Integrated Cities:

Procuring Transit Infrastructure through Integrating Transport, Land Use and Finance

Final Industry Report, Project 1.55
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Sustainable Built Environment National Research Centre

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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.

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The project videos can be viewed on the SBEnrc official YouTube channel:

https://www.youtube.com/watch?v=iqz9GXJuakU&t=4s (P1.55 full 10 minute video)

https://www.youtube.com/watch?v=bzJttLpFN1M&feature=youtu.be (P1.55 short summary video)

https://vimeo.com/290106133 (The Trackless Tram: Reflections on a visit to China)

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Executive Summary

Most cities want more and better public transport and most want more lively, productive and sustainable centres, especially in the suburbs. Planning such integrated cities requires close alignment of building intensity, land use mix and transport infrastructures. Designing these in conjunction is essential, but rare. This industry report shows how to maximise the gains in land values due to station proximity, and how land value capture tools may help finance new urban rail, especially with the new technology of Trackless Trams.

The report draws on case studies from around the world as well as several industry workshops conducted over the 18 month life of this research project. The conclusions show how integration of transit and land development can occur using private funding and finance as the glue. This is Integrated Cities. The document summarises the central ideas captured in the longer Guide and Manual[1]. Both these documents are written with a view to the application of the Integrated Cities model to Australian cities but with a particular focus on Perth.

This report is structured into the following sections:

- **Part 1 Introduction** – describes the need for integrated cities and how transit, particularly rail, can act as the catalyst for urban regeneration through gains in adjacent land values.
- **Part 2 Designing Integrated Cities** – describes how new technology transit systems (especially Trackless Trams) and Transit Oriented Developments (TODs) can create value and the various models for value capture.
- **Part 3 Delivering the Integrated Cities Model** – describes ways to overcome traditional agency/ sectoral silos that hinder integrated outcomes, through collaborative approaches for industry and government based around partnerships with private sector funding and financing.

Emerging transport technologies are identified in the report as enablers for the integrated models. In particular, Trackless Trams (TTs) are seen to offer numerous advantages over conventional light rail or buses. The extra high ride quality created is due to the integration of six autonomous innovations from high speed rail transferred into a bus. This and the additional advantage of being able to operate on conventional road infrastructure and be powered through on-board electric batteries that are recharged at solar-powered stations, have created a new kind of transit with rapid deployment times, high passenger capacity and much more competitive costs, thus providing greater ridership at lower costs. Most of all, the TT system has the qualities that can attract developers to want to build around stations and hence it can unlock urban development and create the kind of integrated cities that all urban policy agencies are wanting.

In order to fund such new technologies, there is a need to create land development and tap the subsequent land value increase to fund the new transit as together they unlock each other's role. This report outlines four different value capture models based on the different proportions of public to private funding to generate the finance needed to build the integrated transit system.

Each of the four models has different procurement tools to help generate the private funding:

- Full Public Sector Capital: the Land-based Levy Model.
- Some Private and Substantial Public Capital: the Tax Increment Finance Model.
- Some Public and Substantial Private Capital: the Special Improvement District Model (SID).
- Full Private Capital: the Entrepreneur Rail Model (ERM).

The more that private funding can be involved, the more possibilities of transit-land use integration there are. This is because greater value is created by early involvement of private developers who understand urban markets and who can unlock superannuation funds and other private funding sources, as well as the extra benefits that flow from the density increases associated with this model.

The report concludes that both the SID and the ERM models are the best suited to delivering integrated cities in Australia, because these models have the greatest potential to both create, and capture, value. Both models have a long history of application in Australian cities up until the 1940s and are being rediscovered in cities around the world although not much has yet happened in Australia.

There are two models then suggested, for how to procure such integrated cities without requiring government to be the primary funder. One is by using the new approach of City Deals and the other using Unsolicited Bids that produce the integrated outcomes desired. Both can be used to take the innovation of a Trackless Tram and use it to unlock private investment through land development opportunities, and at the same time unlock community and political support. This is the Integrated Cities model, for which the approach has been detailed in a 50-Step Manual[1] and summarised in the flowchart on the next page.

Integrated Land Development Finance and Transit

Begin Integrated Transit and Land Development Planning

Skill Base Responsible

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

Development potential - Precedent - Preference - Community Values - Public and Private Interests - Transport Service - Politics - Statutory Planning - Risks

Land Development/ Real Estate

GO/NO-GO GATE 1: Would entrepreneurial approach succeed in this corridor?

Pre-transit Conditions - Post-transit Value - New Technologies - Place Making - Uplift - Legal Restrictions and Barriers

Transit Planning

GO/NO-GO GATE 2: Is there good potential for land value uplift in this corridor?

Plan Asset Base - Discuss with Existing Owners - Begin Community Engagement

Land Use Planning

GO/NO-GO GATE 3: Is there sufficient land assets and sufficient local goodwill to unlock potential development?

B Leverage Funding and Financing

Seek Funding for Land Development - Estimate Development Potential With and Without Transit

Land Economics

GO/NO-GO GATE 4: Is there sufficient funding for both land development and transit system?

C Investigate Potential Transit Configurations

Transit Configurations to Uplift Land Values - Implications for Existing Infrastructure - Integration with Wider City - Alternative Revenue

Transit Planning

GO/NO-GO GATE 5: What transit design can unlock land development to attract funding and financing?

D Procurement Governance and Delivery

Governance Mechanisms - Resolve Transport and Planning Misalignments - Risk Management Partnerships - Plan Procurement Model

Strategic and Policy Planning

GO/NO-GO GATE 6: What is the best governance model for procurement and delivery?

Proceed with Integrated Transit and Land Development Project

1 Integrated Cities: Why we need them

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 [2–5]. 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 governments 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 recover operating costs as farebox revenue is inherently limited due to equity demands [8].

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 also to provide for the demand for transit-oriented urban fabric: Transit Oriented Developments (TODs), with urban vitality and liveability benefits [3,6–8]. To reflect this demand, all major Australian cities now have planning policies that encourage greater land use intensity adjacent to stations.

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 [7,9–13]. The focused land intensity of TODs that is fostered by this process is a major economic benefit both in the agglomeration economies, and the significant time and infrastructure cost savings in the alternative more scattered urban forms that it replaces [14–16]. 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 [14,17].

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 [5,18,19].

This three-factor integrated development approach – transit, finance and urban land development – can simultaneously meet the demand for urban rail and for focused, well-located urban redevelopments. The integrated 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 [7,20].

The following section outlines the key elements needed for the integrated cities approach. Further background on the central ideas captured here is in the longer Guide and Manual [1].

2 Designing Integrated Cities

Designing integrated cities requires the close alignment of building intensity, land use mix and transport infrastructures. Designing these in conjunction is essential, but rare.

The following section outlines the key considerations of transport and land development including the important influence of technology on transport planning and transport systems, and the underutilised role of land development as a source of infrastructure financing. It describes some of the new concepts in transport systems, especially new autonomous transit systems that are likely to attract land development investment around stations, and then the new concepts of how to capture the value and enable private sector investment to drive the delivery of integrated cities.

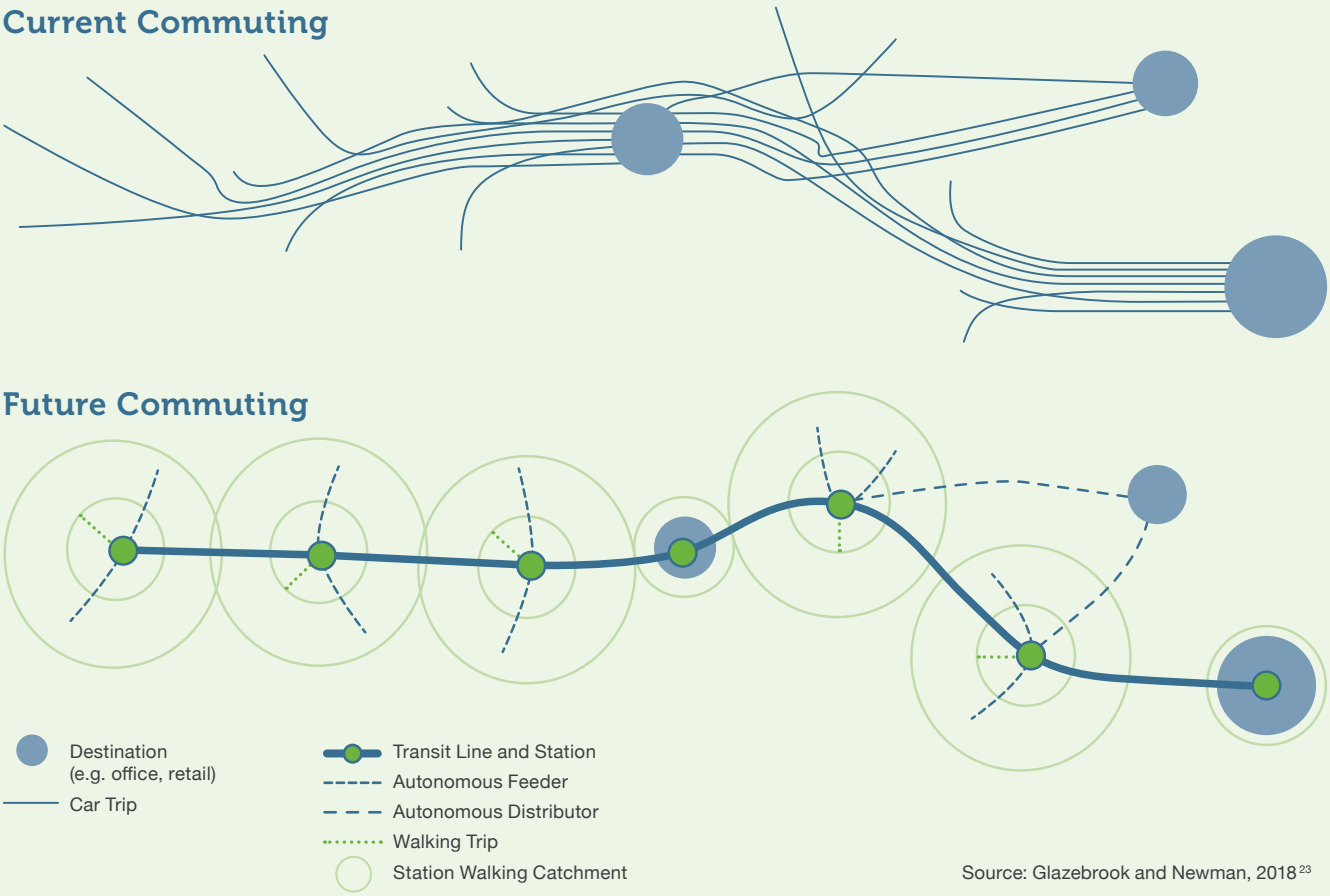
2.1 Transport planning and autonomous technology

The tram, train and especially the car, which currently dominate urban transport are all essentially products of the 19th century [21]. Modern versions of these modes are more developed in many ways such as in safety and comfort; however, they are little changed in the key characteristics (capacity, effective speed) which determine how they accommodate urban travel and also how they shape our cities [3,22]. In contrast, all of these modes represented a major leap forward over previous transport technologies (walking, horse drawn vehicles) when they were first introduced. Indeed, in many respects our current transport systems have gone backwards in recent years. Cars and freeways which can only handle around 2,000 passengers per lane per hour have come to dominate longer distance travel over rail-based solutions, which can handle ten times that movement in the same space. Growth in private mobility has led to rising traffic congestion, and with it slower speeds, both for the cars themselves and for any other vehicles (trucks, buses, trams, bicycles) caught up in the congestion. Thus, urban efficiency has declined despite the apparent improvement in personal mobility [23].

A major technological change in transport is underway; the development of autonomous vehicles. These are sometimes seen just as driverless, but they can involve drivers and still be significantly better transport systems in terms of their speed, rideability, capacity and safety. Studies in the UK have estimated that the eventual replacement of conventional cars by autonomous ones will result in a significant improvement in road safety. However, if we simply replace privately owned vehicles with privately owned autonomous vehicles, this will do little to reduce road congestion or parking requirements, or to make our cities more liveable. It will also not support the integration of land development to create the urban centres that so many cities are demanding, to help service the suburbs and create the people-oriented knowledge economy-based urbanism highly sought after.

The use of autonomous technology in transit systems is the other approach that cities can take and there are two scales at which it has been developing: high-speed rail systems, which are now almost completely autonomous, and short trip demand-driven shuttles that are still being trialled. High-speed rail down corridors provides the highest capacity systems available and these are in great demand now across the world, within cities and between them. The new local shared mobility technologies that are 'communally' owned autonomous vehicles could replace eight or more private vehicles, particularly if operated in a continuous multi-hire mode and if used to provide feeder services to and from transit systems or nearby activity centres. This 'last mile' service could substantially reduce the need for long distance trips by private cars (with a typical average of 1.2 passengers/vehicle or less) which are the least efficient form of transport in terms of energy and space. Future commuting of the kind illustrated in *Figure 1*, combining high speed rail down corridors and local autonomous shuttles, could substantially reduce both road congestion (improving the efficiency of commercial vehicles) and the need for more road capacity, especially motorways.

Figure 1. **A comparison of current versus future commuting scenarios**



Source: Glazebrook and Newman, 2018[23]

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 100 km^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 systems, making them more economic in lower density suburban areas, or in cities where activities are highly dispersed.

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 opportunities from developing around the stations. The higher value land around such stations would enable much higher density yields and it would also be possible for a developer to save between AUS$20,000 and $40,000/dwelling through reduced parking provision. This could enable 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 Cities model. However, a new technology has entered the urban transit system with large potential to provide an even stronger base for integrating cities, which we have termed the Trackless Tram.

2.2 Trackless Trams as an enabling technology

As well as 'local shared mobility' there are other new opportunities for transit along urban corridors. 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 and just as cars have improved in technology with new ICT advances, so has light rail with the invention of a range of technologies. These include driverless guidance systems, electric propulsion with storage and recharging, and the replacement of metal wheels and tracks with rubber tyres, transforming the current type of light rail into what is referred to as Autonomous Rail Rapid Transit, Guided Electric Transit System, or simply a 'Trackless Tram' (TT). The technology has emerged from China's CRRC high speed rail system where six new technologies have been added to a bus to create a style more like light rail[i] – see *Figure 2*.

The authors also prepared a video[ii] after visiting the Trackless Tram production facility in China.

Figure 2. **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 bus rapid transit and it is not light rail transit but a whole new fixed track transit system.

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.

Table 1. **Calculations of Trackless Tram patronage capacity and hence transport niche.**

Transport Mode	People per hour per km of lane space	Multiples of car capacity in a suburban street
Car in suburban street	1000	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

Source: Based on Newman and Kenworthy, 1999, 2009, 2015

The transport niche is therefore at least equal to, or probably more than, a usual light rail system and can be quite transformative in terms of spatial efficiency at moving people along a corridor and providing the fast connection between areas of the city not having a heavy rail service. It is also likely to reduce the need for parking and, because it is electric, it is quiet, emission-free and attractive for developments close to stations.

The patronage capacity for a TT averaging 50kph, with stops every 2km and a maximum of 3 carriages (300 people), is likely to be 15,000/hr but could increase to 25,000/hr with 5 car trams for special events and peak times. These are transformative capacity potentials.

The costs of a TT system were estimated by the Bodhi Alliance and EDAB consulting, in a report prepared for the City of Parramatta in Sydney's west. This report estimated the cost at AUS$5.59 million/km of a route, including vehicle costs. By comparison, the cost of installing a tram with rails was estimated at $15.31 million/km, and the trambus system (higher capacity, elongated buses) at $5.51 million/km, essentially the same cost as the TT system[24]. Some light rail systems in Australia have been installed at a much higher cost, for example AUS$175m per km (Sydney), AUS$120m per km (Gold Coast) and $50m per km (Newcastle and Canberra). The TT is thus around one tenth of the cost of recent Australian light rail projects, varying mostly with the amount of work needing to be done in the road system.

The range of technical benefits described above and the high ridership potential of the TT make this an ideal technology for the rapid implementation of new transit in Australian cities. The other big attraction is this fixed low-cost transit system could be used to create new centres in the suburbs of Australian cities, so long as a mechanism can be found to create integrated land development around the stations.

The Trackless Tram and integrated cities are discussed in the project video[iii].

[i] YouTube video: World's first unmanned smart electric bus trials in south China. https://www.youtube.com/watch?v=bXB87NWHvDg

[ii] YouTube video: The trackless tram: Fixed or flexible? Reflections on a visit to China. https://vimeo.com/290106133.

[iii] YouTube video: SBEnrc Project 1.55 Integrated Cities. https://www.youtube.com/watch?v=iqz9GXJuakU&t=4s

Box 1. Benefits of Trackless Trams

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, high ride quality, passenger safety and fixed-route land-value creation, with four important additional distinctions:

1 Rubber on the Road.

The TT running gear is rubber tires intended to run on asphalt or concrete. Thus, there is no digging up of streets (and hence very little disruption to businesses, houses or traffic), although space must be found in the roadway, probably replacing parking as with LRT. A rail-type bogey and hydraulic system for the wheels (taken from high speed rail) provides a significantly better ride quality than traditional buses. The TT is also around half the weight of a diesel bus (9T cf 17T) and in 3 years of trials has made no impact on the road surface, compared to damage from trucks and buses. The autonomous technology prevents the swerving and sharp stopping character that can cause rutting in roads.

2 Battery-powered.

The TT 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 fully charged while out of service at a depot. These enable quiet and emissions-free environments attractive to pedestrians and ideal for land development. The stations are inter-operable with recharging of local shared mobility autonomous shuttles feeding into the transit system, as suggested in the Future Commuting model in *Figure 1*.

3 Autonomous.

The TT has the potential to be driverless as it is equipped with all the new autonomous guidance systems. However, the current operating system has a driver who can over-ride the system at any time to go around accidents or other blockages. Ideally, it would operate in fixed route transit corridors to enable the autonomous guidance system to be maximised in speed. The TT navigates the corridor along virtual railways using the optical sensing system based on GPS and LIDAR; lines are painted onto the road for other road users and pedestrians to see the route. The autonomous character not only enables higher speeds, but also higher ride quality, as it is very precise (with very little sway) in how it holds the bitumen or concrete road in transit and when entering a station; in the same way a train or tram holds the steel track.

4 Low cost.

The whole system is considerably cheaper than light rail, as the overhead catenary and on-road steel tracks of light rail are not needed it has a simple manufacturing system and it 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.

2.3 Value leakage, value capture and value creation

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 Transit Oriented Development (TOD) with good access to the train line [9,10,13,25,26].

Land value gain is generally estimated through hedonic 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 [11,13,26–28]. In the case of Perth, Australia, land values within the 500m around the new Southern Railway stations increased by 42% over 5 years after the announcement of the rail service and the older rail system attracted an 18% increase for residential land values and 50% for commercial land values within 400m.

Research on value increases around rail stations is designed to find ways of capturing some of the value to help pay for the railway. However, in the traditional approach, much of the increase in land value is not able to be captured, as the investment benefits the few private property owners in the vicinity of the improvement, who are able to sell their property for a premium based upon public investment. While the investment is likely to result in public good, the return on investment to the funder is nil, whereas to the local property owner the increased asset value may be considerable. This is value leakage.

Some value can be captured when techniques are used to hypothecate land value tax increases (tax increment financing), or special developer levies and parking levies are added after the line is built or even announced[29]. However, this may not lead to integrated land development as it can even drive development away.

A preferred approach is what we have called value creation. This occurs through a strategic decision to use private investment from development (unlocked by a new transit system) to help pay for the transit capital and operations. This is a win/win situation for transit and land development because it results in higher densities being financially viable, more commuters within the station catchment due to increased TOD intensity and, in turn, this creates an increased ridership with associated benefits of increased service frequency and fare revenue. This is the Integrated Cities model and it needs further explanation based on how much private sector finance can be brought into the approach.

2.4 The Integrated Cities model

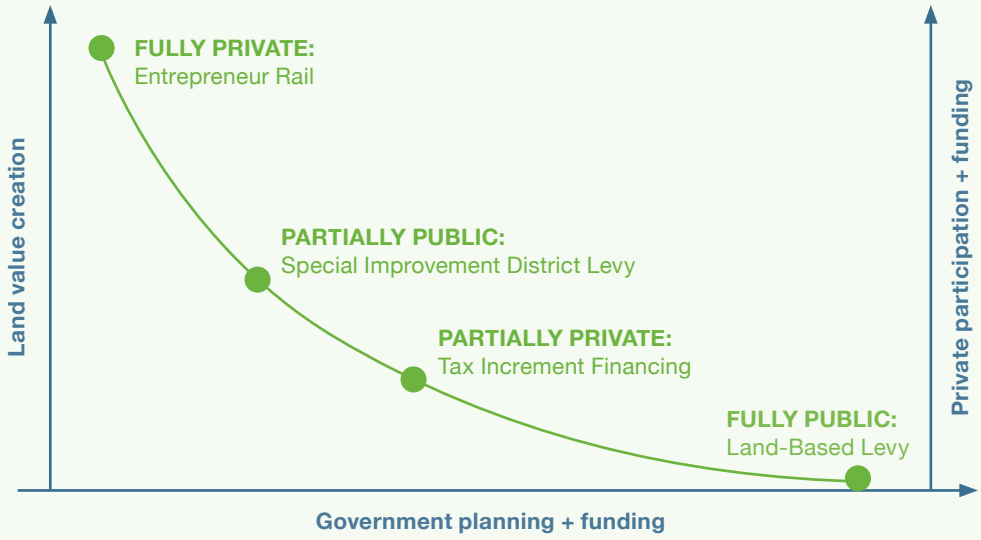
The development of the Integrated Cities model starts from the premise there is a greater need to bring together skills from financing, land development and transit planning and engineering.

Around the world, including in Australia, there is a history of entrepreneurial rail building from the late nineteenth and early twentieth centuries. Overseas, there are many places that currently use this approach as the major way of building transit infrastructure and this trend is growing. For a number of reasons, including policy alignment, technological advancement and shifting expectations of urban performance, the time is right for this model to be reinstated in an Australian context.

Our research describes four different models of integration between transit, finance and land development *(Figure 3)*, using four different proportions of public to private funding to generate the finance needed to build the integrated transit system and associated Transit Oriented Developments (TODs). Each of the four models has different procurement tools to help generate the private funding:

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

Figure 3. **The four models for Integrated Cities with their primary procurement tools**



Increased private funding tends to generate more possibilities for transit-land use integration and hence value creation. 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. The models are outlined further below, with examples from around the world.

2.4.1 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 transport 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 integration with private finance difficult. The Cross-rail project in London appears to be working well based around private investment in stations and a business levy.

2.4.2 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 takes a long time before the money begins to come into Treasury.

2.4.3 Some Public and Substantial Private Capital: the Special Improvement District Levy 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 (SID) based on the similar idea of tapping private investment in Business Improvement Districts (BIDs) 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.

SID levies are called various names in different 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. In Australia, we know them as 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. The identified area usually comes out of a partnership from the bottom up, where businesses, local governments and communities 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 that can enable the whole process of urban rail and urban regeneration to proceed[30].

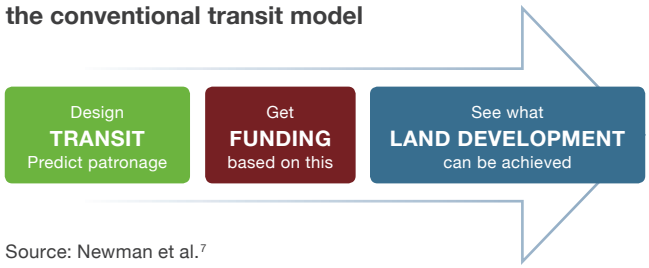
2.4.4 Full Private Capital: the Entrepreneur Rail Model.

The Entrepreneur Rail Model (ERM) is historically how tram and train lines were built as real estate developments from the 1840s to the 1940s, including in Western Australia. 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 a mix of private suburban railway companies, government-owned companies and the privatised former national railways, who find private investment in land for extensions and station upgrades.

The CLARA (Consolidated Land and Rail Australia) bid in Australia for High Speed Rail is also based on this model. The ERM guarantees integration of transit and land use, as without this the financial success of the rail and land development will not eventuate. 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'[7].

The traditional approach to public transport planning involves first estimating transit numbers based on current development and transport use, then setting the route based on the least resistance and least costs, and finally seeking to secure government funding *(Figure 4)*.

Figure 4. **Graphical representation of the conventional transit model**



Source: Newman et al.[7]

Underdeveloped lands are largely overlooked as they do not currently generate transit numbers. The ERM is designed to turn the traditional approach on its head and suggests that government should not define the route but rather a broad corridor where a transit-activated set of developments are likely to occur. *Figure 5* illustrates the Integrated Cities Model based on the ERM, where transit and land use integration is brought about through

the necessity of delivering a return to the source(s) 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 service to the land involved. The model thus seeks to find the best partnerships that can enable integration of the rail and land development functions in urban economic development.

Figure 5. **Graphical representation of the Integrated Cities Rail Model**

Source: Hargroves et al. (2018), adapted from Newman et al. (2017)[7]

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 then 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[31]. 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. These will generate revenue to invest in the infrastructure; the ERM creating new markets that government planners cannot achieve on their own.

The fully government-based approach to land value capture means the 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.

Our research suggests that the SID model and ERM model are the best way to make integration work. Both will not only build transit infrastructure based on significant private investment, but will also ensure viable urban regeneration projects with density and mixed use TODs. This is welcome for governments that do not have sufficient funding; but even if they did, it enables a better set of urban development: high value, high quality, integrated urban development through partnerships.

3 Delivering the Integrated Cities Model

The procurement of such integrated urban development and transit 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 Guide and Manual[1] associated with this research project has been developed to assist governments, developers and communities create such an integrated project in a positive way.

Two mechanisms are examined for procuring an Integrated City development: through a City Deal or through an Unsolicited Bid.

3.1 Procurement through City Deals

The Australian Federal Government have 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[iv]. This approach showing the various roles in a City Deal is set out in *Figure 6*.

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[32–34]. This is particularly

Figure 6: **New partnership models are needed for the City Deal**

Source: Sharma and Newman (2017)[9]

[iv] 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 Capture tools and partnerships with community and private expertise and investment.

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[7].

These Australian 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 national Federal Government developed for the partnership with the new Infrastructure and Projects Finance Authority in the Department of Prime Minister and Cabinet. 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.

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[35].

The City Deal Model requires an 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:

- 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.

3.2 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 financing such as a superannuation company. Such privately initiated railways will require a range of government approvals to develop their project to cover the issues listed above under City Deals. *Box 2* provides an outline of how Western Australia intends to do Unsolicited Bids. The Government calls them Market-led Proposals. The applicability of these to new transit projects funded through land development is obvious.

Box 2. Unsolicited Bids or Market-led Proposals

The Western Australian Government's 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 within scope and has 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 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.

4 Conclusion

This research project has found some new technology opportunities for creating Integrated Cities, especially the new Trackless Tram. However, it needs a new kind of approach to make sure land development is integrated into it. The solution is to do it through private investment that simultaneously builds the transit and the land development around stations.

The establishment of an 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 rail and urban regeneration projects. If the necessary master planning and financial planning can be done with such a grouping then the Federal Government's City Deal process could begin to enable such projects to proceed by guaranteeing the risks involved for private investors such as superannuation companies. The process would follow the detailed Guide and Manual for procuring an integrated transit, finance and land development project, produced as part of this research[1].

Alternatively, a Market-led Proposal or Unsolicited Bid could follow the same steps in the Guide and Manual, but with a more private company-led approach. Either way, an alliance of partnerships reaching from local communities right through state agencies up to the Federal Government, can help build an integrated, innovative, inclusive, resilient and sustainable future in our cities. The key is to seek better ways of involving private investment to enable integrated transit and land development.

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 Integrated Cities Model is how land development becomes the cornerstone of its funding, how the integration of private land development entrepreneurial skill 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.

Finding ways to enable this model through government is a challenge, as transit 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 will 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 transit-oriented developments is now clear. The demand for an Integrated Cities 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 high value outcomes. It will depend on communities of interest being formed into partnerships.

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

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

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