WORLD RESOURCES INSTITUTE

WORLD BANK GROUP

MODULE 1: TOD AS A STRATEGY TO ACHIEVE A SUSTAINABLE CITY

Transit Oriented Development at a Corridor Scale

Course Objective

- Transit-oriented development (TOD): Planning and design strategy focused on compact, mixed-use, pedestrian and bicycle friendly urban development closely integrated with transit stations
- Objective: Be able to have a general understanding of the central pillars of TOD planning and tools for implementation
- The course introduces the concept of TOD *at the corridor level*
  - TOD can also be a central strategy for city-wide and regional planning, and influences specific local-area planning around stations, connecting these frames together
- Complementary WB Courses
  - Sustainable Urban Land Use Planning
  - Integrated Urban Transport Planning
  - Land Readjustment
  - Land Market Assessment
  - Land-based Financing
  - Flood Risk Sensitive Land Use Planning

Course Structure

Module 1: TOD as a Strategy to Achieve a Sustainable City

Module 2: TOD Corridors

Module 3: The Building Blocks of TOD

Module 4: Design & Urban Planning Components of TOD

Module 5: Investing in TOD

Module 6: Sequencing for Implementation of TOD Corridors

Module 7: Housing Strategies & Local Economic Development Tools for Inclusive TOD

Module 8: Monitoring and Evaluating TOD Projects

Module 1:
TOD as a Strategy to Achieve Sustainable Cities

Bicycle parking in Kathmandu, Nepal

Image Source: World Bank. *Street parking for bicycles in Kathmandu*. Photograph. Flickr. February 3, 2009. Accessed August 18, 2016. https://www.flickr.com/photos/worldbank/3426991535.

Module Objective and Outline

- Objective: Understand the concept of TOD, its benefits and how it can help cities become more sustainable. Become aware of main barriers for implementation.
- Outline:
  - The context faced by cities
  - TOD definition
  - The benefits of TOD
  - The history of TOD
  - Scales of TOD
  - Lessons from the field
  - Barriers to implementation

The Context: Urban Sprawl

Sprawl in Nevada, United States

Image Source: Jan Buchholtz. *Suburban Cornrows*. Photograph. Flickr. January 15, 2014. Accessed August 18, 2016. https://www.flickr.com/photos/jansgate/12468062583/sizes/l.

The Context: Unsustainable Urban Growth

Ghost towns in China

Photo by: Kai M. Caemmerer http://kaimichael.com/
[copyright provided]

The Context: Rapid Motorization

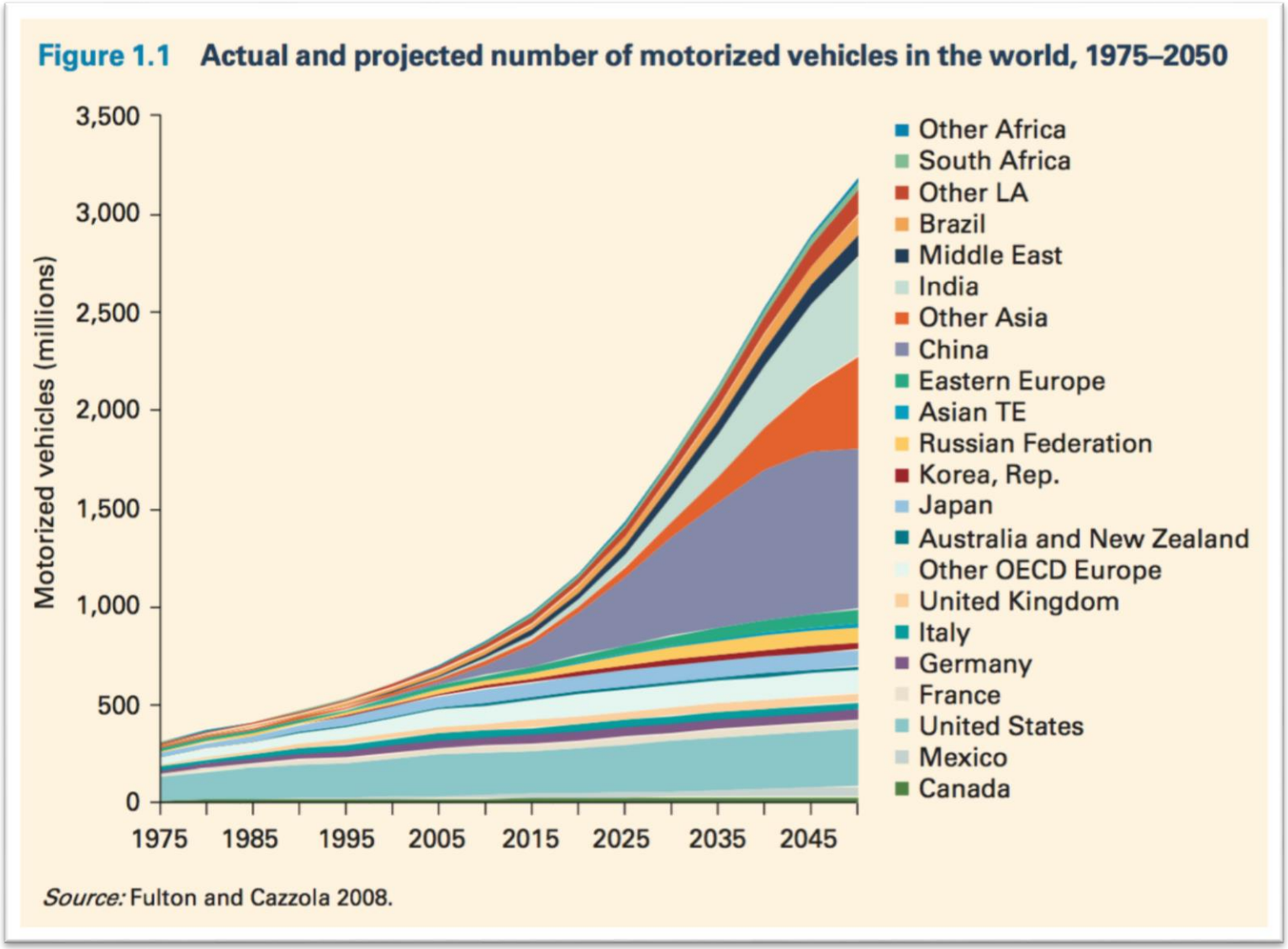


Image Source: Suzuki, Hiroaki, Robert Cervero, and Kanako Iuchi. *Actual and projected number of motorized vehicles in the world, 1975–2050*. Chart. Washington, DC: The World Bank, 2013.

The Context: Energy Consumption and Density

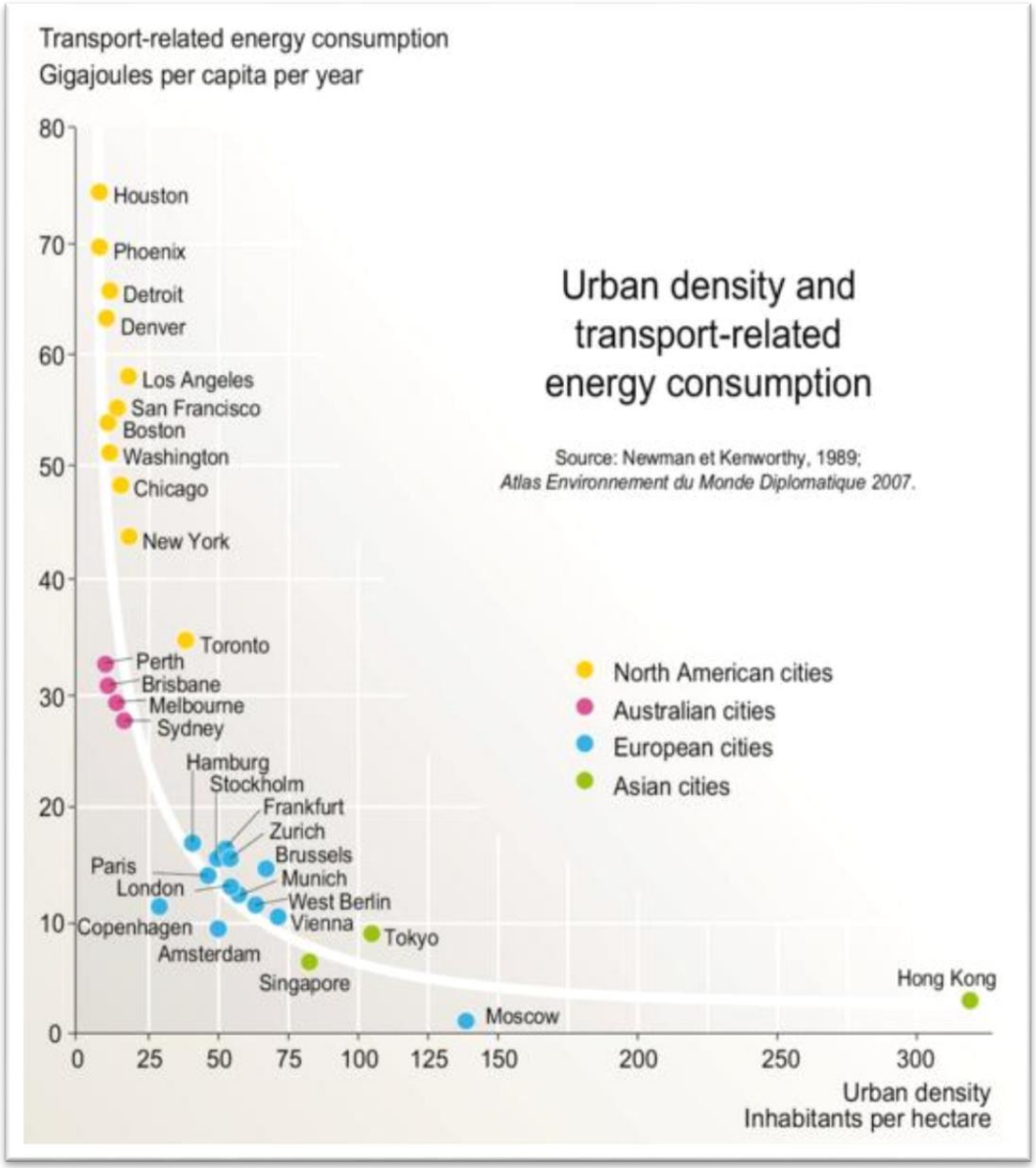


Image Source: Suzuki, Hiroaki, Robert Cervero, and Kanako Iuchi. Urban density and transport-related energy consumption in selected cities. Chart. Washington, DC: The World Bank, 2013.

The Context: Energy Consumption and Density

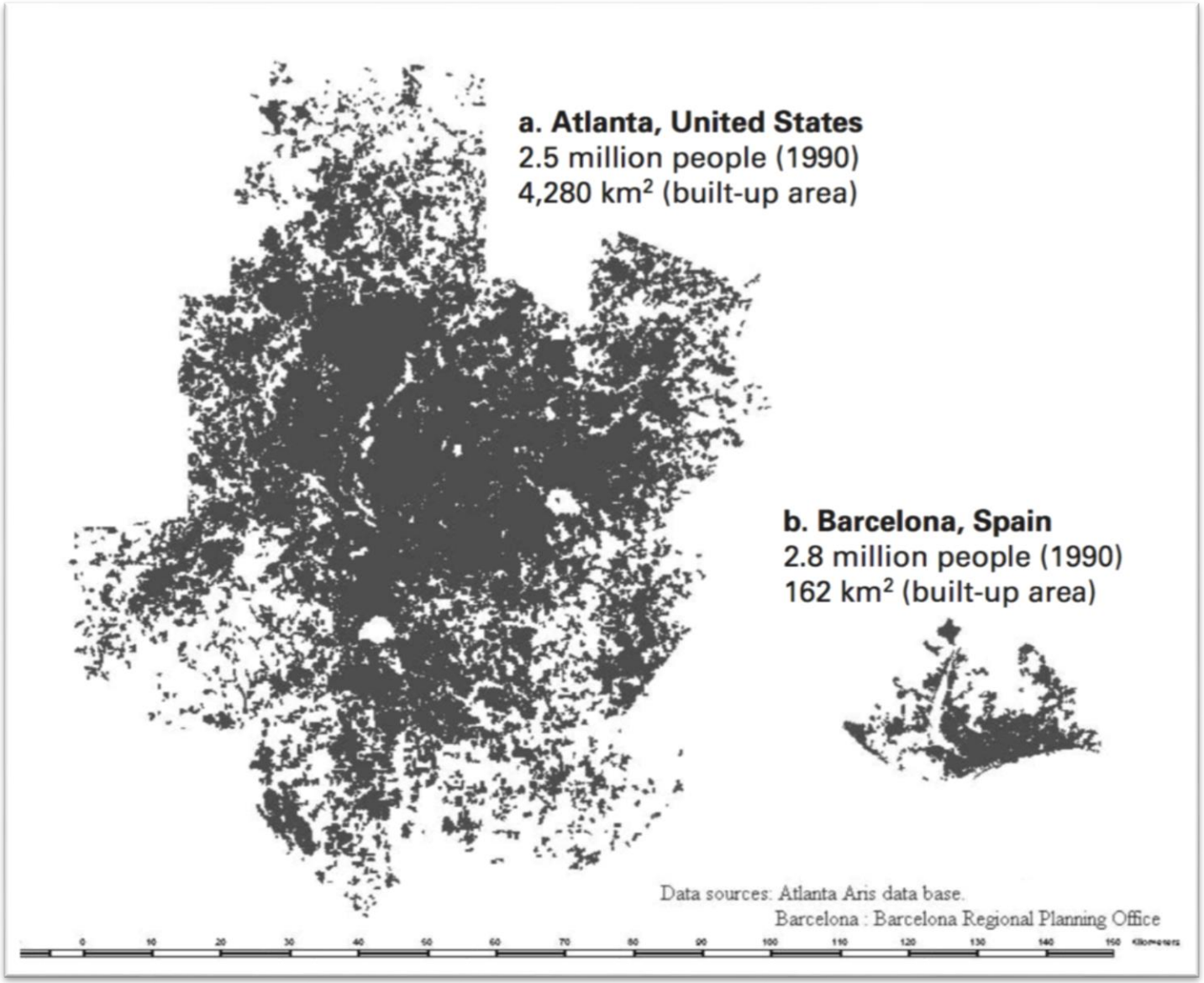


Image Source: Bertaud, A.2003. "Cleaning the air in Atlanta: transit and smart growth or conventional economics?" Journal of Urban Economics 54(3): 379-400.

The Context: Urban Footprint

Whitby, Toronto:
Sprawling suburb
13.0 tCO2e per capita

Etobicoke, Toronto
Single family homes near city center
6.6 tCO2e per capita

East York, Toronto
Dense inner-city neighborhood
1.3 tCO2e per capita

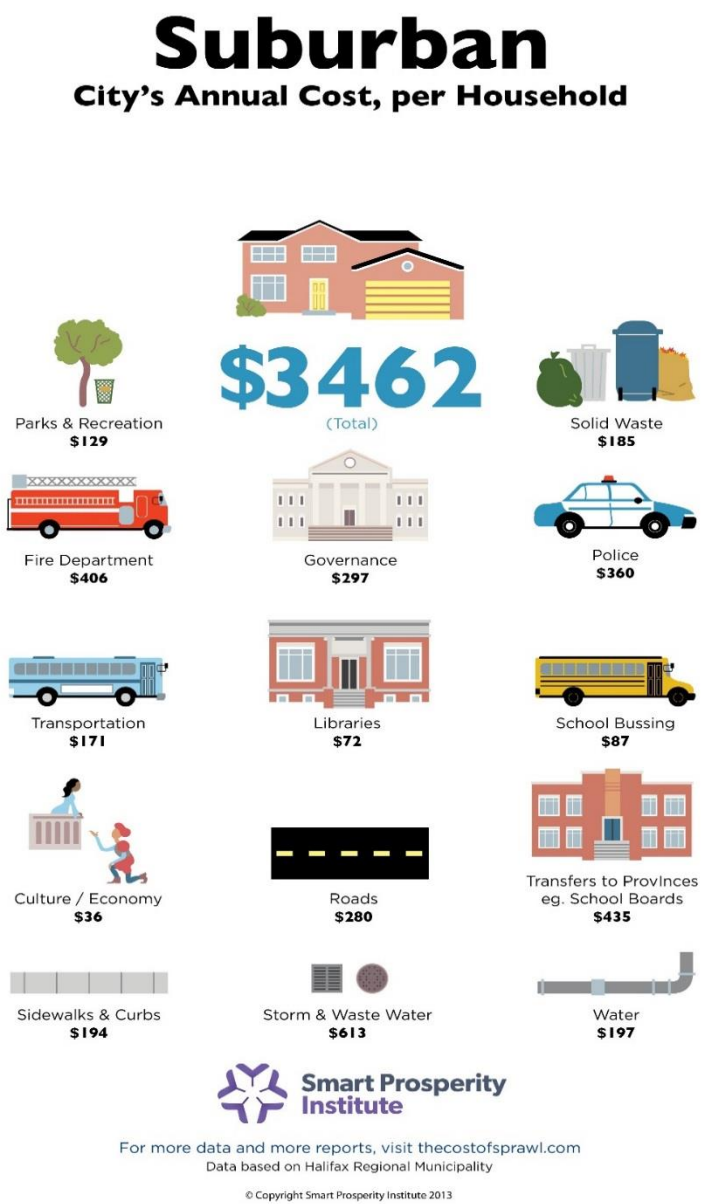
tCO2e = tonnes of carbon dioxide equivalent-
a standard unit for measuring a carbon footprint

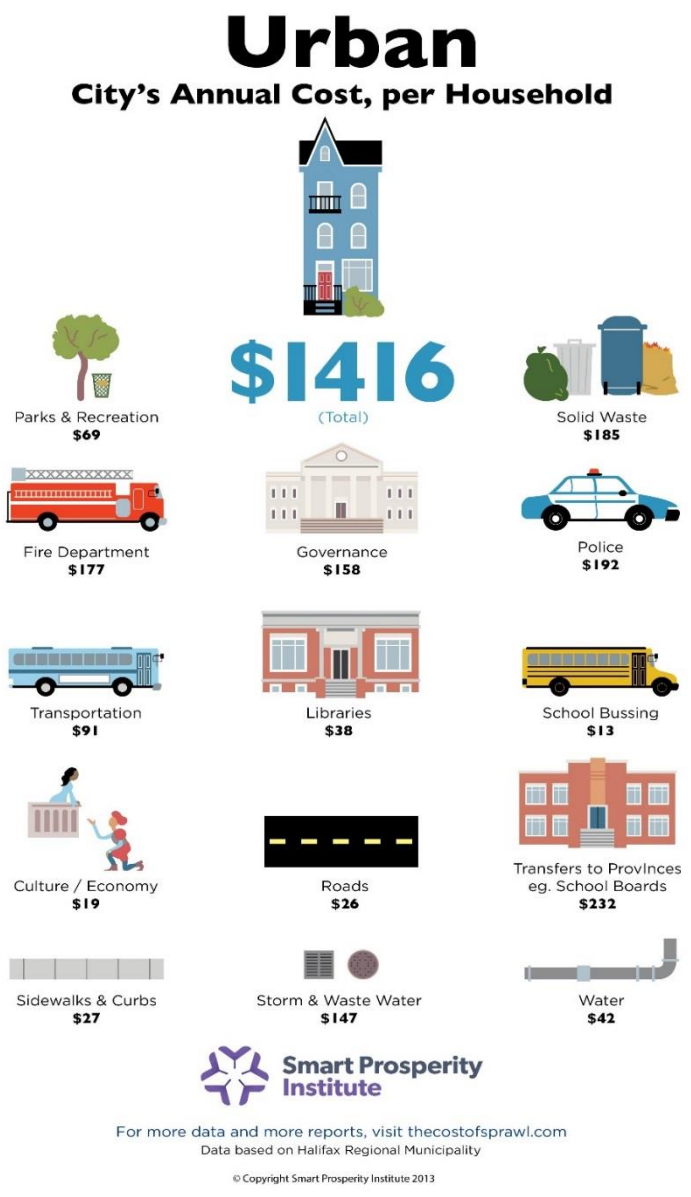
Image Source: VandeWeghe, Jared R and Christopher Kennedy, "A Spatial Analysis of Residential Greenhouse Gas Emissions in the Toronto Census Metropolitan area," *Journal of Industrial Economy*, 11: 2, April 2007 (pp. 133-144).

The Context: Additional Costs of Urban Sprawl

Image Source: World Bank. Over 3 kilometers of the primary and secondary wastewater networks of Sarajevo have been repaired or rehabilitated. World Bank Photograph. Accessed August 13, 2016. https://www.flickr.com/photos/worldbank/8571535313/in/album-72157634870018511/.
Clive Moss. Traffic. Photograph. Flickr. December 13, 2006. Accessed November 5, 2016. https://www.flickr.com/photos/clivemoss/414131016/sizes/l.
Chibi@18. Traffic. Photograph. Flickr. January 31, 2005. Accessed November 5, 2016. https://www.flickr.com/photos/chibi/3158404040/sizes/l.
Digies. Pollution. Photograph. Flickr. February 17, 2011. Accessed November 5, 2016. https://www.flickr.com/photos/digies/5480540816/sizes/l.

The Context: High Cost of Sprawl





Sprawl's Harm on the Urban Poor

Urban Sprawl and automobile-dependency have a number of adverse effects on the urban poor:

- Sprawling cities remain largely inaccessible to the urban poor
- Urban poor are generally concentrated on periphery of city, often in informal settlements
- Difficult to access public services and economic opportunities located in city center

Urban sprawl in Mexico City, Mexico

Image Source: Travis S. *Mexico City Aerial.* Photograph. Flickr. December 18, 2008. Accessed November 15, 2016. https://www.flickr.com/photos/baggis/3179149748/sizes/l.

What is TOD?

TOD is a planning and design strategy used to achieve well-designed, high-density, mixed-use, mixed-income, pedestrian and bike-friendly urban development, organized around mass transit stations.

Key Elements of TOD

- Access to opportunities
- Mixed-use development
- Mixed-income development
- Access to mass transit
- High-density development
- Walkability and bikeability

Image Source: EMBARQ India/WRI.

The Case for TOD: Sustainable City

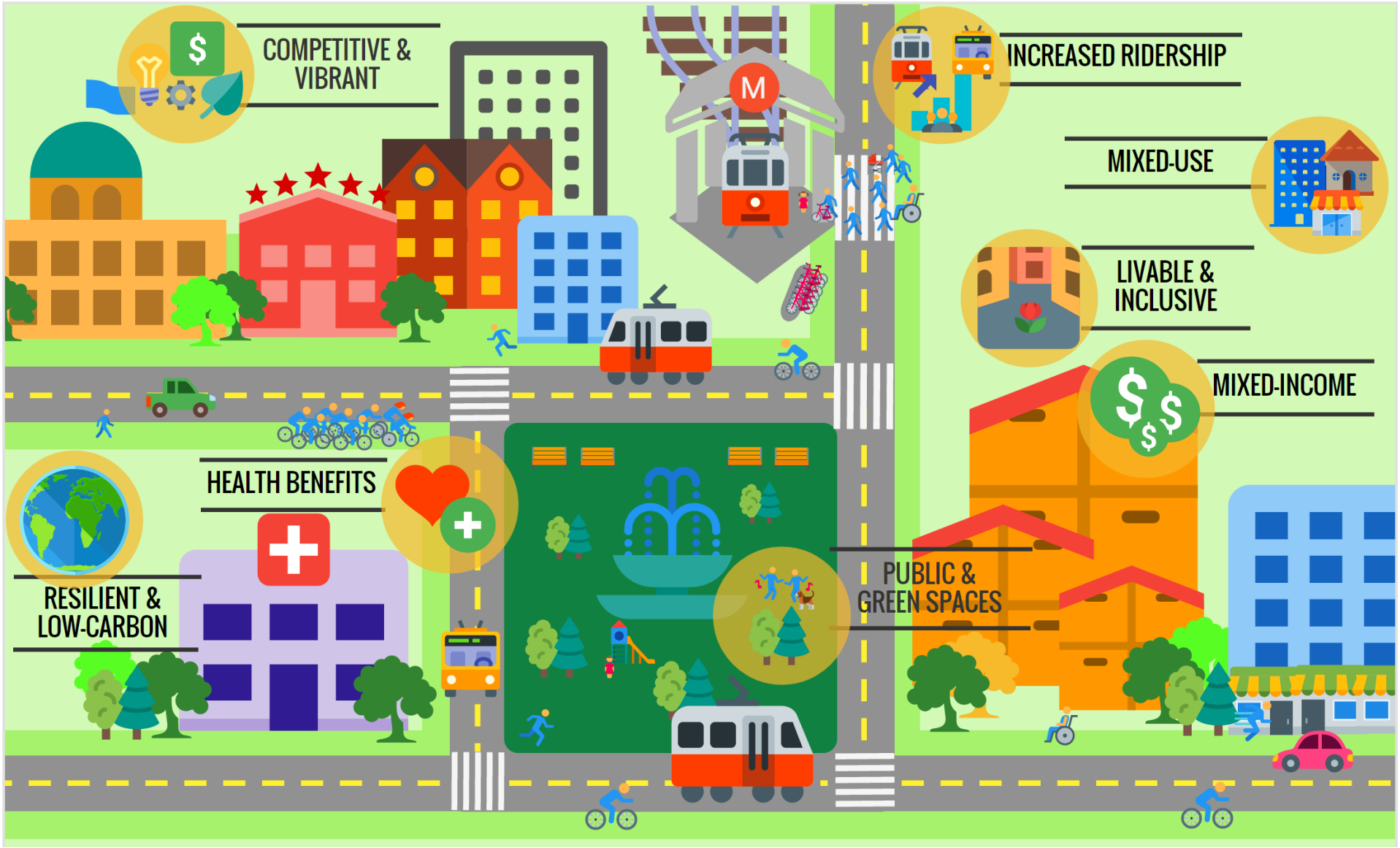


Image Source: WRI.

TOD and City-wide Accessibility

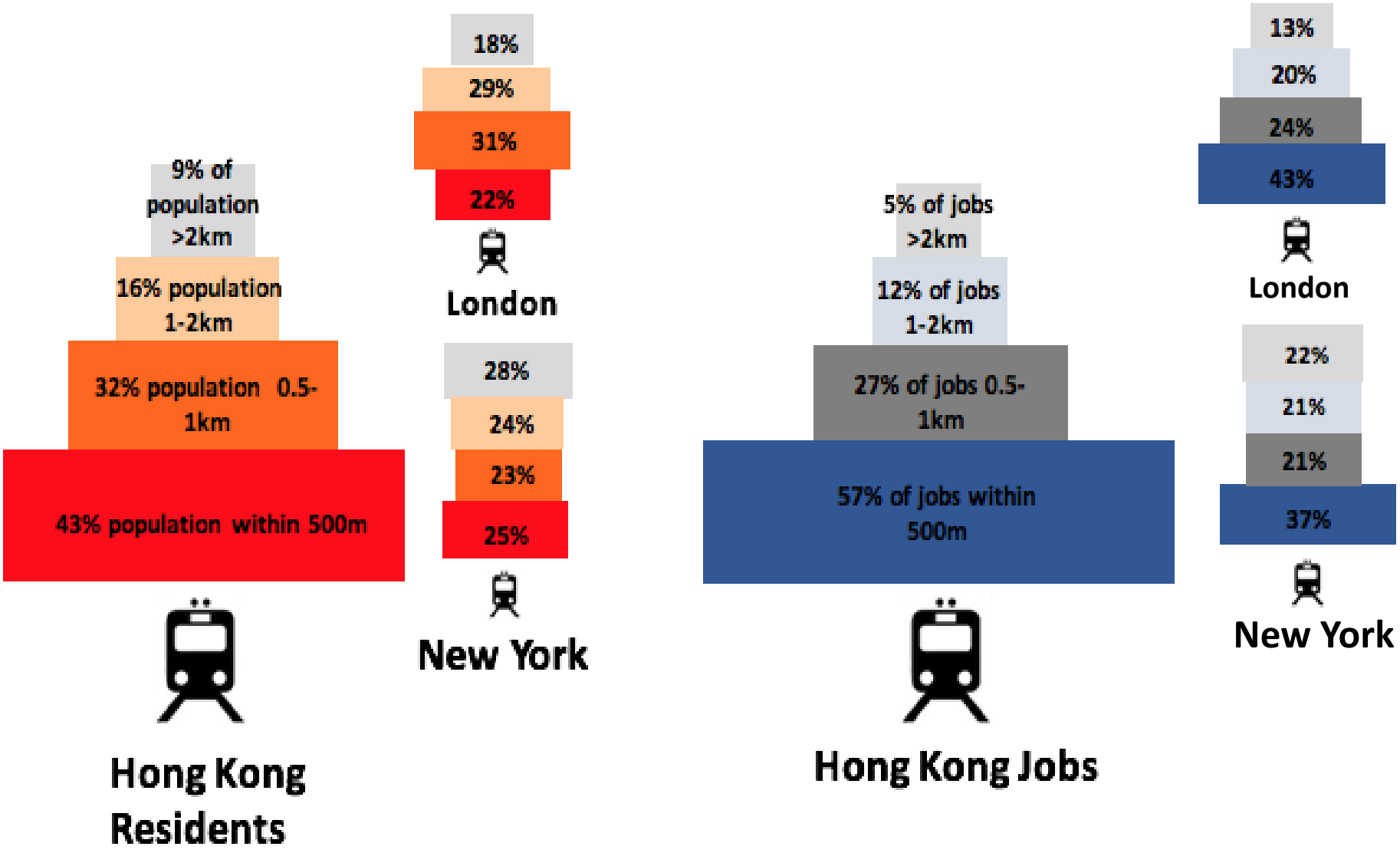


Image Source: LSE Cities.

A History of TOD

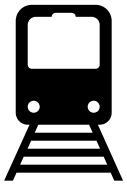
Like many cities in Europe, the city center of Florence, Italy, is dense and walkable.

Image Source: Trikelef. *Florence.* Photograph. Flickr. April 29, 2009. Accessed November 10, 2016. https://www.flickr.com/photos/trikelef/3608043144/sizes/l.

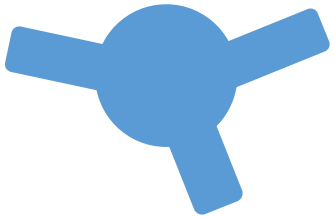
City Development Always Limited by Range of Accessible Areas

- As transport technologies evolved, the amount of ground that could be covered in a day was increased
- Cities – their labor markets and commercial influence – grew with trains and then private cars
- In the 20th century, auto-centric infrastructure increased average speeds and cities spread out
  - In addition, buildings separated from each other to make room for car storage - parking

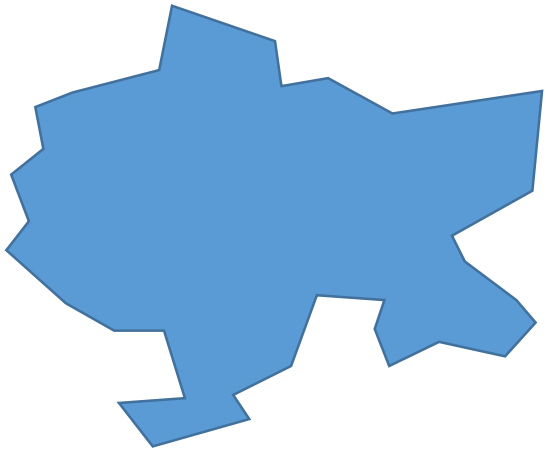
A Walking City



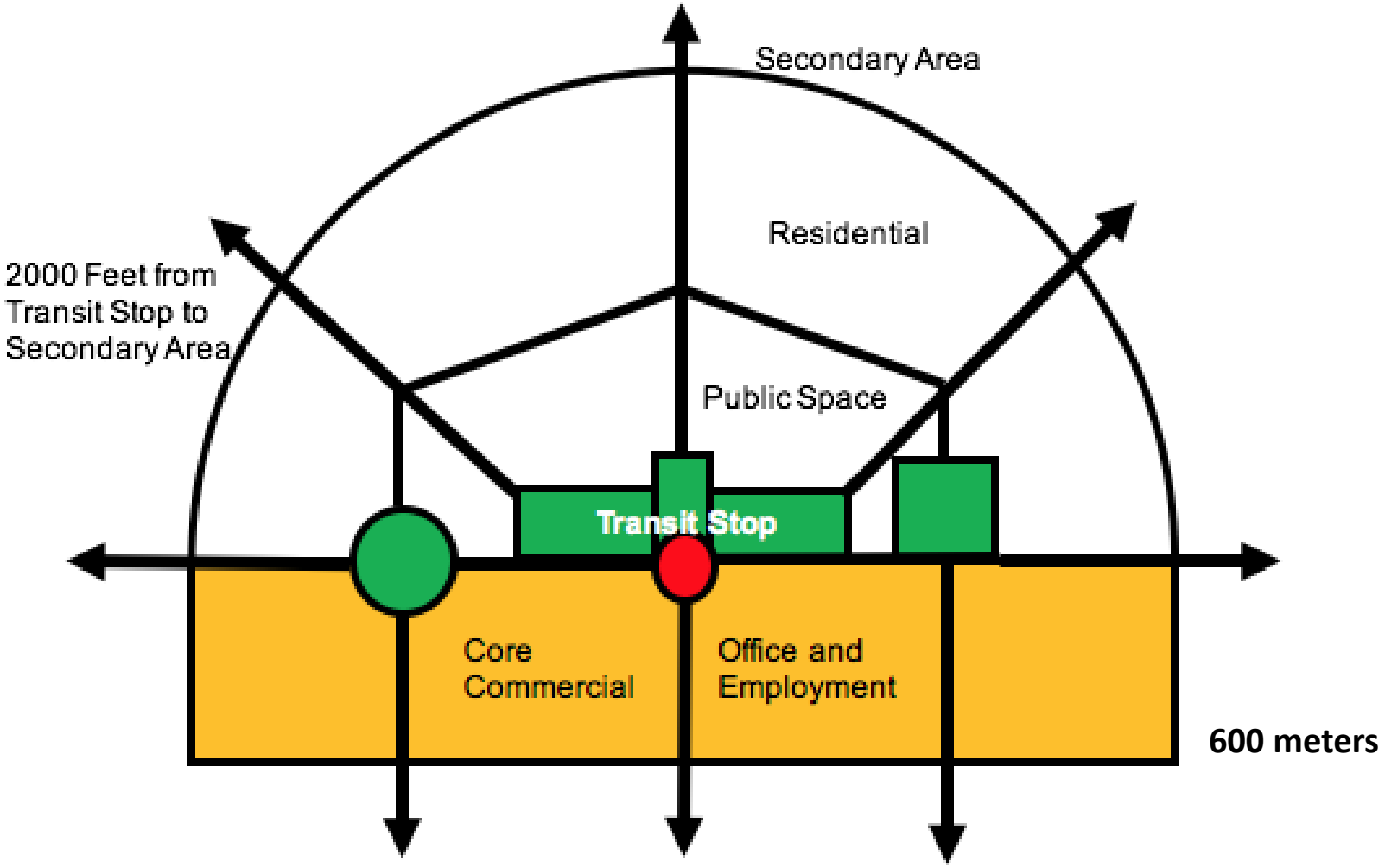
A Transit City



An Automobile City



TOD as Envisioned by Peter Calthorpe



A diagram of Peter Calthorpe's vision for TOD

TOD in Tokyo Metropolitan Area

- Mega-Cities in Japan = Chains of Walkable Cells connected by Railways
- A network of 800m radius walk-able areas from each railway station in Tokyo Metropolitan Area

Source: Hidetoshi Ohno, Tokyo 2050 fibertcity,2006, the University of Tokyo

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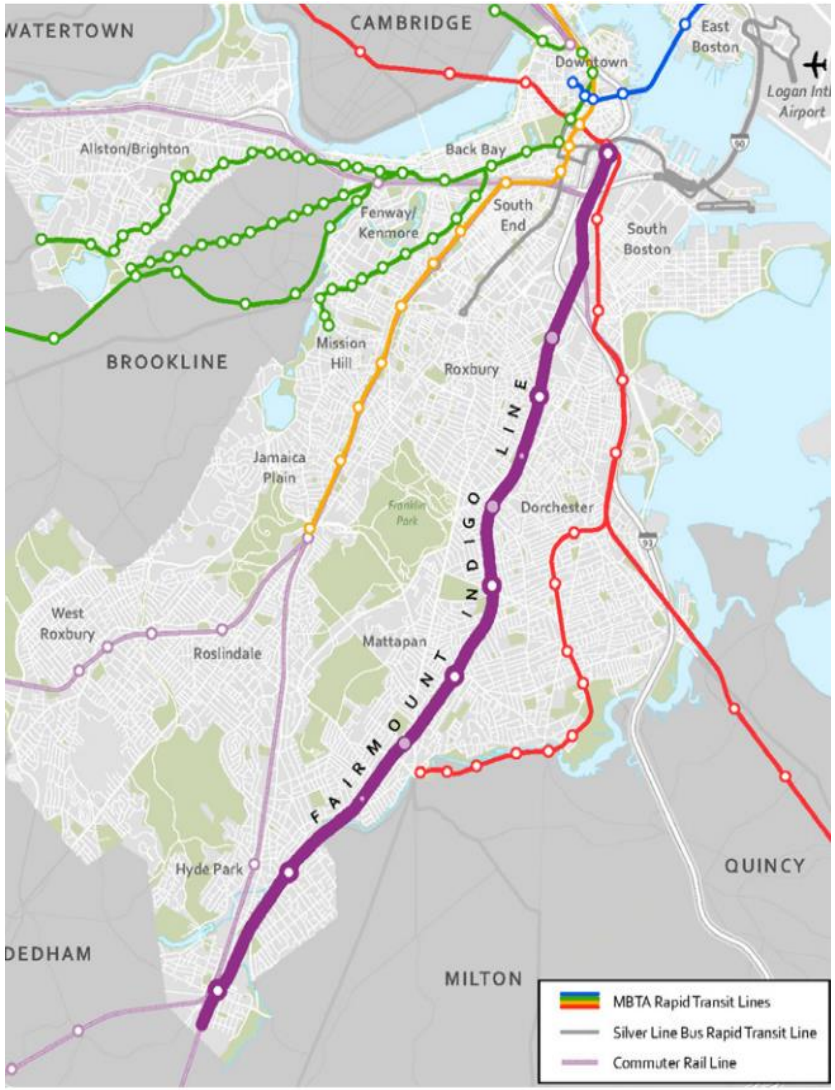
TOD in Developing Countries: Curitiba's BRT Corridor Development

IPPUC: Cléver Ubiratan Teixeira de Almeida

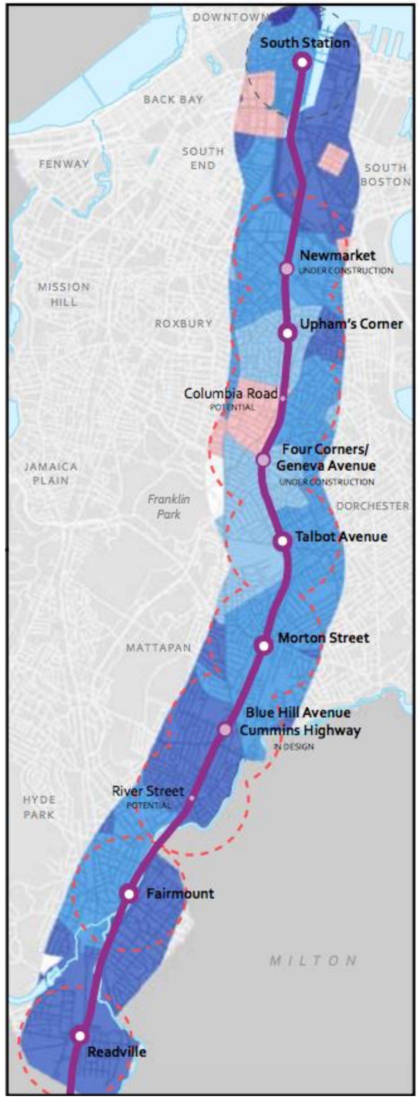
Scales of TOD: Regional/City Level



Boston, Massachusetts' Fairmount Indigo Railway Corridor

Image Source: Boston Planning & Development Agency (formerly the Boston Redevelopment Authority). Office of Digital Cartography and GIS. 2012.

Scales of TOD: Corridor Level



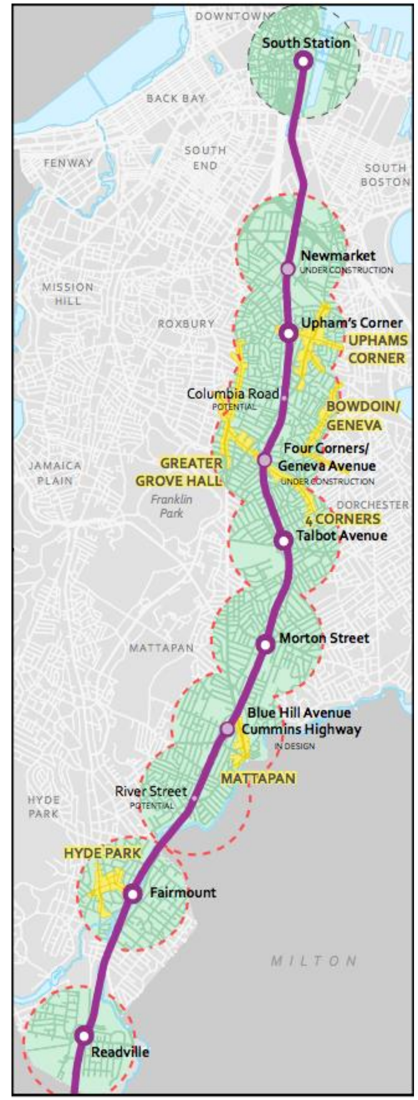
Median Household Income

in the past 12 months, by census tract

- $100,000.01 - $218,419.00
- $50,684.01 - $100,000.00
- $35,000.01 - $50,684.00
- $22,314.01 - $35,000.00
- $12,429.00 - $22,314.00 (poverty threshold*)

BOSTON: $50,684

**Weighted average poverty threshold for a family of four in 2010.*
2010 American Community Survey, 5-year estimates



Main Street District

Boston, Massachusetts' planned Fairmount Indigo Railway Corridor

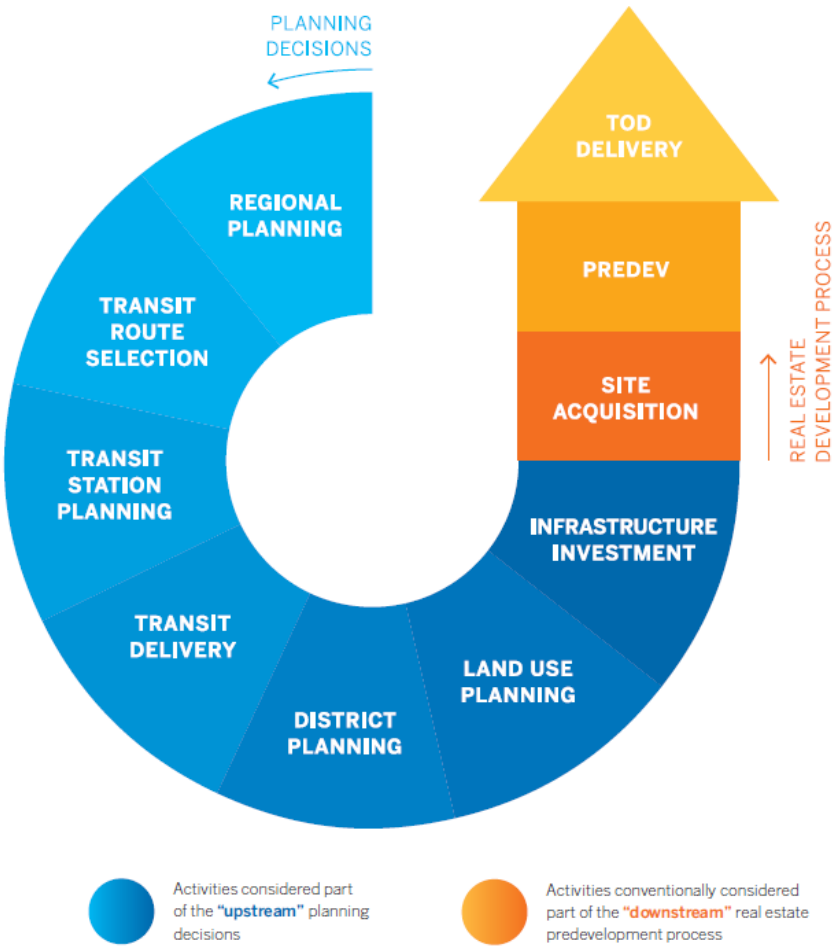
Image Source: Boston Planning & Development Agency (formerly the Boston Redevelopment Authority). "Fairmount Indigo Planning Initiative Corridor Profile." 2012.

Scales of TOD: Station Area Level

The station area around a bus rapid transit stop in Bogotá, Colombia

Image Source: Mariordo59. *Transmilenio, Bogota, Colombia.* Photograph. Flickr. August 15, 2011. Accessed November 10, 2016. https://www.flickr.com/photos/30998987@N03/8434094610/sizes/l.

TOD Implementation Project Cycle



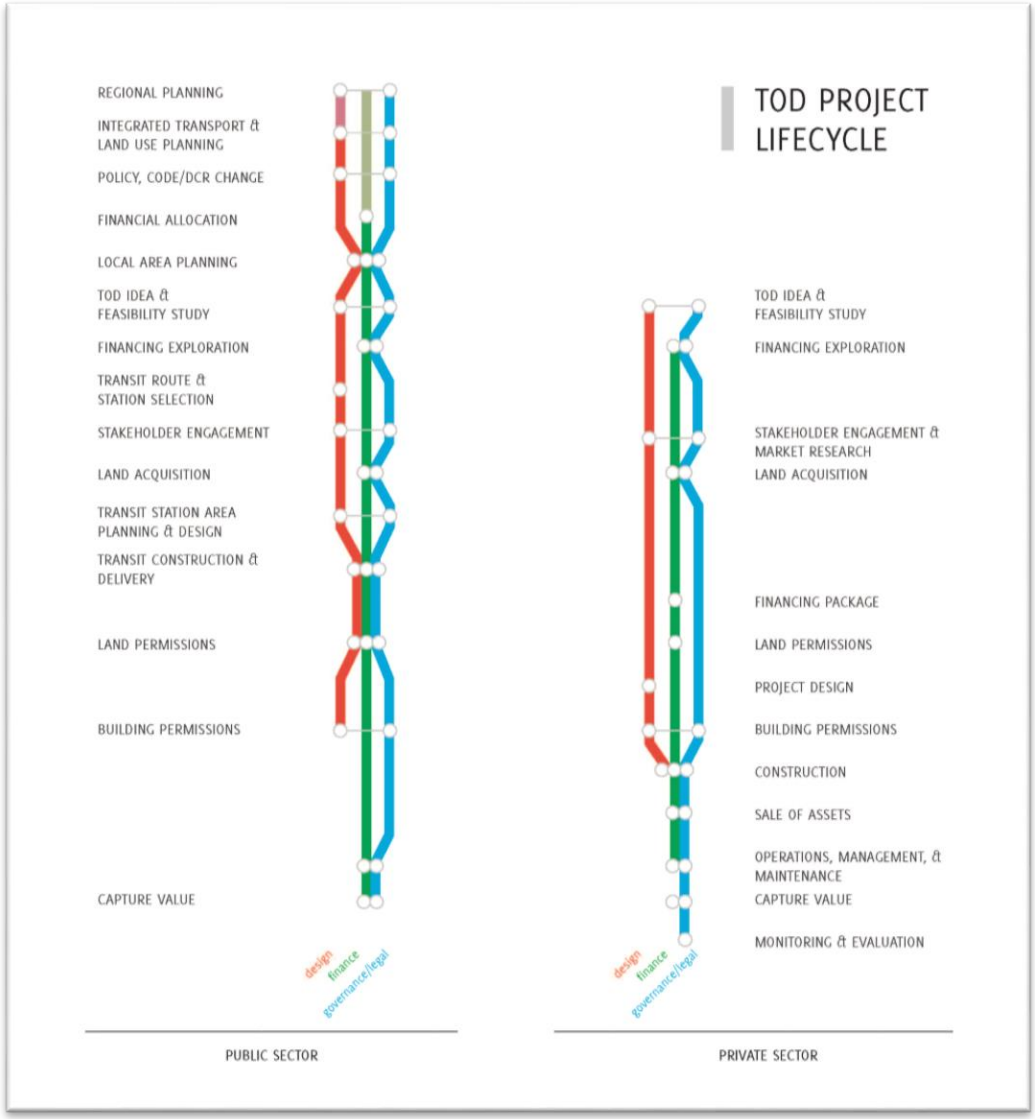
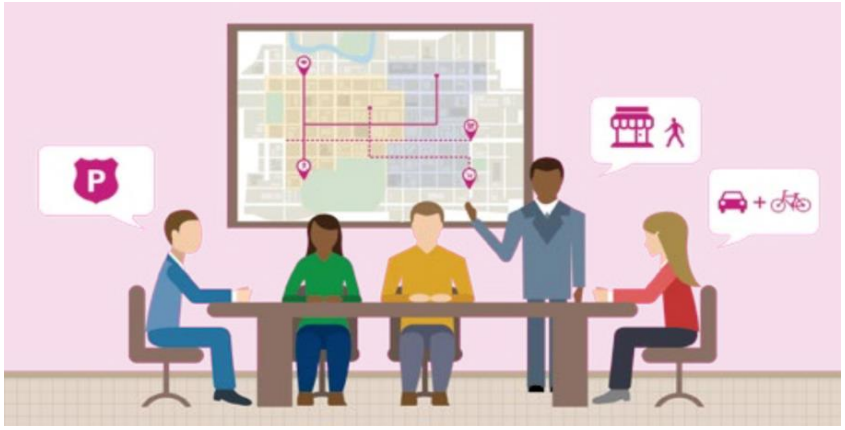


Image Source: Carlton, I. and Fleissig, W. "Steps to Avoid Stalled Equitable TOD Projects" Living Cities. April 2014.
Image Source: WRI.

Barriers to TOD Implementation



- **Lack of integrated and coordinated planning:** Departments at national, regional, and local level must coordinate to ensure successful TOD
- **Lack of supportive TOD policies and regulatory framework:** Policies and regulations must encourage TOD- in particular, high-density development must be allowed
- **Lack of funding:** Land value capture schemes and BRT systems can make TOD more affordable

Image Source: EMBARQ Brasil. *DOTS Cidades - Manual de Desenvolvimento Urbano Orientado ao Transporte Sustentável*. November 2014. Accessed August 23, 2016. http://wricidades.org/research/publication/dots-cidades-manual-de-desenvolvimento-urbano-orientado-ao-transporte.

TOD: Lessons from the Field

Political economy

- Political leadership and vision for the city
- Appropriate institutional structures
- Community participation
- Intergovernmental and metropolitan collaboration

TOD: Lessons from the Field

Planning and Regulation

- Holistic and integrated approach
- Supportive regulatory environment

Finance

- Leverage capital
- Use a combination of financing options
- Use public sector investment to encourage private sector investment
- Stakeholders must have shared vision

TOD: Lessons from the Field

Implementation

TOD takes time and accordingly:

- Create democratic, transparent, and fair processes
- Create new spatial identities through placemaking strategies to create vibrant communities
- Allow for adjustments over long-term market cycles
- Limited transit network diminishes TOD appeal
- Limit gentrification through increased access to low-income housing

Module Quiz

1 . **Which one of the following statements about Transit-Oriented Development (TOD) is true?**

a. TOD encourages visionary urban design, mass transit, walking and cycling.
b. TOD aims to create an urban road system that is friendly to private vehicles.
c. Private vehicles fueled by clean energy are encouraged by TOD because they are environmentally friendly
d. Social equity is not a consideration of TOD.

2. **Which one of the following choices is NOT an element of TOD?**

a. Walkable access to public transport
b. Fast and convenient networks of highways
c. Compact and mixed use of land
d. Mixed-income neighborhoods
e. Easy access to public transport and economic opportunities

3. **Which of the following choices is NOT an obstacle to the implementation of TOD?**

a. Lack of integration and coordination in planning and implementation
b. Lack of supportive policies
c. Lack of funding
d. Lack of innovative designs

Module Quiz

4. **Which was NOT a key lesson of TOD implementation? 7**

a. Create democratic, transparent, and fair processes

b. Maintain spatial identities by limiting low-income housing

c. Limited transit network diminishes TOD appeal

d. Allow for adjustments over long-term market cycles

5. **Which of the following aspects is NOT included in a TOD community?**

a. Commercial and residential development

b. High-quality public transit

c. Safe pedestrian and biking corridors

d. Special lanes dedicated to accelerate travel by private automobiles