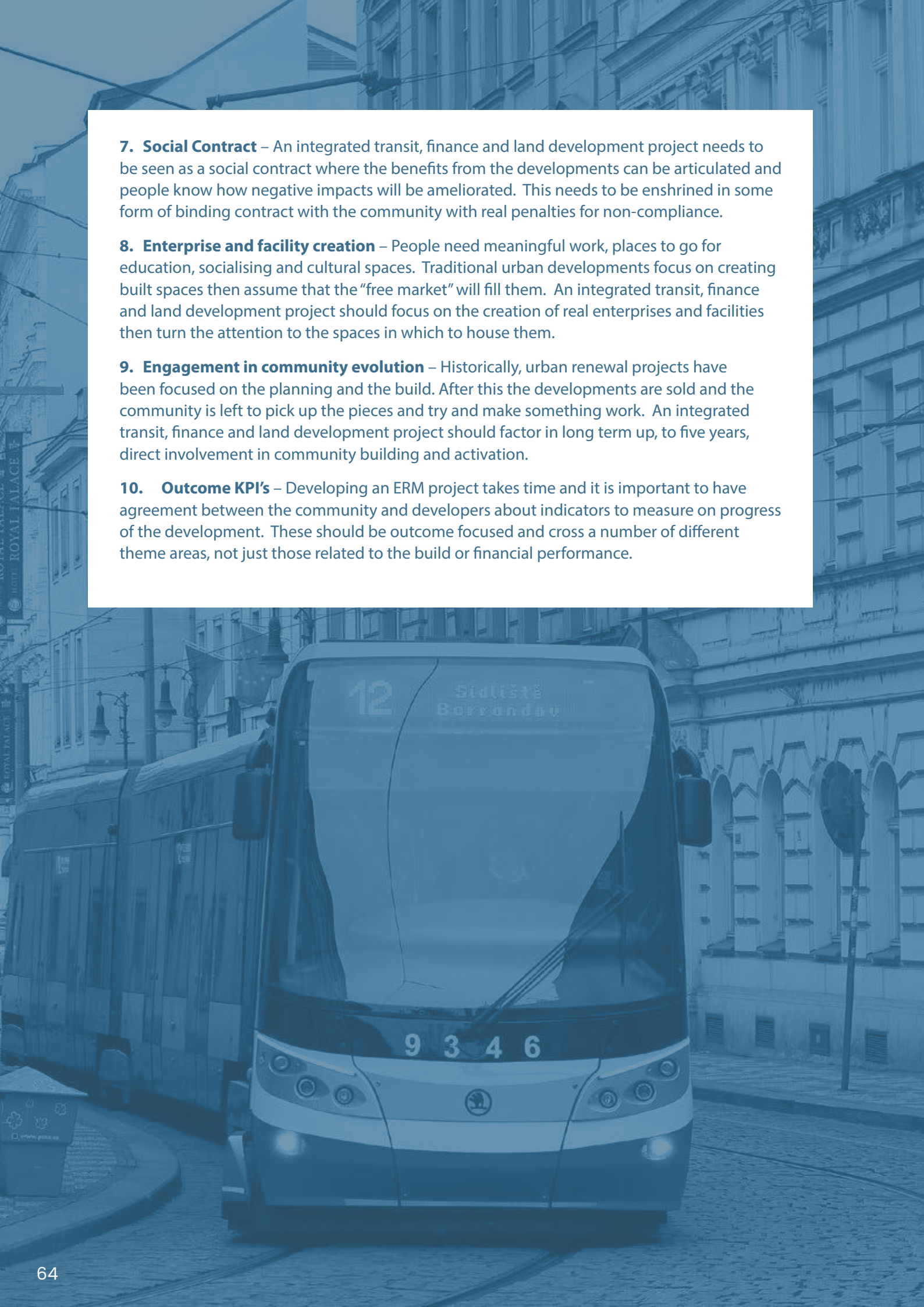
2. Changing the narrative – An integrated transit, finance and land development project is not only about a new mode of transit or urban infill, it represents a change in a community's identity and narrative about "who we are". Integrated transit, finance and land development projects need to work with civil society to invent a new story about "what we will be once integrated transit, finance and land development or simply new transit is here", and have clear benefits of the project to the community built into this story.

3. Lead times – Evolving a community narrative to include an integrated transit, finance and land development project will usually need long lead times because they may involve a community wide re-conception of urban density, style and human movement/transit. It is important that the community education and engagement process starts early in the design process. Across the life of an integrated transit, finance and land development project these campaigns can be very cost effective. Even a basic NIMBY campaign effectively run at the end of a project can cause major delays and cost overruns.

4. A design forum – Traditionally, urban developments have some form of communication strategy or consultation group that operates at the implementation phase of a project, where previously made project decisions are explained to the community. A rail integrated transit, finance and land development project delivered under the model outlined in this Guide reverses this and creates a working forum where the community and the developer can work through the major issues created by the project (see below).

5. 70% Right and "Feel" – Generally, community concerns about developments in urban areas fall into two categories. Firstly, questions that relate to bulk and height of structures. Generally these only have to be 70% right for the community to accept the change. Secondly, however, issues that relate to the "feel" of the community have to be nearly perfect if a project is to work. "Feel" is a complex question that relates to fine grain details in buildings and street level; the mix of residential, retail commercial and food and beverage outlets; the social and cultural demographics of the community; the equity of access to housing and work; and the availability of recreation and green spaces.

6. Context to Structures – Most planning and architectural projects start from the site and the build, work out an acceptable ROI, then see if any funds are left over to do minor alterations to the context. An integrated transit, finance and land development project should start from the context and work back into the structures. This will identify local assets that such projects can leverage at very little expense and identify cost effective interventions that can bring major community benefit.



7. Social Contract – An integrated transit, finance and land development project needs to be seen as a social contract where the benefits from the developments can be articulated and people know how negative impacts will be ameliorated. This needs to be enshrined in some form of binding contract with the community with real penalties for non-compliance.

8. Enterprise and facility creation – People need meaningful work, places to go for education, socialising and cultural spaces. Traditional urban developments focus on creating built spaces then assume that the "free market" will fill them. An integrated transit, finance and land development project should focus on the creation of real enterprises and facilities then turn the attention to the spaces in which to house them.

9. Engagement in community evolution – Historically, urban renewal projects have been focused on the planning and the build. After this the developments are sold and the community is left to pick up the pieces and try and make something work. An integrated transit, finance and land development project should factor in long term up, to five years, direct involvement in community building and activation.

10. Outcome KPI's – Developing an ERM project takes time and it is important to have agreement between the community and developers about indicators to measure on progress of the development. These should be outcome focused and cross a number of different theme areas, not just those related to the build or financial performance.

Generally, communities are not opposed to change; however, much of the NIMBY opposition to projects is because there is no clear social contract between the project and the community. Communities need to know what will change and what benefits and opportunities will come to it from the changes resulting from a project. They also need a path of redress if the project does not deliver on what was planned. Much of the benefit from integrating transit, land use and finance will result from ongoing engagement and curation of the area that surrounds the project after it is built. There are a number of ways that this can be supported. In some cases, Local Government can broker this process, in other cases, community and business groups may provide a better opportunity, or it may be that the project is the catalyst to support the emergence of civil society groups to continue the local community development process.

New Roles for Town Planners

Land assembly

In order to link together land development opportunities along a potential rail corridor, it may be necessary for government to acquire some land parcels to enable the station precincts to be large enough for transit- oriented developments (TODs) to be built, as well as some land for the rail lines. This is more than likely after bids have shown the need for it. This government acquisition may not be needed if private owners are prepared to provide the space for stations.

Land assembly is more likely to be needed to enable development to occur. Private sector proposals can suggest how best to do land assembly to make the most out of a site.

The process of purchasing land for government purposes has various mechanisms across cities and nations. In Australia, this process has been mostly used to enable road construction, rather than rail, though examples are now emerging as cities begin building new rail lines such as the light rail on the Gold Coast and in Sydney. In Perth, the mechanism is straightforward as the MRIF or Metropolitan Regional Infrastructure Fund is available for this purpose, though it has rarely been used for rail infrastructure.

The recent trends in urban transport and land use (Newman and Kenworthy, 2015) would suggest that there is a growing market for rail as opposed to road projects and hence governments should be facilitating this market rather than just roads. Such a mechanism would be well suited to long-term strategic land assembly for the purposes of rail-based redevelopment in the Entrepreneur Rail Model. Redevelopment authorities generally have such power and as redevelopment opportunities and rail projects are clearly a major agenda for most cities, it is not hard to see how they can be part of the implementation of a rail and TOD-based metropolitan plan. It is just a matter of having such agencies integrated more fully into the transport planning process.

Zoning

Integrated transit models rely on land use change to capture the potential benefits of rail infrastructure. Land use zoning restrictions are often hard to overcome as low-rise and low density development is seen to be the only desirable urban form in many parts of Anglo-Saxon cities[68]. However, community support for increased zoning at proposed activity centres will be considerably enhanced by having a rail service as part of the positive benefits.

Government's role in relation to zoning is to ensure that projects are not prevented from going ahead due to land use planning restrictions and it will need to engage the public in detailed design discussions as well as showing the advantages of the new rail line and activity centre. In some cities like Vancouver, a portion of the land investment is returned to local communities so that local value increases are fine-tuned to provide local benefit[69].

68 Newman, P. (2014) Emergent Urbanism as the Transformative force in Saving the Planet." In Haas, T. & Olsson, K. (Eds.) Emergent urbanism: Urban planning and design in times of structural and systematic change England & USA: Ashgate.

69 Newman & Kenworthy (1999), op. cit.

Urban design and building standards

A high quality public realm and enduring urban design are vital to ensuring public acceptance of rail-based redevelopment. Such high quality is usually in the immediate commercial interests of developers as well as redevelopment agencies, who are experienced in ensuring there are detailed design guidelines that cover all the issues; such as density, diversity of housing type and mixed use, reduced parking requirements and improved walking and cycling conditions. These design guidelines should include a proportion of social housing, to ensure access to such quality living is not just for the wealthy[70].

New Roles for Transport Planners

New systems for managing autonomous vehicles

Chapter 9 sets out how transport technology is changing rapidly and becoming more autonomous, electric and integrated. In that chapter, the idea of a Trackless Tram instead of a Light Rail has been set out with a strong case, suggesting this is likely to be how integrated transit, finance and land development could proceed. The whole transport system will need to become much smarter and this will mean monitoring and management of the system will need to increase. As the Trackless Tram operates on roads, the main responsibility will lie with Main Roads agencies. Main Roads Western Australia has already a Traffic Control Centre to monitor the system and ensure the autonomous guidance system is working. When an accident occurs that blocks a Trackless Tram it is possible to redirect them around the blockage; this can be done by the driver/pilot of the Tram over-riding the autonomous system and directing it into the new route to get back into the corridor.

Trackless Trams will be able to recharge overnight in a Bus Depot and the level of power in each Tram would need to be monitored to ensure it is able to reach a Depot.

The integration of 'local shared mobility' shuttles (also outlined in Chapter 9) with Trackless Trams at stations will need to be carefully planned with some kind of prioritisation; they will need to be monitored to ensure the system is working well and facilitating a walkable station precinct for passengers transferring between local and corridor-based transit. These kinds of issues will need to be tested in the early phase of adopting such a new system.

Network coherency and integration

There is the potential for multiple private sector organisations or consortia to be involved in rail development. It is vital that these different lines, and any legacy publicly-owned infrastructure, are effectively integrated into a single network. This can be done at the procurement stage.

Ensuring network coherency and integration would involve:

1. Ensuring an integrated ticketing system. This would require a process for sharing revenue between lines when passengers transfer. It should be noted that Japan's private and public railway operators co-operate to use a common smart ticket, without government compulsion. In Tokyo and the surrounding region this is the SUICA card, developed by the East Japan Railway Company;
2. Regulating fares, ideally by a statutory or judicial body, rather than through a political process. Fare-setting should give weight to the economic requirements of operators, not just equity concerns, so that fares have a reasonable chance of covering operating costs; and
3. Potentially facilitating negotiations between different proponents whose lines should interconnect, or otherwise interact with each other. Also, ensuring that these interchanges

70 Matan, A., & Newman, P. (2015). "Green urbanism in the Indian Ocean region." Journal of the Indian Ocean Region 11 (1).

run smoothly and are well maintained. Once again, the Japanese experience suggests that government compulsion may not be required and should be viewed as a last resort. For example, the Japanese system of 'through running' allows trains to travel seamlessly along the tracks of more than one company, with a change of staff at boundary stations. Co-operation is also common in the aviation industry, with airlines selling connecting flights on another airline's planes as a single ticket. This is known as code sharing.

Since integration already occurs in most urban transit systems between different private sector operated services, it should not be too difficult to manage as long as it is clearly specified from the start. Transit operations will need to be well connected between services. Many cities have several different operators required to integrate with each other across the whole bus and train system. There is no evidence that city transit systems have suffered from private operators in their public transport systems[71]. Hong Kong and Tokyo's bus and rail lines are all examples of private integration required through regulation and they are among the best in the world in terms of service provision and patronage outcomes.

New assessment tools

The emphasis on conventional transport systems is on time savings at the start of system operations as the central factor in a benefit cost ratio (BCR). Some new assessment tools now include agglomeration economies. This has been adopted in the UK and has tentatively begun in Australia, including an Urban Regeneration Agglomeration factor[72]. Transport planners with the task of assessing privately-led rail projects under will need to have a new set of tools with which to calculate BCRs in cases where public funding support is required. These include:

1. Accessibility benefits – Time savings at the start and over the next 30 years as the land development created by the rail project comes into being, providing new access advantages for people who are living and working and visiting the corridor.
2. Agglomeration benefits – Economies that can be gained by the new density and mix of land uses that are facilitated by the project. Elasticities have been estimated in many cities such as those that have been developed by on Australian cities73. However, these elasticities are a second-best proxy for the value of land, which is directly observable in the land market.
3. Amenity benefits – Economies associated with the whole package of quality design creating walkable urban areas.
4. Avoidable costs and benefits that are associated with any urban regeneration replacing development that is car-based on the urban fringe. There will be a need to replace or renew urban infrastructure in any urban regeneration project and this may be included in the costs covered by the private investors. If governments are assisting in this because of their energy, water, waste systems, the costs will also have to include the costs of doing the same development on the urban fringe which over many decades have been subsidised by governments. Such headworks and substations in the Australian urban system amount to over AUS$100,000 per new dwelling in the outer fringe developments compared to urban regeneration74. As well, the general time savings of those who move to inner or middle suburbs instead of living in a new fringe suburb are enormous and have been found to increase BCRs from 1.5 to 7 in some Sydney rail projects where urban regeneration was included.
5. Commercial viability – Public funding support should not be provided if a private project is able to be fully self-funding, as in the case of the CLARA high speed rail proposal.

71 Newman & Kenworthy, op. cit.

72 Newman, P. (2015) The rise of a sustainable city: much more than the wild west. Griffith Review, vol.47: 131 –160.

73 Trubka, R. (2012) Agglomeration economies in Australian cities: productivity benefits of increasing urban density and accessibility. PhD thesis. Curtin University.

74 Trubka, Newman & Bilsborough, op. cit.

A process will be required for situations in which a private proponent makes an offer for publicly-owned land, to redevelop with railway improvements. In some cases, a land subsidy may be justified, or land provided at a concessional rate, as has been the case with the universities, for example; but this sort of support should not become the norm for railway development.

When public roads are required as a right of way for at-grade transit, there will usually be a conflict with government traffic estimation models. These models will suggest large and growing volumes of traffic, requiring the road space be retained for general traffic. In such instances, total transport capacity should be assessed, rather than estimated traffic volumes and road space for general traffic. In cases where the proposed transit line would significantly increase movement capacity, a common occurrence, then this added capacity should be given greater weight than traffic modelling results, as transport mode shares may shift substantially towards transit.

New Governance Arrangements

New institutional arrangements

The importance of enabling private sector investment in both a new rail line as well as the associated urban regeneration is the critical step in unleashing this new model of transport procurement. This is not usually an integrated part of government, thus there needs to be a new governance instrument. Without this, the rail lines will not happen and the activity centres will not be built.

When public land is involved, it is important that the procurement process is controlled by a central agency, preferably Treasury, supported by subject matter experts from the private sector and academia. This process is designed to ensure private sector funds are attracted to achieve public-good externalities as well as the necessary profitability of the private investors like superannuation funds. It also has powers to extract information from other government agencies if required. Treasury would ensure consortia are evaluated by financial criteria, land development criteria and transit criteria, in an integrated way. This cannot be done by a transit agency as their emphasis on choosing the routes in detail first does not optimise land development opportunities, so the rail frequently does not get built as no other funding can be found. A transit agency's primary task in our model is to ensure transit system design and compatibility with any new rail lines after the land development potential has defined the route. This will ensure they do not prevent the land development-based approach from happening.

Planning agencies should also only be there to ensure land assembly, zoning and building design are compatible with overall goals for the city, rather than picking the most appropriate development strategies and markets for urban regeneration. This should come from private sector bids. The delivery process will require the powers of a redevelopment agency to provide government's role in land acquisition, zoning and land assembly to unlock the latent value in land development around the stations. Only by enabling such partnerships is land value created.

It is therefore suggested that two new government roles are established. The first is something like a Transit Investment and Land Development Unit established in Treasury to oversee the bidding process for new projects. State and City Governments should not need to have well developed plans for corridors, otherwise opportunities can be missed by not seeking market-based judgements on where the best redevelopment could happen. Thus, a Transit Investment and Land Development Unit can immediately call for bids from consortia to establish a private rail system based on development of activity centres along a particular corridor or they can assess an Unsolicited Bid on the same kind of project. The three criteria by which these could be evaluated would consist of:

1. Financial – The project should aim to be self-sufficient in capital and operating expenses based on land development, fares and other means such as advertising;

2. Land – The project should aim to utilise government land provided as part of the bidding process as well as private land that will need to be built into development partnerships or purchased as part of the project's financing. Land acquisition, zoning and assembly will be assisted by government to address the problems of fragmented ownership in brownfields sites and restrictive zoning laws, achieve required activity centre goals as well as sufficient funding outcomes to enable the rail line to be built; and
3. Transit – The project should provide a high-quality transit service that is linked into the rest of the system and generates its own patronage from the land development activity centres. The quality of the system should be high enough to unleash the potential for development of the activity centres.

After a private sector consortium has been chosen to lead the planning and delivery of the urban rail infrastructure and the development of available government and private lands, there will need to be another coordinating government entity. We are suggesting the formation of a new kind of delivery agency to facilitate the planning and delivery process. The delivery agency would be similar to development corporations and authorities that have been created in many cities over the last two decades for undertaking the planning and development of urban renewal projects such as the Barangaroo Delivery Authority in the Sydney CBD. It would generally not need new legislation to establish and could be made part of a current redevelopment authority and when the corridor transit and redevelopment is complete or well underway it can be changed to another corridor.

The Barangaroo Delivery Authority model is a tested method in Australia for delivering redevelopment through public private partnerships and thus is likely to apply to the new model proposed in this Guide. Thus, sufficient powers are likely to be available to help unleash the new governance instrument inherent in this approach. The potential for privatising present rail lines in order to create better TOD options would also be possible in the future under this model.

Local government involvement

There are a range of suitable governance models for projects of this kind. In principle there is no reason why a simple limited liability company could not be created. It is the most conventional and flexible model for multiple parties to participate in a commercial venture, allows different parties to take differential shareholdings, provides the ability to leverage assets and borrow on normal commercial terms[75]. This is similar to the model used in Japan to build the Tsukuba Express (TX) project. The TX was built and is operated by a specially-constituted company, which is jointly owned by city, prefectural and metropolitan governments along the route, and a large number of private companies. See Box 6 for more detail.

In certain jurisdictions, such as WA, there are constraints on a local government from 'forming, taking part in forming, or acquiring an interest giving it control of' such a company. However, there is no statutory problem with local governments investing in established companies as long as they do not hold a controlling interest. In this case, the company would be established by the private 'partner' and with the local governments potentially incorporating land assets in return for equity. Any structure of this kind would need to be mindful of restrictions on local government not being in 'control'. These issues vary from jurisdiction to jurisdiction.

The alternative approach would be to establish a limited partnership model. The private participants (e.g. the suppliers and operators of the transport systems) are likely to be more in favour of a company structure than a partnership structure, as the company structure would more easily enable the project to be split into different entities such as an asset company and an operating company, which tends to be the contemporary way of structuring such a project. The asset company could then be sold

75 The core concepts in this section were provided by Raymond Davy, Conway Highbury Pty Ltd.

to investors such as superannuation funds with a long-term revenue stream from an access rental agreement, much as with toll roads.

The most appropriate governance structure will depend on many factors, especially the range of partners/participants involved, and needs to be developed on a case by case basis.

Risk management

The final part of enabling the entrepreneurial rail process would be to assist with risk management. As governance systems and private company systems are attempting to create a new approach to how urban rail can be built without government capital and operational funding, it is necessary to help provide a level of risk management. There are various ways this can be done, but perhaps a key mechanism would be to reduce the number of consortia down to two key bidders and then fund them for the detailed planning phase where they need to create the land development opportunities and integrated plans involving multiple stakeholders. Such a risk management mechanism could be lifted when the governance systems are established and are providing confidence for all concerned. Such assistance could also be applied to a community engagement process that ensures value is shared in the project[76].

Challenges and Externalities

There are a number of potential challenges relating to project delivery and the broader public interest, which must be managed in a privately-delivered project. These are addressed below.

Bankruptcy of the proponent

As this is a commercial undertaking, there is a risk of project failure or bankruptcy of the proponent. This could leave a project half-finished and a loss from pre-sold developments along the route. The tramway regulatory framework addressed this issue, as well as the risk of a proponent going rogue, by requiring the proponent to leave a deposit with the Treasury. This deposit would be forfeit if the project was not completed to schedule.

Fares, integrated ticketing and network regulation and integration

A privately-delivered project should ideally integrate seamlessly with existing public transport services. One aspect of this is integrated ticketing; with a single ticket granting access to multiple journeys and without an extra charge for transferring. Integrated ticketing is conveniently delivered by smart cards, such as the Opal Card in Sydney or Transperth's SmartRider. This should be required by government so that any new services can be accessed using these smart cards and the existing public fare system.

Requiring integration in this way provides the lowest transfer penalty between services, although this then creates the new complexity of determining how revenue is shared. It would be reasonable for the public ticket operator to charge a fee for this service, and a formula would also be required to divide up fares in cases of transfers when a passenger travelled from one operator's network to the other. This is already happening in Perth with shared bus routes like the 999/998.

On the related issue of fare regulation, governments can protect the public from excessive fare increases by regulating the price. However, a single unified fare may not be appropriate for all services, and there is a risk to an operator's revenue of fares being set inappropriately low. This problem

76 Jillella, S. S. K., & Newman, P. (2015). Participatory sustainability approach to value capture-based urban rail financing in India through deliberated stake-holder engagement. Sustainability, 7, 8091e8115. *http://dx.doi.org/10.3390/su7078091*

undermined the private operators of the New York Subway[77]. The goal should be to make it the same fare as on other routes.

Housing affordability

Land value capture depends on increasing land values to pay for new infrastructure. This raises the concern that it may result in elite, high-value land uses, to the exclusion of disadvantaged people within society. There are several means to address this potential problem:

1. Construction costs can be reduced by easing or removing minimum parking requirements.
2. Carless developments may be enabled, where residents to not need to own a car to make most daily and weekly trips, which lowers the total cost of living, even if housing is not being delivered at the lowest possible price.
3. There is a role to play in public housing and development agencies, such as the WA Department of Communities (through the Housing Authority) and Landcorp, the WA State Government land developer. These two agencies have well-developed processes for partnering with private developers to deliver public good outcomes, including affordable housing.

Changing land uses over time

When a project is first developed, the highest and best use of land at some of its stations may be only moderate levels of development intensity. Increasing development intensity may create opposition from the existing community, as is commonplace in Australian cities. Removing low-cost car parking could be particularly difficult. These issues need to be addressed as they should not be allowed to prevent the multiple benefits obtained from new transit and new urban regeneration projects.

Local content

The WA Government has set a target of 50 percent local content in the manufacture of its new C-series railcars[78]. The Trackless Tram (outlined in detail below) is relatively easy to have assembled locally and this was confirmed with CRRC and with a local bus assembly firm.

Leadership

For each of the models presented here, consideration will need to be given as to who takes a leadership role in progressing a project. This may vary from project to project and will certainly vary with the degree of private sector involvement.

Model 1: Full public sector capital

This model has the strongest level of government control and leadership will most likely be required from government. Given the financial implications of this model, these processes should generally be led by Treasury, with input from planning and transport agencies.

Model 2: Some private and substantial public capital

Tax-increment financing models could potentially be applied to taxes from either State (stamp duty; land tax) or Local government (council rates). This will require cooperation between State and Local government, either in the form of a joint committee or a delivery agency, with both State and Local government input into the process.

77 King, D. A. (2011). Developing densely: Estimating the effect of subway growth on New York City land uses. Journal of Transport and Land Use, 4(2), 19-32. doi: 10.5198/jtlu.v4i2.185 Cited in Sharma and Newman, 2017.

78 Public Transport Authority of Western Australia (2018) Railcar Program. https://www.metronet.wa.gov.au/projects/railcar-program Accessed 2 August 2018.

Transit projects have been delivered internationally by entities with representation from more than one tier of government, such as Tokyo Metro, which is 53.4% owned by the Government of Japan and 46.6% owned by the Tokyo Metropolitan Government[79].

Model 3: Substantial private and some public capital

The Special Improvement District (SID) model is predicated on voluntary participation by the business community in an area, in return for infrastructure improvements and subsequent redevelopment opportunities being unlocked. In this case, a strong leadership role would be required at a local level, possibly local business or community groups, or the local government, in consultation with the former. Local councils may view this mechanism as a way to regenerate their area. It is also possible for an Unsolicited Bid to be formed around private developers who involve local authorities within a company structure.

Model 4: Totally private capital

With totally private capital, leadership should most likely be either from the private proponent, an Unsolicited Bid, or from either State or Local government. This is more than likely going to involve an Unsolicited Bid though in all cases, partnerships will need to be formed with local stakeholders, particularly land holders whose land might be redeveloped and who will need to be compensated or involved as partners. The Japanese practice of land readjustment delivers on this need for land assembly, acquisition and partnership building.

The outline above sets out the main components for delivering an integrated transit and urban regeneration project based on private financing. The Manual in Appendix 2 sets out the skill base responsible for each group of steps needed to plan, procure and deliver such an integrated transit, finance and land development system. In the next chapter we look at some case studies of where this process has begun in Australian cities and then we examine how new technology can help make the model happen.

79 Tokyo Metro Company (undated) Company Outline. https://www.tokyometro.jp/lang_en/corporate/profile/outline/index.html Accessed 2 August

08

Case Studies for Procuring an Integrated Transit, Land Development and Finance Project

In the three Australian case studies outlined below, a SID type development is suggested to show how an integrated City Deal set of partnerships could be created to help deliver the projects. Alternatively, a similar set of partnerships could be developed with a stronger emphasis on private investment and then be procured by an Unsolicited Bid.

Bayswater and Success Hill TODs, Perth

Bayswater and Success Hill Stations are on the Midland heavy rail line some 8 and 10 km from the Perth CBD in Western Australia. They are in need of transformation with middle suburbs where much of the built form is in decline and businesses are very keen to see people return and investment to flow. The station precincts need some infrastructure improvements and the potential is there to lower the station in Bayswater as it will be the interchange point for two new rail lines, the Forrestfield-Airport Line which will enter Bayswater from an underground tunnel and the Ellenbrook Line which will go from there to the north east with a substantial new rail catchment.

Figure 15 shows the Bayswater Station with the MetroNet lines feeding into the station and Success Hill is three stations, or 4.9 km beyond that. The proposed Curtin/Canning-Stirling Light Rail (next case study discussed below) can also be seen along with a Fremantle-Murdoch-Armadale Light Rail that is also under consideration. Other MetroNet stations like the new South Perth Station, the shifting of Midland Station and the extension of the Joondalup Line to Yanchep could all be treated in a similar way to the model outlined below for Bayswater and Success Hill. Possible use of the model for level crossing developments on the Armadale line could be considered, but will require sufficient land development opportunities and community support for this to work.

Figure 15. *MetroNet Rail Map, Western Australia, with potential extensions and proposed light rail.*
Source: Liu (2017)

Both Bayswater and Success Hill station precincts have public housing sites which are in need of redevelopment and could access the National Housing Infrastructure Facility. Both stations need improvements and there are road and tunnel issues to resolve, but the big transformations are the need for denser redevelopments in the surrounding area within walking distance of the stations that can create a whole new walkable community.

Success Hill has a large TOD area around its station where the council and community are keen to see substantial transformation but with sustainability innovations driving the design. The future visioning for Bayswater has been driven by a community group called Future Bayswater, which has won a number of awards for its creative process to develop a plan for regeneration of the area.

The potential is there for a SID to be created by the two local governments, Bayswater and Bassendean, along with community groups such as Future Bayswater, business groups like the local Chamber of Commerce and land-owners. It is suggested that a SID is created called The Bayswater-Success Hill Alliance and that it is set up by the two local governments and other incorporated bodies. This group would develop:

1. A Master Plan for the improvement of the areas in partnership with the local authorities, state agencies including the Metropolitan Redevelopment Authority with their powers of land assembly and regeneration, together with the businesses and potential investors in the area, and,
2. A Financial Plan for how they would generate the investment required from a range of sources.

After such work, a City Deal could be negotiated with the Infrastructure Projects Finance Authority (IPFA) that could provide the risk guarantee that would enable the two projects to receive finance from superannuation companies willing to back the regenerative urban development and the infrastructure improvements. Bids from consortia to do the projects could then be sought through the State Government Gateway process.

Alternatively, the Alliance could seek bids from private sector groups and proceed direct to an Unsolicited Bid.

Curtin/Canning to Stirling Light Rail Project, Perth

An urban rail route from Canning to Stirling in Perth, Western Australia has been proposed to generate opportunities for higher density residential development in and around the activity centres along the corridor and particularly around future urban rail station precincts which would be located where the key development opportunities arise. The route would provide a much-needed East-West link through the Perth CBD (with urban regeneration opportunities), but also would drive employment opportunities outside the Central Business District by revitalising activity centres as alternative places to live and work. It will be the basis of Curtin University's proposed expansion as Greater Curtin, a AUS$7billion new city of innovation for a campus that would have double its present level of activity.

The councils along the route have established a loose alliance and have begun to do a Business Case for building a new transit link to be funded out of land development along the corridor.

Urban rail would link:

1. The Scarborough Urban Renewal Precinct and the Stirling Strategic Metropolitan Centre with Perth City;
2. Leederville city centre redevelopment projects;
3. Government land where the Department of Agriculture are soon to shift from;
4. Curtin University and the Bentley Technology Park;
5. The Bentley Regeneration Precinct and Cecil Avenue Development (two large public housing estates being redeveloped and suitable for National Housing Infrastructure Financing); and
6. Canning City Centre which is similar in size and scope to Stirling City in its regeneration plans.

The Stirling-Curtin/Canning route would connect by urban rail up to 80,000 new dwellings which represents around 40 per cent of the infill housing target for the Central Sub-region in the Perth and Peel @ 3.5 Million plan. The capacity of the route to facilitate and connect employment and economic development opportunities is substantial, linking sites with some potential 830,000m^2 of commercial development. Preliminary costs for a light rail are estimated at AUS$45 million per km for the 22 km line (first stage); however, see Chapter 9 for how this could be significantly reduced if a new technology, the Trackless Tram, were used instead.

Preliminary potential revenue from the Stirling part alone suggests land development revenue to state and local government of around AUS$748 million, $100 million over 25 years from local value uplift with businesses and $200 million from a parking levy revenue over 25 years. Curtin's new city development will not be possible unless significant parking is saved; cost savings of $612 million over 25 years are estimated by reducing parking and saving $45,000 per bay inside new developments (estimates from Evan Jones, Responsive Environments, based on City of Stirling studies). The work done by the City of Stirling provides a model that with support, can be extended to cover the Canning to Stirling Urban Rail proposal, especially if directed by an Alliance of key local interests. The Canning Council has already identified major sites for redevelopment..

Further estimates from other parts of the proposed line are being assessed through the council alliance.

The State Government's focus currently is on delivering Stage 1 MetroNet as a long-awaited upgrade of the heavy rail network to provide much needed public transport linkages to Perth's expanding outer suburbs. However, Light Rail is considered the catalyst for urban renewal and densification in the inner and middle suburbs, and these areas have strong market opportunities to attract private investment. As shown in the next chapter this could also happen with a Trackless Tram.

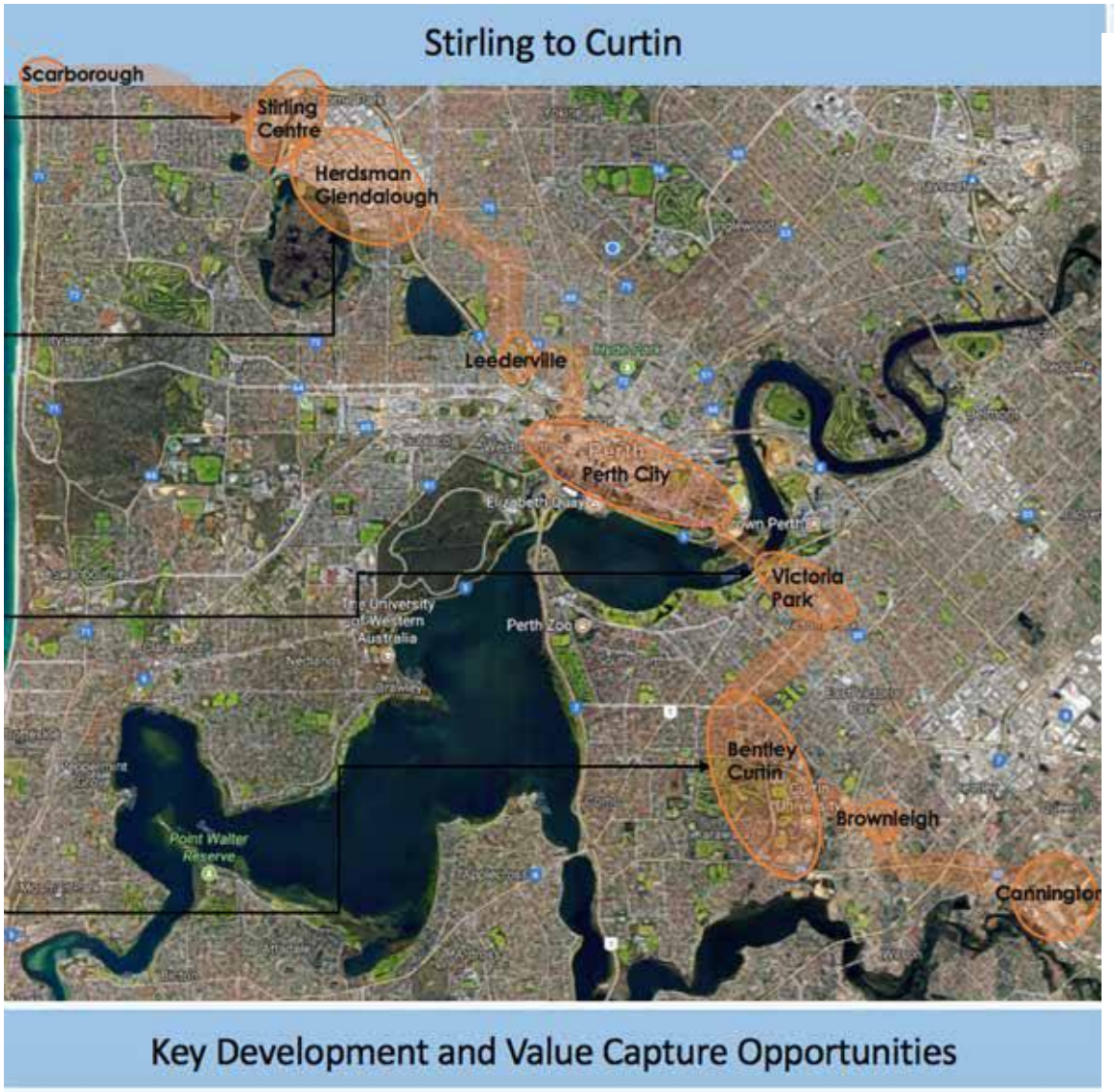


Figure 16. *Stirling to Curtin/Canning corridor of light rail and development opportunities, Western Australia. Source: Evan Jones, Responsive Environments*

There is an opportunity to make meaningful contributions to the State's plans on light rail on Trackless Tram and help bring forward delivery of such a project that would:

1. Create more intensive land development and urban regeneration through transit-oriented urban fabric.
2. Provide the alternative funding approach that this land development could provide.
3. Enable a number of transit technology and TOD innovations to be demonstrated along the route (see Chapter 9); and
4. Set up a process for governance with Local, State and Federal Governments and how they can become involved with the private sector to deliver it.

The proposed light rail project has had over AUS$10 million worth of studies done at the Stirling end of the project with detailed knowledge of the potential costs and the value that could be captured to help pay for it. The proposed corridor route is set out in Figure 16 without detailed alignments as these need to be worked out with the key stakeholders, especially those who would be investing in land to make the most of a particular alignment.

A formal alliance approach is needed amongst local governments and Curtin University along the proposed Canning to Stirling route to: develop a technical rationale; seek business and community awareness and buy-in; and thus have the basis for a City Deal. The whole corridor can follow the lead taken in Seattle and Portland to attract funding and financing from a range of sources, particularly private investment.

It is therefore suggested that a formal Alliance be set up between Canning, Victoria Park, Perth, Vincent, and Stirling councils and Curtin University, along with other stakeholders such as major community groups like Leederville Connect (who have been doing work such as Future Bayswater) and groups like the Property Council who can represent developers. This Alliance would set up a Master Plan and a Financial Plan to feed into a City Deal process along with key State Government agencies and create a Strategic Business Case for the Light Rail. Or the Alliance could form the basis for proceeding with an Unsolicited Bid which would require a series of developers to take an interest in the project and develop the Strategic Business Case themselves.

The Strategic Business Case would set out the requirements for urban development-based funding and financing of a Light Rail, the kind of state and local land that could be made part of such a project and other funding/financing opportunities. It would also set out the kind of governance and procurement arrangements necessary to make it happen. It would need to develop strong interests from a range of superannuation company investors. A City Deal or Unsolicited Bid would happen best after such work has been completed as an Alliance along the corridor.

A similar Light Rail proposal, though less advanced, has been developing from Fremantle to Murdoch along South Street with potential to continue further along Ranford Road to Armadale passing through the new station from the Thornlie extension rail line. This would involve an Alliance of several local authorities and other stakeholders such as the Beaconsfield West Redevelopment (housing project), other State Government land development projects in Fremantle, and the Murdoch Activity Centre (comprising a university, two hospitals and multiple business interests). Other similar concepts are being developed in Perth with potential to provide demonstration integrated transit, land development and finance.

Lillydale-Cave Hill-Mooroolbark TOD project, Melbourne

In Melbourne, Victoria, the Lillydale line is a single track from Mooroolbark Station to Lillydale Station. In between these, a new and very large redevelopment is being planned at Cave Hill that wants to build a new station and a TOD around it. This project could be expanded into a City Deal where the three stations are all developed around a double tracking exercise paid for from the enhanced urban development potential. To create such a transformative concept would require a Lillydale-Cave Hill-Mooroolbark Alliance with the developer, Intrapac, the local authority, the local educational institution Box Hill Institute, any established community groups and State Government agencies responsible. Potential investors would be invited to help create the concepts for the three TODs.

The Alliance would develop a Master Plan and a Financial Plan to feed into a City Deal that would help create the Strategic Business Plan and enable the project to proceed.

Other ideas for using the model developed in this report are being examined in Fishermans Bend and in the northern part of Melbourne – both are looking to upgrade the value of land through a transit system and to use the associated land development to help pay for the transit. The CLARA project outlined before is also looking to see if a Trackless Tram system could help unlock development across its new towns next to its high speed rail line from Melbourne.

Other Projects in Australian Cities

There are numerous other examples of private-funding for urban rail that are rapidly beginning to emerge in Australia. Some of them are:

1. Linking Townsville CBD, Queensland, to the James Cook University Health and Innovation Precinct in Queensland with potential redevelopment opportunities along the way (and fitting this into their already developing City Deal);
2. Linking the Liverpool CBD, New South Wales, to the new Badgerys Creek Airport with redevelopment opportunities in the city and along the link as part of the Sydney West City Deal;
3. Linking Hobart, Tasmania, beginning with the Northern Suburbs rail reserve corridor, through urban regeneration projects unlocked by a new light rail or new technology Trackless Tram.

The research team suggest this kind of urban regeneration, linked to transit and private finance, will accelerate into the future due to technological change that is opening up new possibilities for such integration. Other global cities are expressing similar interest in the model such as Auckland and Edmonton, especially since the advent of the new technology of the Trackless Tram.

09

Technological Change and Integrated Transit, Land Development and Finance and the Trackless Tram

There are two major technological changes that hold good prospects for making the integrated transport, finance and land development model work better:

1. Autonomous 'local shared mobility'; and
2. The Trackless Tram.

These will be briefly outlined here.

Autonomous Vehicles

A major technological change in transport is underway; the development of autonomous or 'driverless' vehicles. Companies such as Google are already driving such vehicles on regular streets around Australia and America to test their safety features. Singapore has trialled autonomous taxis and various trials of autonomous buses are underway including in Perth and Sydney (Figure 17). In the case of Sydney, an autonomous shuttle bus trial is underway at Olympic Park, being conducted jointly by the NSW Government, the National Roads and Motoring Association, the Sydney Olympic Park Authority and a number of private companies[80]. Initially the shuttle bus will operate on dedicated routes, and later it will begin operating on public streets.

Autonomous Taxi, Singapore
http://bit.ly/selfdrivingtaxi

Autonomous Shuttle Bus, Sydney Olympic Park
http://bit.ly/driverlesssmartshuttle

***Figure 17**. Autonomous cars and shuttle buses are already being trialled.*

A similar autonomous shuttle bus is being trialled at Curtin University, Western Australia, to enable easy local shared mobility to be demonstrated and by the RAC (WA) in South Perth.

Studies in the UK have estimated that the eventual replacement of conventional cars by driverless ones will result in a significant improvement in road safety. However, if we simply replace privately owned vehicles with privately owned driverless vehicles, this will do little to reduce road congestion or parking requirements, or to make our cities more liveable as many denser parts of our cities will be flooded with autonomous vehicles searching for people to collect.

However, if 'communally' owned, a driverless vehicle could replace eight or more private vehicles, particularly if operated in a 'continuous multihire' mode and if used to provide feeder services to rail and other mass transit systems or nearby activity centres. A single such vehicle could, for example, collect two to five people, drive them to a rail station for the morning commute, then return empty to collect three or four more loads of commuters in the morning peak period. At the destination

80 NRMA (2017). Transforming mobility: A regulatory roadmap for connected and automated vehicles. *https://www.mynrma.com.au/-/media/documents/reports-and-subs/trialling-autonomous-vehicles-in-nsw.pdf?la=en* Accessed 25 May 2018.

end, autonomous vehicles could deliver commuters to offices or other facilities which were beyond the walking catchment of the station (destinations such as offices and shops are usually more concentrated than origins such as houses, with a higher proportion of people able to walk to them) (see Figure 18).

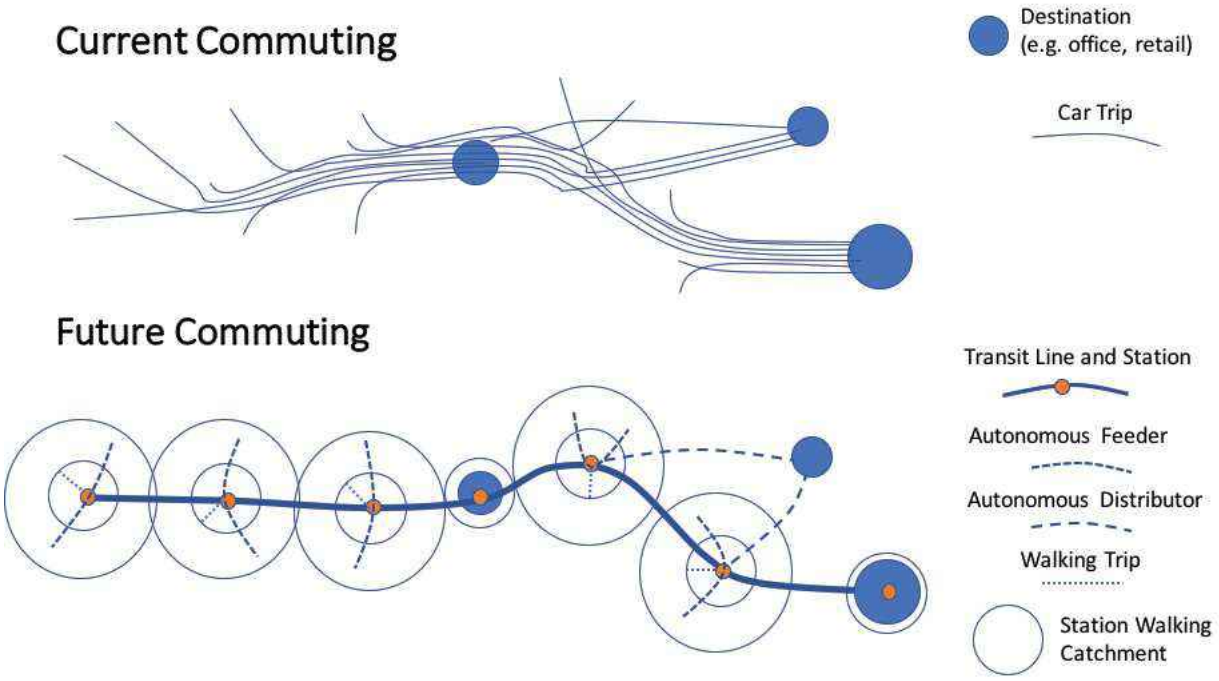


Figure 18. *A comparison of current versus future commuting scenarios.*
Source: Glazebrook and Newman, 2018

Development around the centres would be an essential feature of this model and would be attractive for developer investment as there are large numbers of pedestrians passing through the area. Parking would be much reduced in this Future Commuting model as there is less need from both kinds of autonomous mobility. Such extra incentive for land development is often underestimated; for example in Sydney it has been estimated that car parking occupies at least 100km^2 of land, worth in the order of AUS$100 billion if put to other uses (land values in Sydney have recently reached $1,000/m^2). In addition, the use of autonomous shuttles to feed rail or other mass transit can widen the catchment areas of the transit system, making them more economic in lower density suburban areas, or in cities where activities are highly dispersed.

For an integrated transit, land development and finance project, using local shared mobility to enable last mile/first mile connections, it would be possible for a developer to save between AUS$20,000 and $40,000 per household unit and this can enable much more affordable housing as well as more affordable living with families not needing a car or having one less car.

The Australian RAC estimate the cost of owning and running a medium sized vehicle at AUS$175.80 per week, or 76.18 cents per kilometre travelled. This estimate does not include parking charges or speeding or parking fines[81]. Under existing technology, ride-sharing app Uber's price is not much

81 RAC (2018) Car Running Costs 2018, Medium Vehicle. *https://rac.com.au/-/media/files/rac-website/car-and-motoring/running-costs/2018/voc_2018_medium.pdf?la=en&hash=90D7323A99D9D88F26E2D84995CEC805C5AB99E7*

higher than this, at $1 per kilometre plus 32 cents per minute[82]. This near parity in cost diminishes the need for additional privately-owned vehicles, beyond the first car per household, and calls into question the rationale for mandated minimum parking requirements in development schemes.

Fully autonomous vehicles may even be cheaper to rent than to own, as the fixed costs of car ownership and insurance can be spread over a greater driving distance, reducing the cost per kilometre travelled. A local shared mobility shuttle could be easily built into the innovation being trialled in any of the potential projects outlined above.

For an integrated development using high speed transit along corridors and local shared transit mobility to enable last mile/first mile connections, there would be multiple extra value in developing around the stations. The higher value land around stations would enable much higher density yields and it would be possible for a developer to save between AUS$20,000 and $40,000 / dwelling (through reduced parking provision), enabling more affordable housing and more affordable living with families not needing a car or having one less car as well as being much closer to urban services and employment. Many urban transport and planning benefits would flow as the urban regeneration time savings compared to development on the fringe would enable highly significant benefits over costs.

This is the technological base for the Integrated Transit, Finance and Development model. However, a new technology has entered the urban transit system with large potential to provide the base for integrating cities, which we have termed the Trackless Tram.

Trackless Tram Technology Overview

As well as 'local shared mobility' there are new opportunities for what happens along urban corridors where there have been decades of growth in both heavy and light rail. Heavy rail carries 20 times the capacity of a freeway lane and is likely to have a continuing role with local shared mobility options providing feeder services for stations. But what about light rail, where will it fit? Is it redundant? Can a new technology version of light rail fulfil this connector role across cities?

Light rail has been growing rapidly across the world's cities as a connector joining up heavy rail stations to surrounding areas or completing shorter corridors that have no high quality transit lines. However, many commentators are suggesting that such public transport (heavy rail and light rail) will not be needed in the age of autonomous vehicles[83].

Such comments are missing the fact that not only have cars improved in technology with these new ICT advances, but so has urban rail with the invention of a range of technologies including driverless guidance systems. In fact, High Speed Rail between cities and new fast metro systems within cities have all become autonomous as only with high quality guidance systems could such vehicles travel at over 300 km/hr between cities or over 100 km/hr within cities. The latest transit innovations being developed in Europe and China are on how to integrate these kinds of optical guidance systems, electric propulsion with storage and recharging, and smoothed ride quality into buses, replacing the need for metal tracks. This innovation aims to transform the current type of light rail into what is referred to as Autonomous Rail Rapid Technology (ART), Guided Electric Transit System (GETS), or simply what we have termed a 'Trackless Tram'.

The technology has now emerged commercially and is being trialled in Zhuzhou, China (see *https://www.youtube.com/watch?v=bXB87NWHvDg* and Figure 19). Some of the research team went to China to examine first hand this new technology[84].

82 Uber Technologies Inc (2018) *https://www.uber.com/en-AU/fare-estimate/*

83 Newman, Kenworthy, & Glazebrook, op. cit.

84 *https://vimeo.com/290106133* (The Trackless Tram: Fixed or Flexible? Reflections on a Visit to China)

Figure 19. *Autonomous Rail Rapid Transit in China showing electric battery-powered and autonomous guidance system. Source: CRRC Zhuzhou Institute*

Stations are being prefabricated for rapid onsite erection as part of the highly cost effective system containing the electric charging system for rapid or longer recharge of the Li-Ion batteries on the roof. While many light rail projects take years to build and are highly disruptive to local economies, the TT can be installed virtually overnight due to the lack of infrastructure requirements in the road; autonomous optical sensor systems enable the TT to be rapidly moved along with much less sway and bump in the ride quality and significant increases in capacity. This is not a BRT and it is not an LRT but a whole new fixed track transit system.

The Trackless Tram can travel at 70km/hour through city streets with rapid acceleration and deceleration, while carrying between 300 and 500 passengers depending on its use of 3 or 5 carriages. Its speed and carrying capacity depends not just on smart guidance but on how clear the road right-of-way is provided, as discussed below. TT patronage capacity along a single lane is anticipated to be in the range of 12,000 to 30,000 people/hr (Table 1) this would be higher than light rail and 20 to 30 times the amount that can be carried in cars per hour in a suburban street or roughly 10 times the capacity of cars in a freeway lane. If, however, the TT is not given right of way and has stops less than every kilometre, then it would become more like a bus with significantly less patronage potential.

Trackless Trams are effectively a standard light rail set of carriages, affording all the benefits of a light rail such as a sleek aerodynamic design, multiple doors, higher ride quality, passenger safety and fixed-route land-value creation, with four additional Distinctions'.

1. **Rubber on the Road.** The running gear is replaced with rubber tyres intended to run on asphalt or concrete. Thus, there is no digging up of streets, very little disruption to businesses, houses or traffic, though space must be found in the roadway, probably replacing parking as with LRT. While many light rail projects take years to build, the TT can be installed virtually overnight. However, the rubber on road system is placed within a rail-type bogey and hydraulic system taken from high speed rail and is thus significantly better ride quality than traditional buses. It is also around half the weight of a diesel bus (9t cf 17t) and hence has so far in three years of trials made no impact on the road surface compared to the damage caused by trucks and buses. This is also due to the precise driving character created by the autonomous technology (see below) that prevents the swerve and sharp stopping character that causes rutting in roads.
2. **Battery-powered.** The TT is electric and is powered by lithium ion batteries located on the roof which are rapidly recharged (30 seconds) at solar powered platform-style-stations during service and can be fully charged while out of service at a depot (can be part of a bus depot). These enable quiet and emissions-free environments attractive to pedestrians and ideal for land development. The stations are interoperable with recharging of local shared mobility autonomous shuttles feeding into the transit system as suggested in the Future Commuting model at the start of this Chapter.
3. **Autonomous.** The TT has the potential to be driverless as it is equipped with all the new autonomous guidance systems. However, it is likely to have a driver who can over-ride the system at any time to go around accidents or other blockages. It is much less complicated for any autonomous vehicles to operate in fixed route transit corridors than to occupy streets or lanes that are shared with driver-based vehicles and hence it enables the autonomous guidance system to be maximised in speed, whereas most autonomous cars are heavily constrained when part of mixed traffic. The TT navigates the corridor by following virtual railways from the optical sensing system based on GPS and LIDAR; lines are painted onto the road for other road users and pedestrians to see. The autonomous character is not just enabling speed it is enabling higher ride quality as it is very precise in how it holds the bitumen or concrete road in the same way a train or tram holds the steel track. It has very little sway and when entering a station can be very smooth and precise in docking for user access just as in a tram or train.
4. **Low cost.** The whole system is considerably cheaper than light rail due to the lack of infrastructure both in the overhead catenary and the on-road steel tracks of light rail. Also the light weight and simple manufacturing system which can be assembled locally. The autonomous technologies, new design axle/wheel systems and batteries are not expensive but provide the extra dimensions that give the TT its tram quality.

The potential of this technology to enable integrated transport at a significantly lower cost is set out below. First, it is important to see that it is likely to be significantly cheaper than traditional light rail, see below. Second, it is likely to be just as good at attracting urban development around stations as it appears to be a genuine fixed track transit system (see below).

The autonomous vehicle functionality can ensure it has all the convoy potential of a highly smart signalling system on a heavy rail, perhaps better, and certainly much more than light rail. For the TT in cities like Perth which have significant road space options that can enable separate road-way lanes, an average speed of 50 km/hr could be anticipated. The Trackless Tram patronage capacity along a single lane would therefore be in the range of 12,000 to 30,000 people per hour; as shown in Table 1 this would be higher than light rail and 20 to 30 times the amount that can be carried in cars per hour in a suburban street or roughly 10 times the capacity of cars in a freeway lane.

Transport patronage niche

Transport Mode	People per hour per km of lane space	Multiples of car capacity in a suburban street
Car in suburban street	1,000	1
Car in freeway lane	2,500	2.5
Bus in traffic	5,000	5
Bus in freeway lane (BRT)	10,000	10
Light Rail	10,000-20,000	10-20
Trackless Tram	12,000-30,000	12-30
Heavy Rail	50,000*	50

Table 1. *Calculations of Trackless Tram patronage capacity and hence transport niche.*
Source: Based on Newman and Kenworthy, 1999, 2009, 2015.
** Hong Kong has a new service that provides 86,000 passengers per hour per direction, based on 12 car trains with a capacity of 3,750 per train every 2.5 minutes. Source: MTRC 2018*

The transport niche is therefore at least equal to or probably more than a usual light rail system capacity and can be quite transformative in terms of spatial efficiency at moving people down a corridor. It can therefore significantly reduce the need for parking at the various destinations along the corridor. If, however, the Trackless Tram is not given full right of way and has stops less than every kilometre, then it would become slower and have significantly less patronage potential.

The patronage capacity for a TT in a city like Perth based on an average speed of 50 km/hr (with stops every 2 kilometres) and a maximum of 3 carriage trams is likely to be 15,000 per hour but could increase to 25,000 with 5 car trams for special events and peak times. These are transformative capacity potentials.

In addition to passenger services, a TT might be used for urban cargo by tram, probably just for parcels or other light materials. Urban cargo by tram is a freight service being developed in several European cities, and it can also improve urban freight efficiency, particularly in heavily built-up central areas. Some examples of this emerging business model are given in Appendix 1.

Construction costs

Trackless Trams are much cheaper to construct than light rail, as there are no rails or overhead catenaries. The system requires programming with optical sensors and GPS guidance; lanes can be painted or affixed directly to the road surface for the purpose of pedestrians and other road users. The system also delivers higher capacity and better ride quality than bus rapid transit, as the vehicles are electrically powered and automatically guided along their alignment with new technology axels and wheels. The vehicles are thus cheaper than trams or light rail as shown below.

Light rail in recent years has begun to be very expensive due mostly to the cost of replacing services in the road when laying tracks. In Sydney the cost is over AUS$120m per km, Perth's proposed but abandoned light rail called MAX was $80m per km, the Gold Coast and Canberra around $50m per km. The costs of a trackless tram system were estimated by the Bodhi Alliance and EDAB consulting,

in a report prepared for the Inner West Council and City of Canada Bay in Sydney's west. This report estimated the cost at $5.59 million per kilometre of a route, including vehicle costs. By comparison, the cost of installing a tram was estimated along that road at $15.31 million per kilometre, and the trambus system (higher capacity, elongated buses) at $5.51 million per kilometre, essentially the same cost as the TT system. However as outlined above, the patronage capacity is higher for TTs[85].

Construction costs are presented in Table 2 for Light Rail Transit (LRT), Bus Rapid Transit (BRT) and Autonomous Rail Rapid Technology (ART) or the Trackless Tram (TT) system in an Australian context based on recent data showing the cost per km for the basic vehicles, stations, etc. from Manufacturer and a total cost per km including roadworks.

Cost per km	LRT	BRT	ART or TT
Cost from Manufacturer (for vehicles, stations for recharge, communications)	$15m	$6m	$6m
Total Cost (including above plus road works, depot, service relocation, design and management)	$49-$100m	$18m	$16m

Table 2. *Comparison of construction costs for trams, trambuses and the trackless tram system in AUS $*
Source: Bodhi Alliance and EDAB Consulting and Manufacturer in September 2018

Construction Cost and the Role of Government

A Trackless Tram can be delivered at a substantially lower cost than light rail, and it is reasonable to question the need for private involvement in transit infrastructure.

The integrated land use, transport and finance model introduces an entrepreneurial approach to transit and urban development. This entrepreneurial approach pursues land development opportunities and encourages transit-land use integration, as discussed in Box 8. Conventional public delivery mechanisms have always struggled with land use integration, due to a combination of organisational silos and an imperative to respond to the need for getting from A to B directly, rather than development opportunities. More intensive urban development will also generate increased patronage, and an integrated transit, land development and finance project can be expected to actively pursue this increased patronage, rather than simply responding to engineering a direct route from A to B.

Public transit operations already run at a substantial deficit in Australia, and the need for subsidies to operate public transport should not be increased, beyond the resources needed to service low-density areas for reasons of social inclusion. The need to bring people back into housing options closer to urban amenity and services is a powerful economic incentive as well as social and environmental incentive as outlined earlier.

85 See Parramatta Road project https://www.innerwest.nsw.gov.au/news---hot-topics/hot-topics/parramatta-road

Attracting Private Funding: Is the Trackless Tram Fixed?

Light rail has been shown to stimulate development through boosting land values in its vicinity, with there being a well-established body of literature in support of this. There is evidence of BRT having a similar effect, although not to such a degree as for rail due to noise and diesel fumes being less attractive to developers and the market as well as a lower quality ride from the buses that sway and jump along roads. Regular bus services, while no doubt contributing to the developability of the area they service, have a small value uplift and cars/freeways generally have a negative effect on land values. The value increase due to fixed rail systems has been found in both Australia and India[86]. Bangalore found that not only was land value improved locally but across the whole city after a Metro was built. This suggests how significant quality transit can be to economic development, but perhaps more importantly the underlying market that is suggested can be used to help with funding and financing such transit systems.

As with all transport options, the Trackless Tram system will require significant financial investment though the figures in Table 2 suggest it is a much more manageable number than any other mode with such patronage capacity potential and has a much less disruption of the local economy in the construction phase of LRT. If a Trackless Tram is to be able to attract value capture opportunities it must be more like a train than a bus. It must be more like a fixed service that will not be easily removed from serving a station where developers are needing to see a return from their investment.

The evidence presented here suggests that the Trackless Tram is more like a train as it has a long term fixed route with fixed stations necessary for recharging with power and for which substantial development activity will be attracted due to the flows of people through the area. As such, a Trackless Tram should be able to attract urban development around fixed stations that can be used to help pay for the infrastructure. This value capture mechanism is the basis of how financing can be done in many cities around the world.

The Trackless Tram uses or simulates many of the features of rail that have enabled development around stations, plus a few more. The qualities of TTs that will attract development include:

1. Fixed routes, suggesting permanence and long-term commitment, rather than flexible bus routes, which can be modified or removed quickly and easily, thus undermining investment potential.
2. Better ride quality than conventional buses. The Trackless Tram uses electric motors on each wheel, providing for smoother acceleration and less vibrations than an internal combustion engine vehicle. The automatic guidance system also keeps the vehicles closely following their intended path, especially when accelerating or decelerating away from or into stations.
3. No local air pollution, again due to the electric motors.
4. High capacity, as Trackless Tram vehicles are being pioneered that can carry 300 to 500 people per vehicle, as outlined above, for special times and less capacity at others.
5. With solar-based recharging facilities, the opportunity is created to be a focus for recharging new autonomous and electric vehicles that are now being called 'local shared mobility options' as they bring people to the station for quick interchange to the corridor system in a 'first mile' and 'last mile' linkage.
6. Precise delivery of patrons, whether in wheel chairs or not, so that there is a perfect transfer from station platform to the Tram.

Each TT station is likely to become a magnet for development as the Tram stops provide fixed

86 McIntosh, Trubka & Newman (2015), op. cit.
Sharma & Newman (2018a), op. cit.

transport services and a constant stream of pedestrians. Development is thus likely to be attracted to the Tram stop area for up to 1 kilometre in radius. Such land value increases in transit-oriented development (TODs) can be captured to enable the TT system to be financed. This value capture has been applied in many cities around the world; however, results have been mixed as often the corridor and station location selection is done by transport agencies with little concern for land development opportunities. As outlined above, Japan, Hong Kong and many other cities are now using more land development-oriented market-based approaches. They are integrating transit, land development and finance.

Once a model for funding is developed that uses private investment to integrate land development and the provision of quality transit, then the owners and operators of this system will not want to unlock the integrated land development and transit service at stations. They will want it to be fixed for at least the time in which their investment is due to be paid back. The stations will therefore be fixed at least as well as if a steel wheel on steel tracks was being built instead of a TT. However there is one difference. If an accident or blockage occurs in the path of a Trackless Tram the 'driver' can go into manual operation and take it off the fixed route and move around the blockage. This is something that enhances the system rather than diminishes its fixed track system qualities.

TTs, integrated with land use and finance, are likely to be a powerful new combination providing a 21st century method of transport that brings together the potency of light rail in attracting development and the potency of new technology for the TT as well as for 'local shared mobility' feeding into the new solar stations. The combination is likely to attract significant public support and private funding for a whole corridor of new public transport[87].

Procurement of Trackless Trams, Integrated with Land Development and Finance

Transit-land use integration is likely to be even more powerful with this new technology. It is likely to leverage real partnerships that will enable the selection of routing and station locations that both deliver transport services to the community and increase the value of specifically chosen land parcels for development. For instance, a 'Special Improvement District' (SID) type approach would see developments on such land along the route paying for the stations and contributing to the carriages and road preparations; and even operating the tram system in that corridor[88].

This process may involve the creation of a 'City Tram Company' (CTC) to function as a collaborative legal entity, capable of gathering revenue streams and able to borrow from superannuation funds/ banks based on development opportunities with risk guarantees from the Federal Government and work closely with state agencies. This CTC must bring together the various partners and overcome the silos and barriers in the creation phase'to help design the rules and clarify the risks and rewards. The challenge here is to bring together a grouping of local authorities along a proposed corridor and other partners in a way that can identify the various annuity streams from transport and non-transport elements, including development opportunities within a SID corridor.

87 *https://www.youtube.com/watch?v=iqz9GXJuakU&t=4s* (10 minute video)

88 Sharma & Newman (2018a), op. cit.

While government support is needed, some cities are finding that the less reliance on government capital the more likely the project is to succeed as the need for public funds is escalating in other non-market based areas. There may be government funding such as special rate increment schemes and parking levy funds but these have political challenges and should only be examined if the more enterprising land development approaches are found insufficient. In essence the implementation vehicle needs to be an entity or alliance of the stakeholders which drives the project. If this in place and the partnerships can show that there is a real source of income from land development and transit activity, then it is likely that such a project will attract Superannuation funding as these investment groups are looking for such long term stable projects for their funds. They are also keen to see common good outcomes such as reduced climate change and other sustainability gains.

Different approaches will be needed in different jurisdictions and organisational structures might include alliance structures, mutual structures, and cooperative structures. The first step is likely to be how an alliance of common interests along the corridor can be achieved with a long-term interest in both a quality transit option as well as urban redevelopment opportunities.

Conclusions to New Technology

The Trackless Tram has become a major possibility for delivering an integrated transit, land development and finance system. As set out in Table 3, the Trackless Tram is able to be competitive with an LRT on speed and capacity, on ride quality and with land development potential whilst being similar in cost to BRT. It's lack of disruption in construction and ability to be rapidly implemented mean it is going to be a winner in many cities.

Characteristic	BRT	LRT	ART OR TT
Speed and capacity	✓	✓✓	✓✓
Ride quality	X	✓✓	✓✓
Land developers potential	X	✓✓	✓✓
Cost	✓	X	✓
Disruption in construction	✓	X	✓✓
Implemenation time	✓	X	✓
OVERALL	✓	✓✓	✓✓✓

Table 3. *Comparing BRT, LRT and ART on Trackless Tram. Source: P.Newman, The Conversation 26 Sept 2018.* *https://theconversation.com/why-trackless-trams-are-ready-to-replace-light-rail-103690*

10

Conclusions

The establishment of an appropriately constituted alliance between local governments, local community groups, local businesses and the relevant state government agencies, is considered the best potential mechanism to create opportunities for private investment into combined urban fixed track transit systems and urban regeneration projects. If the necessary master planning and financial planning can be done with such a grouping then processes such as the Australian Federal Government's City Deal process could begin to enable such projects to proceed by guaranteeing the risks involved for private investors like superannuation companies. An alliance of partnerships reaching from the local communities right through state agencies and via private investment up to the Federal Government, can help build an innovative, inclusive, resilient and sustainable future in our cities. The alternative proposed mechanism is to work through an Unsolicited Bid process following the guidelines provided in each State.

The Manual in Appendix 2 is designed to help people who would like to generate an integrated transit, finance and land development project using either of the recommended procurement processes – City Deal or Unsolicited Bid – through a series of steps and associated questions that will enable them to design and deliver such a project.

Urban rail projects across the world are now being owned and operated by private consortia (e.g. in Australia the new light rail on the Gold Coast, in Canberra and in Sydney as well as Melbourne trams and trains). This is not unusual. What is unusual about the new model presented in this Guide is how land development becomes the cornerstone of its funding; how the integration of private land development entrepreneurial skills unlocks access to private capital and creates land value. The power of this model is that the unlocking of private development in new activity centres could not occur unless it was completely integrated with the amenity-creating, value-creating power of a new urban rail service or something equivalent like the Trackless Tram. Finding ways to enable this model through government is a challenge as transport planners have been trained to see transit as a welfare model where they control the whole process. This will need to change, as there is now a growing market for integrated urban rail and urban regeneration which cannot be done without involving the private sector. Various models for creating value through partnerships between transit, land development and finance are likely to emerge, but some of the key principles outlined here are likely to be needed to enable full public and private gains from the new markets for urban rail and urban regeneration.

The need and the demand for new urban rail and TODs is now clear. The demand for a new transit procurement process involving private sector funding is likely to follow; this will not just be the only way that many governments will want to engage with expensive rail and urban regeneration projects in inner and middle suburbs, but it appears to be the best way of providing the highest value outcomes. It will depend on communities of interest being formed into appropriate alliances.

11

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Appendix 1

Urban Cargo by Tram

by Professor Hussein Dia,
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Autonomous electric trams offer opportunities to improve freight operations and help operators increase profit from the tram network.

A number of existing examples across Europe show how tram operators are attracting businesses to use their network for freight transport. Having in place large and well-run tramways for passengers has lured the private sector to consider new freight and logistics opportunities around efficient tram operation which in turn makes the network even more productive.

In France, for example, the city of Saint-Étienne runs the *TramFret* [89] project (Figure 20) which uses older trams to move produce from a warehouse on the outskirts of the city to the busy downtown area. Since its launch in June 2017, the non-passenger once-daily service has been delivering water, soft drinks, snacks and canned goods to supermarket stores. The project was initiated by the research and development institute *Efficacity* [90] as a partnership between the local authority and the tramway operator in an effort to reduce congestion and reliance on road traffic to deliver freight, which in turn would reduce emissions and pollution. Although still in its early stages, the local authority is supportive of the initiative which is proving economical (fast and convenient). In some cases, the goods are pushed straight out of the trams into stores. The tram operator is also finding value in using older stock to deliver the goods which helps it to generate more income from existing assets and infrastructure.

Figure 20. *The TramFret Project in France. Photographs copyright: Philippe Rony*

89 http://tramfret.com

90 https://www.efficacity.com/en/home/

Another example is from the German city of Dresden where Volkswagen has been running a successful similar service (Figure 21). The *CarGoTram*,[91] a partnership between the car manufacturer and the city's transport operator, is used to move car parts from the freight depot to the factory using the city's tram passenger route.

Figure 21. *The CarGoTram in Dresden. Photograph copyright: Volkswagon*

Other cities in Europe, such as Zurich, have also been experimenting with using trams for purposes other than passenger transport, such as transporting recycling bins and bulky electric waste in old trams allowing them to better utilise their assets and increase profitability for the tram operator (Figure 22).

Figure 22. *The Cargo-Tram project in Zurich Photograph copyright: ERZ Cargo-Tram*

91 https://www.metro-report.com/news/single-view/view/freight-tram-to-support-electric-car-production.html

One of the key advantages of using autonomous tram systems is the reduced cost to operators. Cities around the world can benefit from running similar services which are more likely to reduce reliance on private vehicles than buses, especially in urban areas where the trams use a dedicated set of tracks not shared by other modes of transport. The experience from Europe also suggests that businesses find them as a very visible form of clean, reliable transport.

Parcels on Passenger Trams: Peer-to-Peer Concept

Another concept and potential opportunity is to use passenger trams to provide a technology-based cost-effective on-demand solution for delivering small parcels around cities (Figure 23). This would result in reducing congestion, and ensuring faster, cheaper and more reliable delivery services.

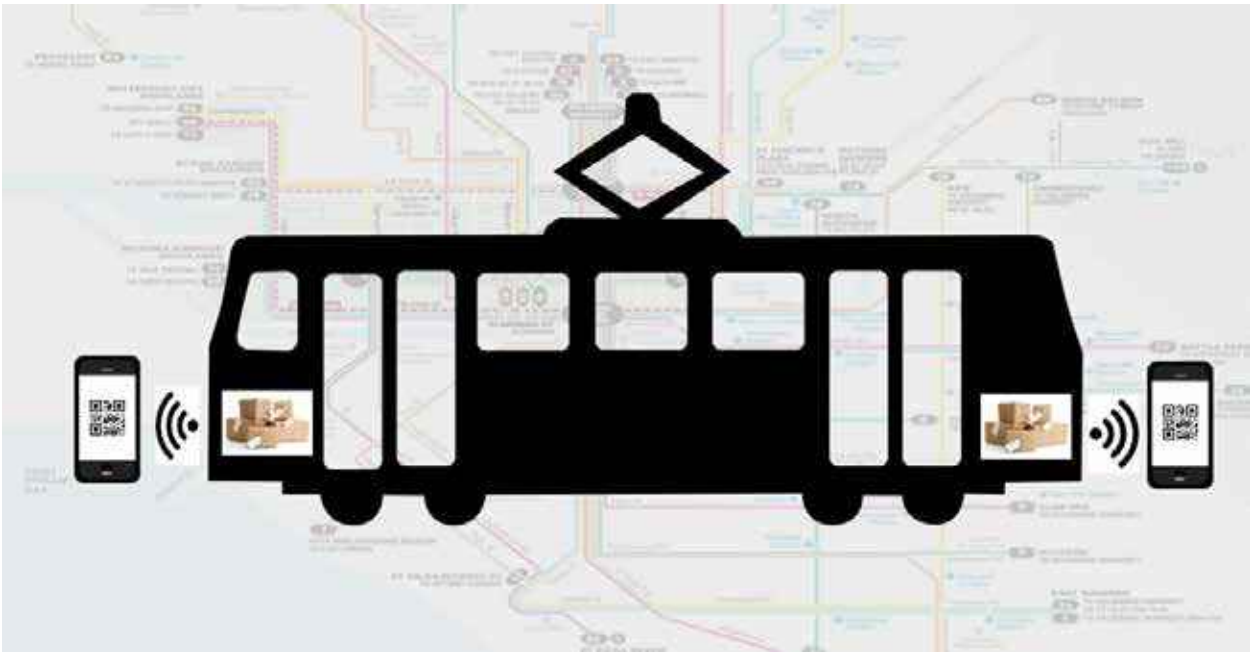

Figure 23. *Concept for Parcel Delivery on Trams.*
Concept by Hadi Ghaderi

Using a mobile app, the sender of a parcel books a shipment slot on a specific tram or tram route. The sender waits at the tram station and uses a mobile app to scan a barcode on a secure box on the side of the tram. The box opens and the sender places the parcel and locks the box. The transaction is shared (possibly on the Blockchain to enable ease of transfer of money) between the sender and receiver and both people can track the parcel's movement as it travels around the network. When the parcel arrives at the destination tram stop, the receiver scans open the box and collects the parcel.

In a similar fashion, technology can also enable the use of trams for delivery of larger items (supermarket pallets for example) during off-peak times and at night. This is another opportunity for businesses to supply their customers, particularly in pedestrian streets and zones where there is no vehicle access.

There are clearly some challenges that need to be worked through (such as demand for such services, space availability on trams, potential delays, safety and security concerns). If successful, this approach can boost freight connectivity in urban areas at a low cost and reduce the number of small delivery trucks on the roads, particularly in congested areas.

Appendix 2

The Manual

A 50 Step Process for Delivering an Entrepreneurially-financed Transit-activated Corridor

The following 50 step process for delivering a Transit-activated Corridor (TAC) includes a number of planning processes, leading to a number of decision gates. A TAC proposal must meet the conditions at each of the decision gates in order to proceed.

Figure 24 presents a stylised flow sheet summary of this process.

Part A: Identify Land Use Uplift Potential of Corridor and Build Asset Base

Stage A1: Develop a situational awareness of the specific corridor (What do we need to know initially to get an indication of whether the corridor may be suited to an entrepreneurial approach that integrates land development into transit through private funding?)

1. *Development Potential: Are there significant developable land parcels whose value could be unlocked by improved transit access?* How ready are the sites along the corridor for development? Are there parcels of under-developed land (including low density housing stock)? Are there topographic, heritage or other barriers to development in the corridor? What are the real estate market considerations? What is the 'character' of the corridor, including the culture, socio-economic level, density? What would be the impact on land development potential of surrounding areas? Is there less existing development than allowed under current zoning?
2. *Precedent:* What studies have already been done in this space relevant to the corridor? Are there any relevant interests, previous efforts or investments related to such studies that need to be considered?
3. *Preferences:* Are there existing preferences from government or the private sector for the location of transit corridors and stations? Is there the potential to build on previous efforts to deliver quick wins?
4. *Community Values:* Are there community values associated with corridor and associated redevelopment options (including past responses to development proposals)? How organised are the community in this corridor around shaping development? What is the appetite for redevelopment?
5. *Private and Public Interests:* What are the interests in the corridor (and between corridors) held by state government agencies, local government, developers, commercial businesses and land holders. Are the interests conflicting or aligned? If conflicting how can they can be brought together?
6. *Transport Service:* How are transport needs served now? (Sketch out adequacy of present system.)
7. *Politics:* Is there any relevant history of corridor development aspirations or experiences? Is there potential for a Market-led Proposal? What potential is there for a government-led partnership with industry and the community (is there history or a precedent for partnerships in the area)? What politicians are involved in the corridor and are they marginal seats? Is there interest for wider Federal Government involvement?

8. *Statutory Planning:* What are the zoning, land assembly and/or mixed-use potential/ impediments in the corridor? Is there a precedent for amending such planning structures to encourage development?
9. *Risks:* What are the major risks involved in implementation of a transit-activated corridor approach in this corridor? What is their severity and how can they be mitigated? Prepare a risk matrix.

Leading to:

10. **Go/No-Go Gate 1:** Would an entrepreneurial approach succeed in this corridor?

Stage A2: Understand the specific location potential (What is the potential for land value uplift in the corridor?)

11. *Pre-transit Conditions*: What are the established current and projected values of existing land uses along the corridor (housing, units and commercial developments) with current zoning?
12. *Post-transit Value*: What is the estimated improvement to short-term and projected land value due to transit activation? How would a high-quality transit link affect the rental rate per square metre, rate of sales, or absorption of development on this land? Could the yield be increased and by how much? What are the implications from reduced parking requirements? What is the potential for mixed use options at each station precinct?
13. *New Technologies:* What is the potential for increasing land value uplift and hence unlocking land development through new technologies in buildings and transit? Can Trackless Trams and local autonomous vehicles be a new way to attract development opportunities? What new building and construction technologies could compliment transit activation and increase land value? (For instance, the sale of excess solar PV from surrounding buildings to the transit provider for station operations, or new opportunities for autonomous shuttles providing local shared mobility services for first and last mile services and to encourage greater patronage.) What are rough costs for such innovations?
14. *Place-making:* What is the potential for place-making to increase the value of the land, through a focus on urban quality and character building? Is there a culture of place-making in the corridor?
15. *Uplift Classification:* What are the classifications of land value uplift potential for each of the land parcels along the corridor that are likely to be considered for station co-location? (This would involve the adoption of a suitable multi-variate classification system for consideration of economic, social and political factors and hence potential as a station location.)
16. *Legal Restrictions and Barriers*: What are the current zoning and other planning restrictions on the land? What are the minimum parking requirements? How difficult will it be to remove these restrictions?

Leading to:

17. **Go/No-Go Gate 2:** Is there good potential for land value uplift in this corridor?

Stage A3: Investigate land asset availability

Plan Asset Base: What land parcels are critical for the project to succeed commercially? What further lots are desirable? How much can be drawn into the partnership process?

18. *Discuss with Existing Land-owners:* Reach out to existing land-owners for potential partnership or sales.
19. *Begin Community Engagement:* Establish major issues that could be positively resolved as part of both land development and transit delivery.

Leading to:

a. Go/No-Go Gate 3: Is there a sufficient land asset to fund the project and sufficient local goodwill to unlock potential development and transit?

Part B: Leverage Funding and Finance

20. *Seek funding for land development from Superannuation companies and other finance companies*. Is there interest in land development that will involve building a transit system?

21. *Estimate the potential amount that could be achieved for land development with and without the transit*. What kind of funding may be possible for a transit contribution from each development site?

22. **Go/No-Go Gate 4**: Is there sufficient funding to finance both the land development and the transit system to deliver both?

Part C: Investigate Potential Transit Configurations

Stage C1: Identify potential transit configurations that could activate land value uplift in the corridor

23. *Integrated Transit and Development Options*: Outline key goals for the corridor that set out how much better is the proposed transit system and how much land development can improve the corridor. Suggest options and technologies that can deliver these such as set out in Chapter 12. What other technology could enhance the transit options? (For instance, can big data analytics be used to deliver preventative maintenance; can blockchain technology and mobile phone applications be used to streamline ticketing and links to last mile service providers?)

24. *Community Outreach*: Continue earlier engagement with the community and other local stakeholders in order to frame specifics of land development and transit opportunities in order to build a social license to develop.

25. *Strategic Plans and Development Controls*: What are the current strategic plans for the corridor and how do the options fit these? What development controls along the corridor would need to be changed? Are there pending or approved development applications in the corridor?

26. *Transit Needs*: What are the current flows of traffic, buses and other modes in the corridor? How will these change with increased development? How can these be met under the proposed new technology options? Are there existing public transport routes that can be absorbed or act as complimentary feeder and distributor services?

27. *Station Requirements*: What are the necessary requirements for each station along the corridor in terms of disability access, ticketing, bicycle parking, access for integrated bus/AV shuttle system, walkability links to surrounding precincts.

28. *Network Integration*: How will the new transit options affect the existing system, what will be replaced and what will need to be changed such as timetables, ticketing, depot and interchange facilities? What are the implications of integrating with existing signalling infrastructure? What are the wider transport network implications around the corridor and can the corridor contribute to enhancing the network over time?

29. *Potential Patronage*: What would be the expected patronage for each station precinct location given the development scenarios? What level of service will be required to meet peak demand, and how can demand be built outside the peak, including in the opposite direction from peak flows? How does the potential patronage from new sites fit in with other present transport usage in the corridor?

30. *Assessment of Benefits and Costs*: What would be the travel time savings for commuters? What would be the accessibility, agglomeration and amenity benefits? How can walkability, cyclability and local shared mobility be encouraged and supported? What are the time savings associated with those living and working in the new urban regeneration compared to living on the urban fringe?

Leading to:

31. **Initial Preferred Transit Configurations**: Based on the previous items, a set of possible route, station and transit technology scenarios would be developed to include the potential for mixed-use development and the provision of transit services, land value uplift estimates, appreciation of changes to accessibility and options for adopting innovative technologies.

Stage C2: Identify associated implications for infrastructure and network management

32. *Construction Implications*: What are the implications for pavement design and road maintenance? What are the likely implications of disruption in the corridor due to the construction phase? What are the implications for allocating exclusive right-of-way along the corridor? Can it be fitted without road widening?

33. *Electricity Grid*: Assuming a transit system with onboard energy storage, what are the implications of recharging at stations on the existing electricity grid? Is it cost-prohibitive to provide such charging options? Can it be sourced from local energy generation options associated with surrounding buildings (potentially allocated via blockchain technology)?

Stage C3: Identify the potential for integration with the broader urban agenda

34. *Strategic Planning*: How does the proposed transit corridor scenario contribute to enhancing the city's strategic planning and mobility objectives? How can it link to other corridors in future? Can this be part of a network-wide transition, rather than an isolated corridor upgrade? How can institutional support be built if the project is outside current city plans?

35. *Adaptability*: Are there areas of the network that don't work which can be addressed by linking developer-involved transit corridors? Where are the 'slow moving' areas of the network? Is the network able to be transitioned or is the complete system in need of updating (meaning changes to established transit and road-use patterns)?

36. *Economic Benefits*: What would be the saved infrastructure investment on the fringes due to higher density along the corridor? What savings from road and parking infrastructure are required to meet continued car usage?

Stage C5: Investigate alternative sources of revenue

37. *Alternative Revenue from Passengers*: What revenue can be gained from advertising and non-transport revenues derived from passengers?

38. *Other Revenue:* What other sources of revenue exist, such as laying fibre optic cables within the alignment, parcel or freight delivery, or electricity sales?

Leading to:

39. **Refinement of Preferred Transit Configurations**: Based on the previous items the initial set of possible route, station and transit technology scenarios would be refined to ensure implications for infrastructure, network management and strategic planning are taken into consideration.

40. **Go/No-Go Gate 5:** What transit design configuration can unlock the land development and hence attract the funding and financing of the transit service using new transit and building technologies and planning?

Part D: Procurement Governance and Delivery

Stage D1: Establish appropriate governance mechanisms that enable procurement and facilitate delivery of integrated transit, land development and finance projects.

41. *Governance Mechanisms*: What governance mechanisms can be used that effectively engage with planning, transport and finance agencies (using examples from around the world and in the present local structures)? How can the early engagement with other developers be appropriately maintained through the governance structure selected? Are there any regulations that would prevent delivery of such new technology options and new partnership projects?

42. *Wider Implications*: Can the structure be part of wider re-development governance mechanisms to enable rapid adoption of particular projects across the city? (For example, the formation of a 'Trackless Tram Projects Development and Delivery Authority' (T2D2) as part of a Metropolitan Redevelopment Authority).

Stage D2: Resolve transport and planning misalignments around route and station locations, level of patronage predictions and expectations around new technologies

43. *Capacity*: What is required (knowledge, skills, resources, remit) to establish an authority with staffing sufficient to understand and collaborate to resolve misalignment issues? Can private sector and community secondments enable entrepreneurial scenarios to be properly interrogated?

44. *Deliberative Democracy*: How can deliberative democracy processes be developed that can resolve issues along the corridor involving private sector, community and government stakeholders.

Stage D3: Develop risk management partnerships between the three levels of government and the private sector

45. *Risk Management*: What is the process to identify and seek consensus on the associated risks and options for mitigation.

46. *City Deal*: What kind of 'City Deal' type processes exist that could be used to mitigate risks by appropriately drawing on government credit ratings and project evaluation? (E.g. the Infrastructure Projects Finance Authority of the Australian Federal Government.)

Stage D4: Facilitate procurement to achieve the best bids on scenarios based on planning, transport and finance outcomes

47. *Procurement Models*: What model is best for the delivery agency to enable procurement to reflect the integrated planning, transport and financing requirements in the bidding process? (this may involve a City Deal model or an Unsolicited Bid model as outlined in Chapter 9.)

48. *Procurement Process*: What will be the best way to find public good outcomes whilst addressing local government interests, developer interests and transport agency interests for mutual benefit to enable delivery? How should the procurement process be finalised to the satisfaction of the three levels of government?

Leading to:

49. **Go/No-Go Gate 6:** What is the best governance model for procurement and delivery? Who should cut the ribbon?

Figure 24. *A stylised flow sheet summary of the 50 Steps in the Manual for Delivering an Entrepreneurially-financed Transit-activated Corridor.*

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