Transforming the Urban Space through TOD

City, Corridor and Station Scales

Gerald Ollivier
Transport Cluster Leader
World Bank Hub Singapore
<table>
<thead>
<tr>
<th>WHY TOD?</th>
<th>More Competitive</th>
<th>Access and Mobility</th>
<th>Partly self financing by capturing value created</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High quality neighborhoods with lower infrastructure costs and lower CO2</td>
<td>Resilient to Natural Hazards</td>
<td></td>
</tr>
</tbody>
</table>
HONG KONG: DECOUPLING ECONOMIC GROWTH AND RESOURCE USE BY SHAPING A HIGH DENSITY URBAN FORM SUPPORTED BY TRANSIT

Source: LSE Cities. © LSE Cities
MEASURING JOB ACCESSIBILITY

- a. Line 1, 2, and 3 and walking: **12%**
- b. Scenario a plus bus: **28%**
- c. Scenario b plus TOD: **39%**
- d. Scenario b plus bicycle: **46%**

Zhengzhou
- Population: 6.4 million
- GDP per capita: US$11k
- Peak hour accessibility

Percent of jobs accessible within 45 minutes by public transit

*Source: The 3V Framework (World Bank)*
LAND DEVELOPMENT AND ACCESSIBILITY

Only 15% of new development in the access range of metro stations in 2015

<table>
<thead>
<tr>
<th>Scope</th>
<th>Scale of construction plots within the coverage (hectares)</th>
<th>Scale of construction plots outside the coverage (hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>2.61</td>
<td>148.87</td>
</tr>
<tr>
<td>Public infrastructure</td>
<td>25.29</td>
<td>4.37</td>
</tr>
<tr>
<td>Total</td>
<td>27.9</td>
<td>153.2</td>
</tr>
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</table>

Guaranteed future congestion
| 1 | Align Human/Economic Densities, Mass Transit Capacity and Network Characteristics for Greater Accessibility |
| 2 | Create Compact Regions with Short Commutes |
| 3 | Ensure Resilience of Areas Connected by Mass Transit |
| 4 | Plan and Zone for Mixed Use and Mixed Income Neighborhoods at Corridor Level |
| 5 | Create Vibrant, People-Centric Public Spaces Around Stations |
| 6 | Develop Neighborhoods that Promote Walking and Biking |
| 7 | Develop Good Quality, Accessible and Integrated Public Transit |
| 8 | Manage Private Vehicle Demand |

*Source: World Bank TOD COP*
TOD at City Scale
SETTING A VISION WITH CLEAR TARGETS

By 2030 in Singapore

8 in 10 households living within a 10 minute walk from a train station

85% of public transport journeys (less than 20 km) completed within 60 minutes

75% of all journeys in peak hours undertaken on public transport

Source: Alain Bertaud

Land Transport Master Plan 2013
Pedestrian accessibility to rail and metro stations
NY & London: More than half people and more than 2/3 jobs located less than 1 km to mass transit stations
HK: 3/4 of people and 83% of jobs located less than 1 km to mass transit stations
Source: LSE Cities
REFLECT URBAN VARIATIONS

- Articulating urban densities
- Creating a hierarchical public transport network (mass transit) supported by good walkability and bikability
- Ensuring affordable housing near mass transit city wide
TOD TOOLS

Enabling Factors

Physical and Technical Aspect

- Land
- Infrastructure (Transit + Other)
- Design
- Financing
- Affordable Housing
- Stakeholder Engagement
- Institutional Structure
- Political Leadership & Vision
- Regulatory Environment

Social Aspect

- Infrastructure Categories
- Institutional Categories

Tools for Land Assembly

Voluntary

- Tool 1: Land Readjustment
- Tool 2: Urban Redevelopment
- Tool 3: Land Sharing

Involuntary

- Tool 1: Eminent Domain
- Tool 2: The Right of Preemption

Funding sources

- Investment revenues
- Land value capture
- Grants
- Fiscal incentives
- Service charges
- Air right sales
- Own source revenue

Revenues, and other non-reimbursable monetary support, that can be used to repay the costs of the investment components.
### DESIGN ELEMENTS OF TOD AT VARIOUS SCALES

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>CITY</th>
<th>INTER-NEIGHBORHOOD</th>
<th>NEIGHBORHOOD</th>
<th>STREET</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUALITY PUBLIC TRANSIT</td>
<td>Proximity to urban center</td>
<td>Financial viability of public transit</td>
<td>Access to public transit</td>
<td>Public transit infrastructure</td>
</tr>
<tr>
<td>NON-MOTORIZED MOBILITY</td>
<td>Continuous street network</td>
<td>Pedestrian and cycling networks</td>
<td>Internal connectivity</td>
<td>Sidewalks and bike paths</td>
</tr>
<tr>
<td>VEHICLE DEMAND MANAGEMENT</td>
<td>Optimization of daily commutes</td>
<td>Safe and orderly roads</td>
<td>Parking management</td>
<td>Road safety for all users</td>
</tr>
<tr>
<td>MIXED-USE AND EFFICIENT BUILDINGS</td>
<td>Regional facilities</td>
<td>Public amenities and marketplaces</td>
<td>Efficient buildings</td>
<td>Live streets</td>
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## DESIGN ELEMENTS OF TOD AT VARIOUS SCALES

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<tr>
<td><strong>NEIGHBORHOOD CENTERS AND ACTIVE GROUND FLOORS</strong></td>
<td>Local economy</td>
<td>Neighborhood centers</td>
<td>Active ground floors</td>
<td>Public-private transition</td>
</tr>
<tr>
<td><strong>PUBLIC SPACES AND NATURAL RESOURCES</strong></td>
<td>Green area networks</td>
<td>Energy, water and waste efficiency</td>
<td>Green and public space networks</td>
<td>Public life</td>
</tr>
<tr>
<td><strong>COMMUNITY INVOLVEMENT AND IDENTITY</strong></td>
<td>Inclusive stakeholder engagement</td>
<td>Place identity</td>
<td>Community management</td>
<td>Sharing the street</td>
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Access the full content of [dOOTs CIDADES in Portuguese](https://bit.ly/DOTSCidades) in Portuguese. 

A product of WRI Ross Center for Sustainable Cities
TOD at Corridor Scale
TASTE OF TOD: A PLAN FOR SURABAYA, INDONESIA

1. Establishing continuous heritage trail between different historic districts along the corridor
2. Setback regulations to ensure new form does not overwhelm or dominate the heritage asset
3. Promoting hawkers along the heritage trail
4. Communication of historic places, sites and precincts through collateral that ‘tells the story’
5. Boulevard trees providing natural shading for walks along the trail
6. Maintain the continuity of the trail by implementing heritage trail wayfinding signage or plates at most 100m apart

Step 1: Regional Master Planning
- Translation of City’s vision into a regional master plan
- Periodic review and update.

Step 2: Project Consultation/Preparation
- Project team
- Project area analysis
- Corridor assessment
- Corridor selection
- Technology selection
- Corridor redevelopment strategy
- Stakeholder engagement

Step 3: Transit infrastructure & Operational design
- Network and service design
- System capacity and speed
- Infrastructure & technology
- Customer service
- Modal integration

Step 4: Financing & Business Model
- Financing Business Model
- Business and institutional structure
- Transit costs and revenues
- Mass transit & TOD marketing

Step 5: Station Area Prioritization & TOD Plan
- Station area prioritization (3V Model)
- Station-area TOD plan
- Affordable housing strategy

Step 6: Land Assembly & Integration
- Land & Feasibility Assessments

Step 7: Implementation
- Construction plan
- Real Estate Market Positioning and Maintenance
- M&E
TOD Corridor Planning & Implementation

Pre-consultation & strategy development

- Determine transit tech
- Inventory potential redevelopment sites
- Assess economy & potential growth areas

Finalize route and stations
- Finalize cost estimates for transit infra
- Operations plan for transport integration
- Estimate financing gap & propose funding mechanism

Economic development officials
- Finalize transit service changes for integration
- Refine station designs for transfers & NMT
- Refine station area plans with stakeholders
- Create branding strategy & market corridor

Transport planners
- Confirm street infra to be changed
- Monitor progress compared to plan

Urban planners
- Discuss high-potential redev sites at stations
- Discuss phasing of dev & contribution to infrastructure/incentives needed

Real-estate developers
- Developers assess potential real estate projects in corridor
Curitiba has focused its urban growth around their RIT express network of BRT corridors.

CEPAC (tradable air rights) permits for high-density development partially funded construction of new Linha Verde (Green Line).

BRT corridor supports higher density development.
Consistent long-term planning in Arlington, USA (next to Washington, DC) has turned an auto-oriented corridor into a set of urban transit-oriented neighborhoods.
Metro Group adopted phased strategy for TOD along Line #1, starting from stations in downtown and move on to the suburbs.

As of 2016, estimated profits from TOD will cover 15-20% of the total construction costs of Line #1 and #2.
DENVER: WEST LRT CORRIDOR – RANGE OF TYPOLOGIES

RTD West light rail corridor in Metropolitan Denver (USA) opened in 2013

Planners recognized widely varied existing land use contexts, and developed typologies for residential, employment, and balanced TOD nodes.

Lower property values along this corridor (compared to other Denver LRT corridors) allow more affordable housing to be prioritized.

West Line Village to offer “attainable” for-sale housing near Sheridan light rail station.
Private railway companies in Tokyo (e.g. Keio, Tokyu, Odakyu, etc.) are often real estate developers, creating synergies between their rail operations and real estate. These companies focus on building housing and commercial space near their lines to generate demand, and many TOD neighborhoods have high-quality urban design (see Jiyugaoka above left).
TOD at Station Scale

Source: F. Labbe

Source: Hudson Yards website
Understanding Station Position in Urban Landscape

Applying the 3V Approach
IMPACT ON VALUE

<table>
<thead>
<tr>
<th>Distance from Station</th>
<th>Land Value Premium in TODs</th>
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<tbody>
<tr>
<td>5</td>
<td>TOD: High Quality Pedestrian-Friendly Design</td>
</tr>
<tr>
<td>10</td>
<td>TOD: Low Quality Non Pedestrian-Friendly Design</td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>25</td>
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<tr>
<td>30</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
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Source: R. Cervero
Spirit of place                          Enclosure                                    Human Scale                          Layering of Space
Complexity                                 Coherence                                    Legibility                           Linkage

3V Framework © Françoise Labbé
• Local accessibility based on small blocks and on dense and connected street patterns with at least between 80 to 100 street intersections/km$^2$.
• Adequate space for streets. Street network occupies at least 30 per cent of the land and with at least 18 km of street length per km$^2$.
• High quality public space.
• Good quality pedestrian connections (sidewalks, street crossings).
• Traffic calming, traffic and parking management.

• Density levels over 800-meter area within walking distance of station depend on magnitude of transit investment.
• Densities of at least 15,000 per km$^2$ for sustainable neighborhoods.
CREATING A SAFE NETWORK FOR PEDESTRIAN KING’S CROSS
Component 1: Green Transportation Improvement in Heping & Nankai Districts

This Component will finance the redevelopment of the streetscape in certain parts of Heping and Nankai Districts, including the creation of an integrated pedestrian and bike network with infrastructure investments in, *inter alia*, street pavement updates, drainage improvements, street facilities, and landscape improvements.

*Source: FSR for Urban Transport Improvement Project (Tianjin PMO)*
<table>
<thead>
<tr>
<th>City Scale</th>
<th>Land Use Policy and Strategy</th>
<th>Legal and Regulatory Framework</th>
<th>Integrated Land Use and Transport</th>
<th>Modeling of TOD</th>
<th>Leveraging Private Sector</th>
<th>Improving Accessibility around Stations</th>
<th>Capacity Building</th>
</tr>
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<tbody>
<tr>
<td>Corridor Scale</td>
<td>Understanding Transformation Potential</td>
<td>Integrated urban/transport development</td>
<td>Legal and Regulatory Framework</td>
<td>Design and Planning Guidelines</td>
<td>Feasibility Study</td>
<td>Operational guide</td>
<td>Accessibility Plan and Integrated Transport</td>
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<tr>
<td></td>
<td>Financing Scheme/LVC</td>
<td>Citizen Engagement</td>
<td>Capacity Building</td>
<td>Evaluation</td>
<td>Social housing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Station Scale</td>
<td>Feasibility Study for PPP and TOD/structuring</td>
<td>Conceptual Design</td>
<td>Accessibility planning</td>
<td>Case Studies</td>
<td>Public space at local scale</td>
<td></td>
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Welcome to Tokyo