

# Accessible and Livable Cities: A vision for sustainable mobility in 2030

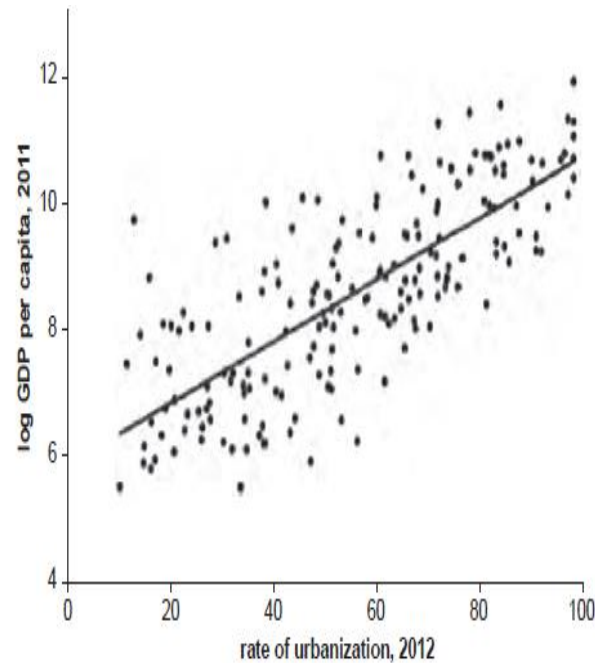
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12<sup>th</sup> Urban Mobility India Conference and Expo  
November 15-17, 2019 – Lucknow, India



Cities are at the core of the development agenda. Rapid and radical changes are transforming the urban transport landscape, impacting how accessible and liveable the cities will become.

# Cities are drivers of economic growth and climate change, also home to the poor

Urbanization and GDP per capita

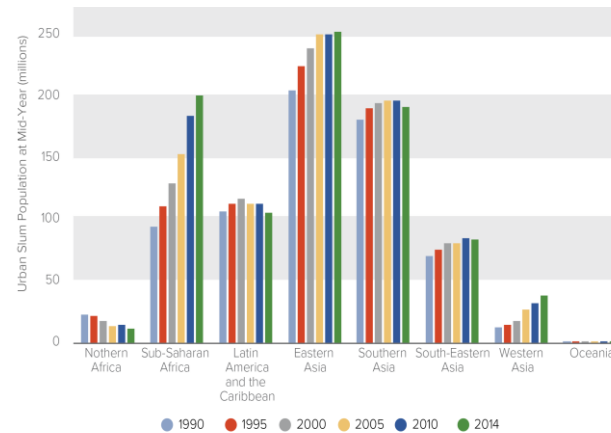


Source: World Bank. 189 countries. The horizontal axis urbanization rate is the percentage share of population living in cities in 2012. The vertical axis represents the natural log of GDP per capita in 2011 U.S. dollar.

## Spur Economic Growth

- Cities generate 80% of global output (500 cities account for 60% of global income growth)
- Growing welfare costs of traffic congestion, urban sprawl

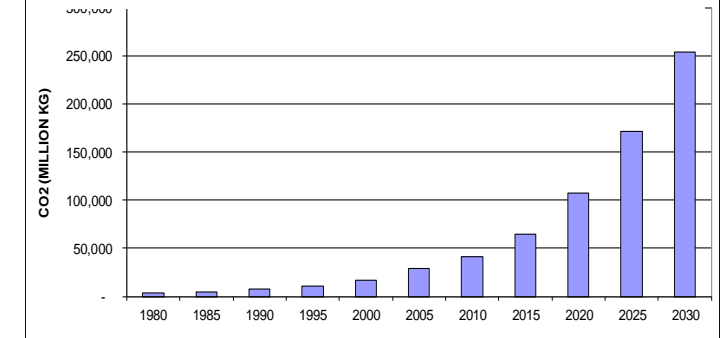
Urban Slum Population 1990-2014



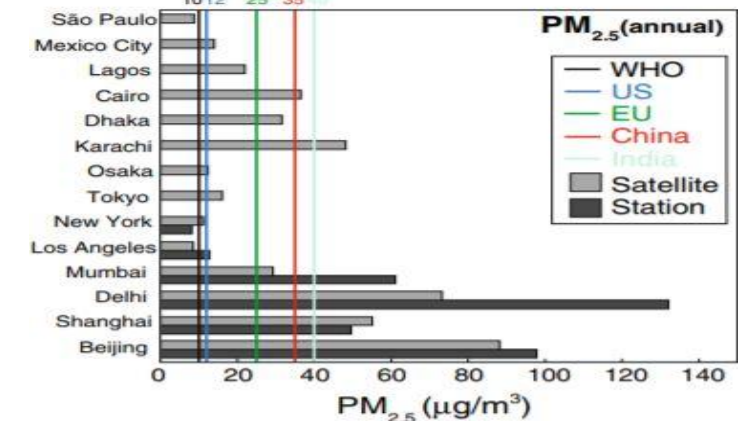
## Bring Inclusive Development

- Jobs, services, social activities
- Growth of slums, urban poverty,
- Bottom quintile spends a disproportionate share of household income on public transport

CO<sub>2</sub> Emissions from Urban Transport 1990-2030 (WRI-WB, 2007)



Air pollution in megacities



## Tackle Local/Global Environment

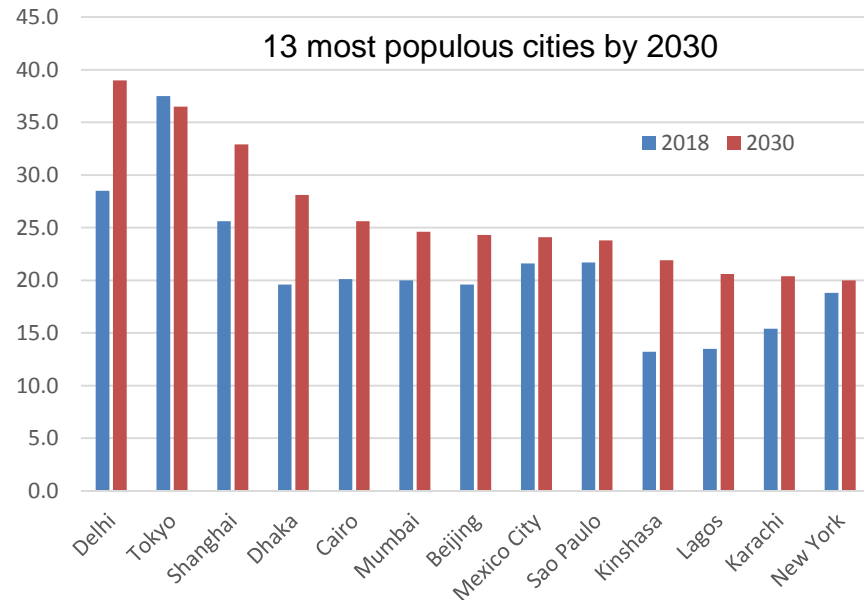
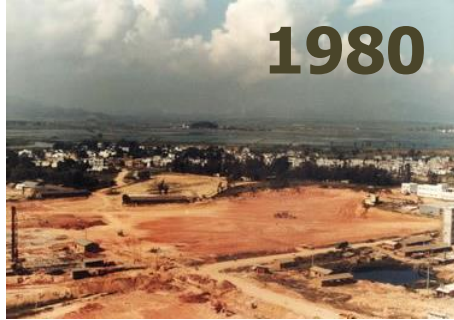
- Urban outdoor pollution linked to 4 million premature deaths
- Cities contribute 70% of energy-related GHG emissions
- Active mobility for healthy society

# Rapid urbanization: spaces transforming faster

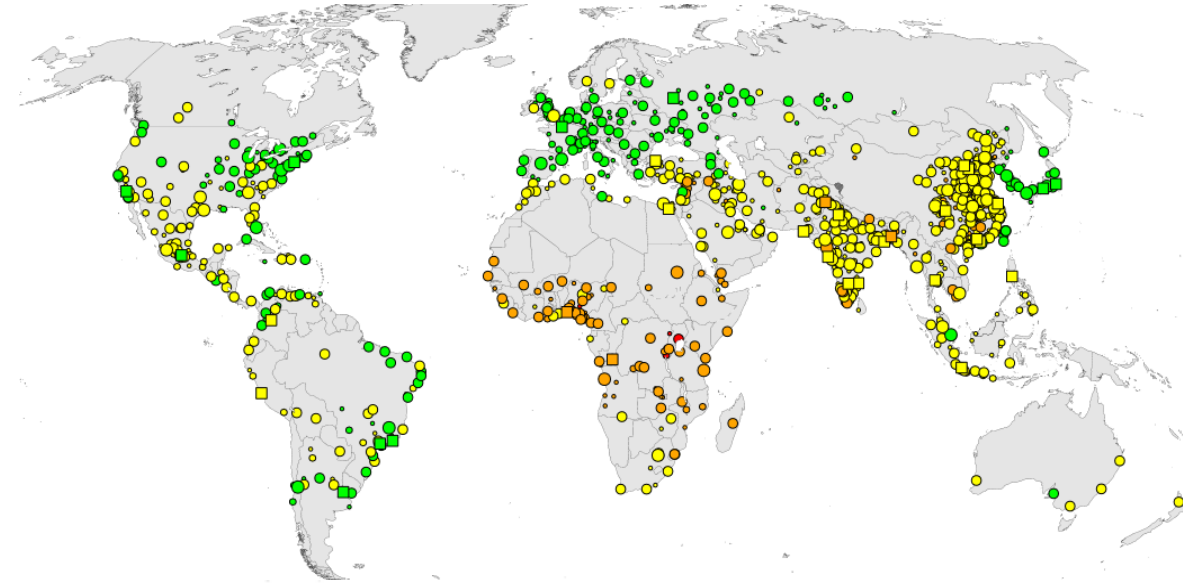
## Shenzhen, China

From a fishing village of several thousand ...

... to a city of 12.5 million



## City growth rate 2018-2030



Source: UN World Urbanization Prospects, 2018

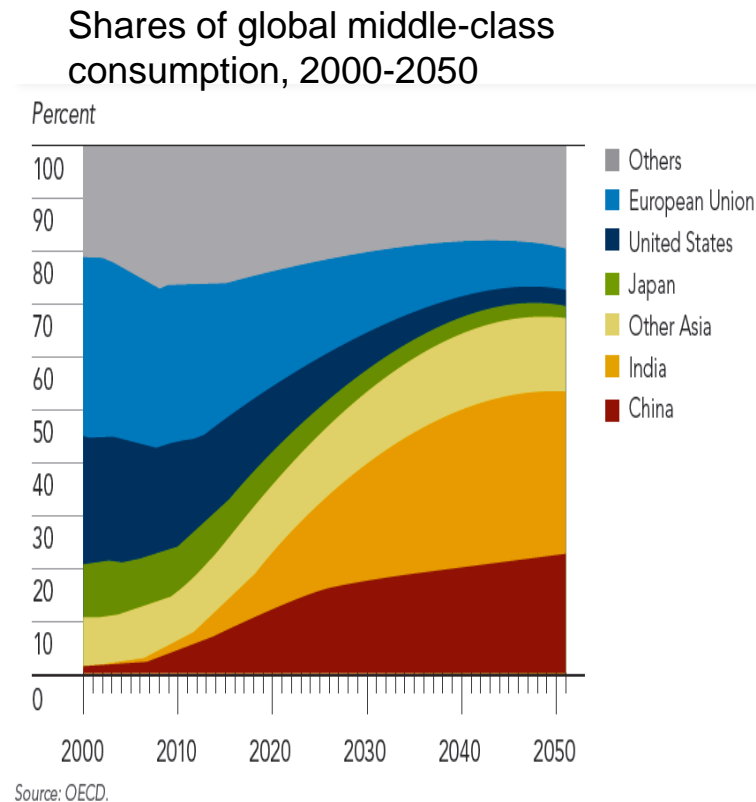
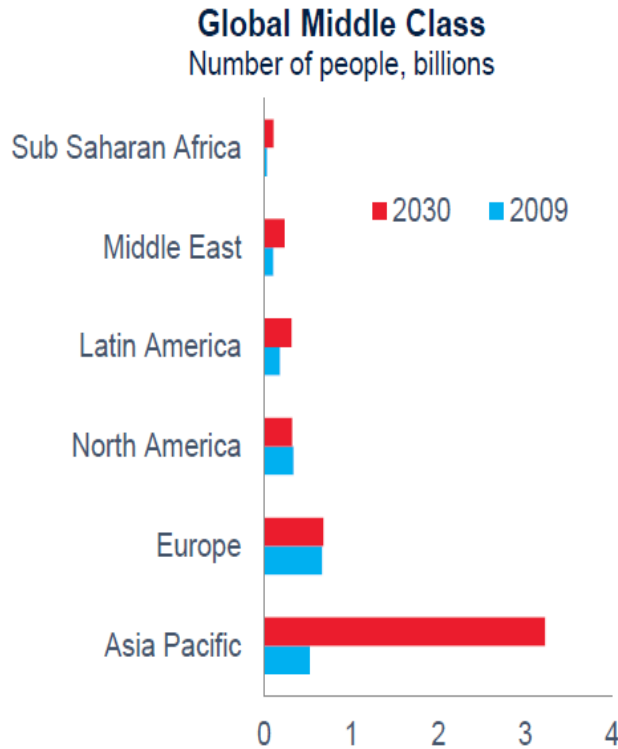
## By 2030

- 60% of population will live in cities, up from 55% today
- 43 megacities up from 35 today, most in developing world;
- Cities in East Asia will triple their built up area and double it in Africa – urbanization at lower income level
- Rapid pace exacerbates institutional and resource constraints

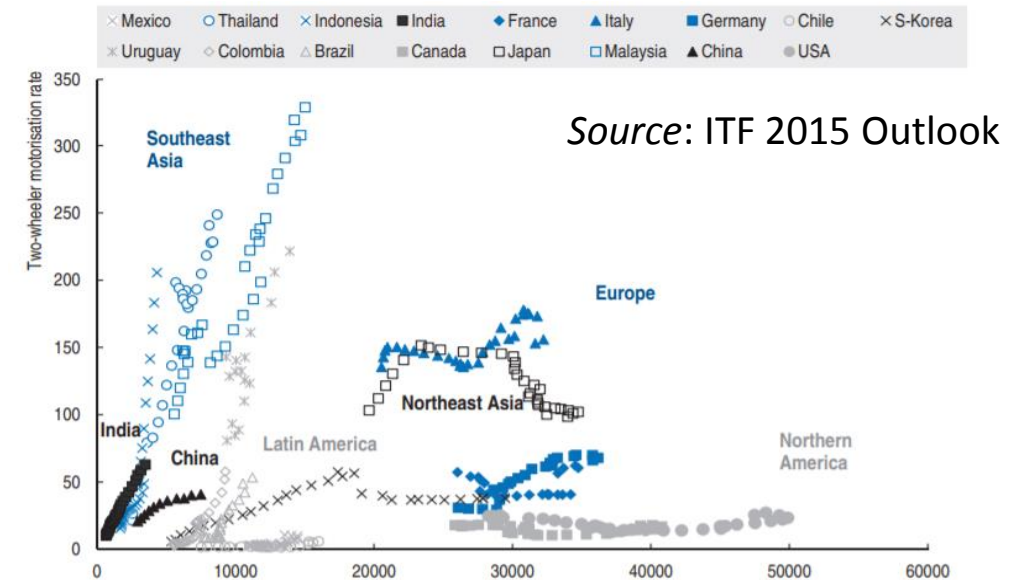


# Socio-economic shift in makeup of global population fueling mobility aspirations

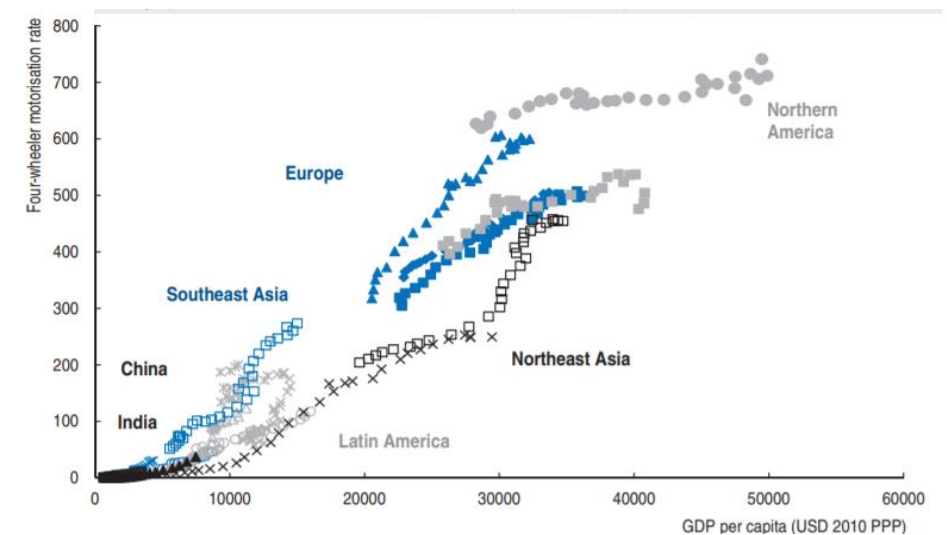
Half of world population will move into middle class by 2030 with new mobility aspirations



- Higher social aspirations: jobs, quality of services, equity issues (gender, aging, people with disabilities)
- Household spending on transportation in Asia projected to grow 3-4 times between 2013-2035 (Source: Petersen Institute)



2-wheeler motorization relative to per capita income



4-wheeler motorization relative to per capita income

# Digital innovation/disruptive technologies are changing how we choose to travel

Technology allows to optimize efficiency of transport systems and engage 'intelligently' with users

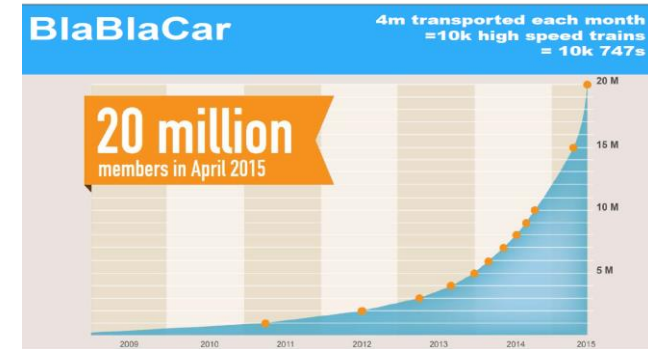
ICT/Digital innovation  
Connectivity enables non-friction flows



Platforms:  
Mapping Apps crowd source  
traffic data



Proliferation of shared-mobility services



- New ways of communicating (smart phones, digital platforms, IoT, cloud computing) allow to match supply and demand and nudge users towards shared transportation options
- New forms of mobility and services (bike-sharing, autonomous vehicles, mobility as a service, e-commerce, drones) better cater to personal needs, blurring the lines between private and public transport.
- The predictive capacity of "Big Data" analytics and the application of Artificial Intelligence can improve transport planning and the performance of transport systems.



O. P. Agarwal  
Ajay Kumar  
Samuel Zimmerman

# EMERGING PARADIGMS IN URBAN MOBILITY

PLANNING, FINANCING  
AND MANAGEMENT



Many attempts to improve urban transport have failed.  
Increased recognition of the new paradigms that need to  
shape policies and institutions for sustainable urban mobility.



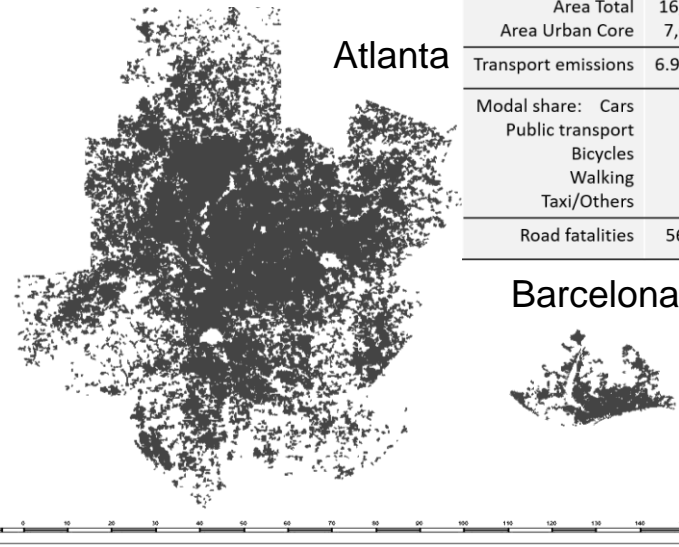
# Transport and Land Use: Early choices lock-in lifestyles, energy use, modal share...

Urban sprawl and motorization:



- Sprawl is expensive --transport demand depends on city layout
- Doubling of urban population in Asia and Africa can only be accommodated by increasing densities and TOD planning

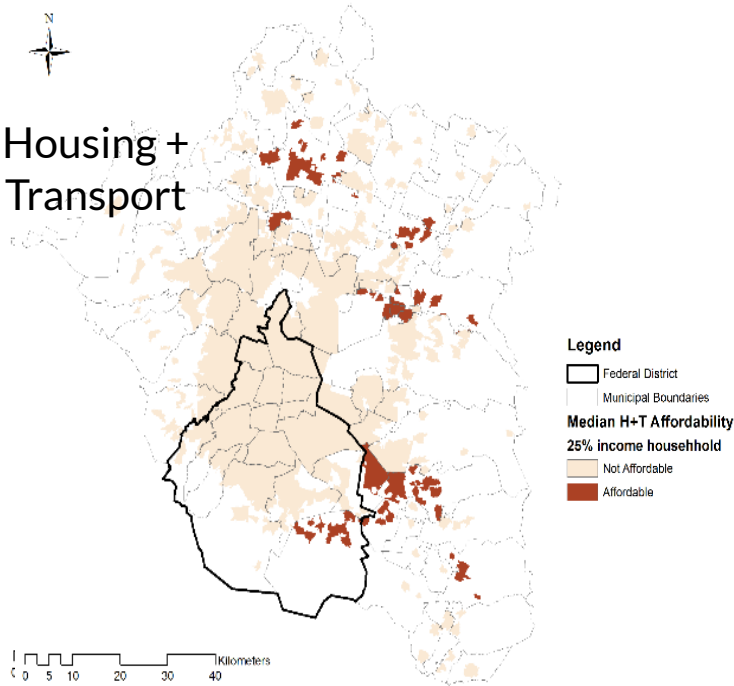
Built-up areas of Atlanta & Barcelona at same scale



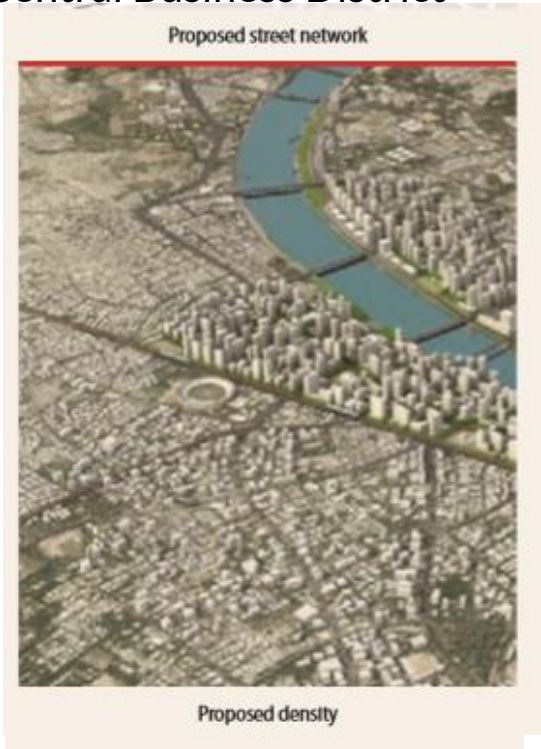
| Parameters          | Atlanta                   | Barcelona                 |
|---------------------|---------------------------|---------------------------|
| Population          | 5.26 million              | 5 million                 |
| Area Total          | 16,605 km <sup>2</sup>    | 3,263 km <sup>2</sup>     |
| Area Urban Core     | 7,692 km <sup>2</sup>     | 648 km <sup>2</sup>       |
| Transport emissions | 6.9 t CO <sub>2</sub> p.c | 1.2 t CO <sub>2</sub> p.c |
| Modal share: Cars   | 77%                       | 20%                       |
| Public transport    | 3%                        | 33%                       |
| Bicycles            | 0%                        | 12%                       |
| Walking             | 1%                        | 35%                       |
| Taxi/Others         | 18%                       |                           |
| Road fatalities     | 564 /year                 | 31/ year                  |

Barcelona

Affordability of Housing and Transport (Mexico Federal District)



Planned densification of Ahmedabad's Central Business District



Source: WB Leveraging Urbanization in South Asia



# Managing demand rather than continuously enhancing supply of road space

Megacities congested even at low motorization rates



Cities are learning that is not possible to build way out of congestion

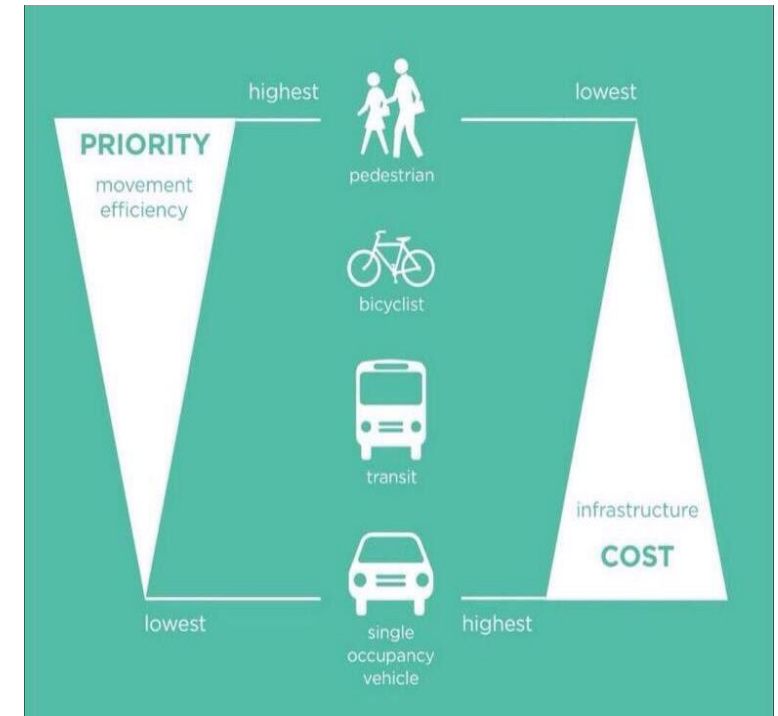
Policies that balance D&S without increasing supply of road space:

- Promoting Public Transport and shared mobility at scale
- Promoting Non-Motorized Transport
- Discouraging use/ownership of personal motor vehicles
- Reducing the number/length of trips per person

Encourage optimal use of available road capacity

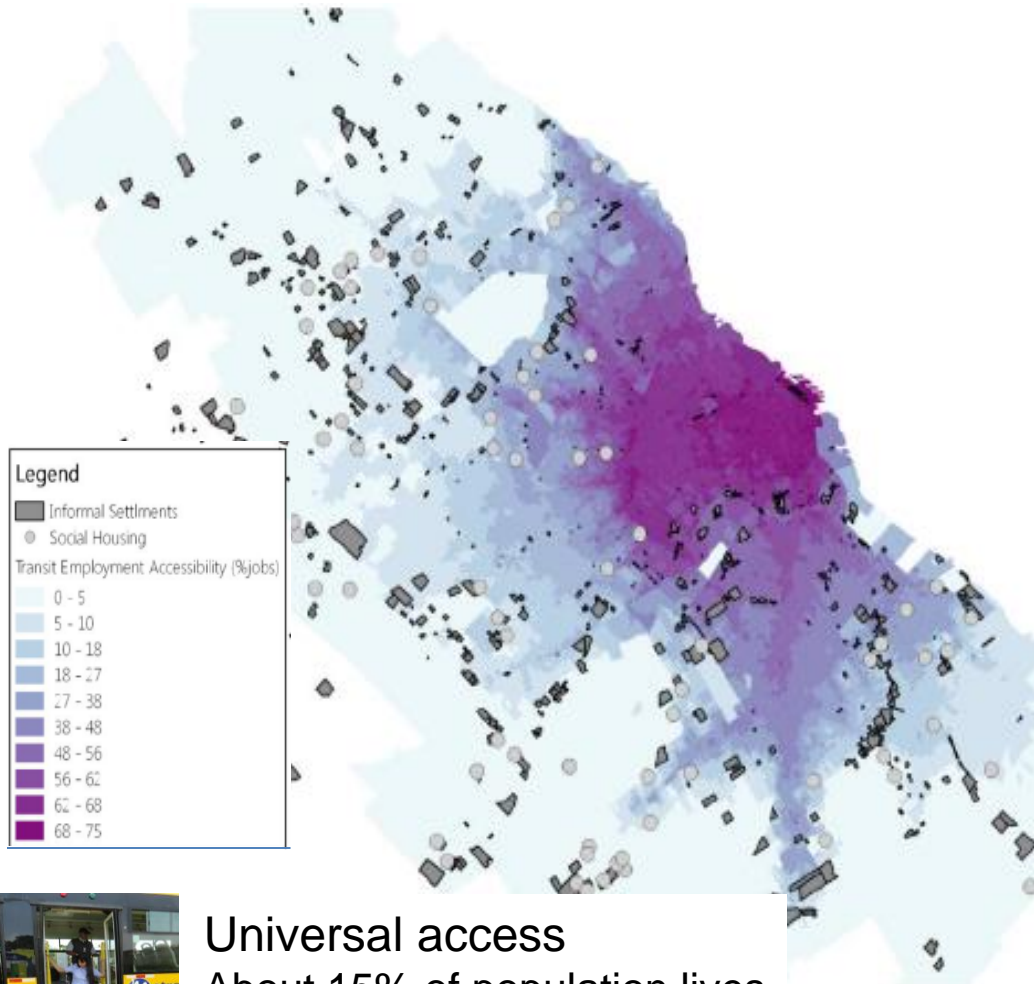


Inverting the urban mobility pyramid: Make Pedestrians and NMT a priority.



# Improving accessibility with a focus on people's needs and aspirations

Access to opportunities: accessible jobs within 1 hour by public transit



**Universal access**  
About 15% of population lives with some form of disability

Closing the Gender gap:  
Differing mobility needs and safety concerns of women



Harassment of women is a major risk in urban transport

- 80% of women surveyed reported harassment in Mumbai
- 95% in Cairo and Alexandria
- 60% in Latin American cities
- In Bogota, women travel less by bicycle than men (1% vs 5%) and walk more (51% vs 39%)

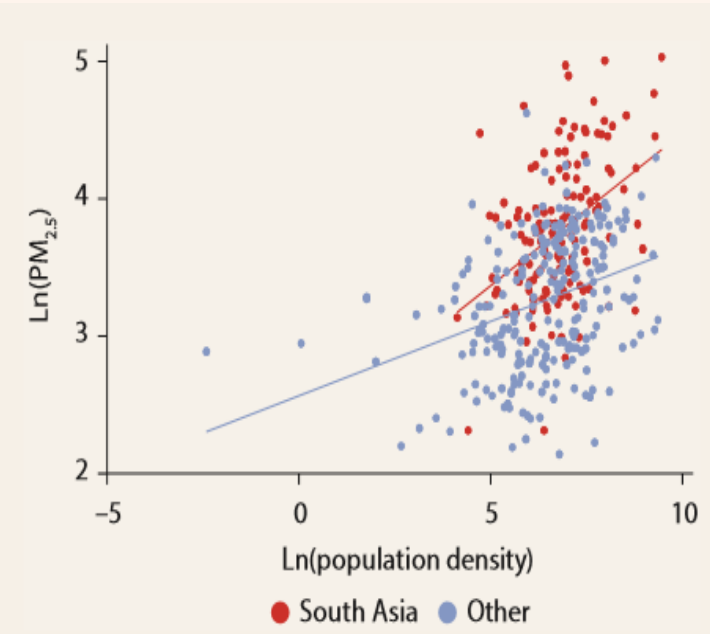


"Public Transport for Me"  
UITP-World Bank Global Campaign

Lack of disaggregated mobility data has made gender issues "invisible"

Safety and "Green" goals also key for livable cities

Relationship between annual mean concentration of  $PM_{2.5}$  and city population density for 381 developing-country cities



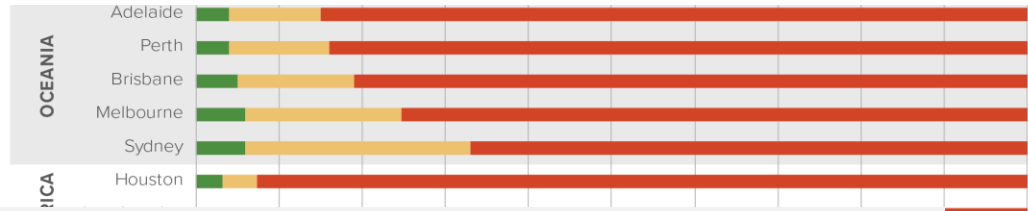
Source: WB Leveraging Urbanization in Asia



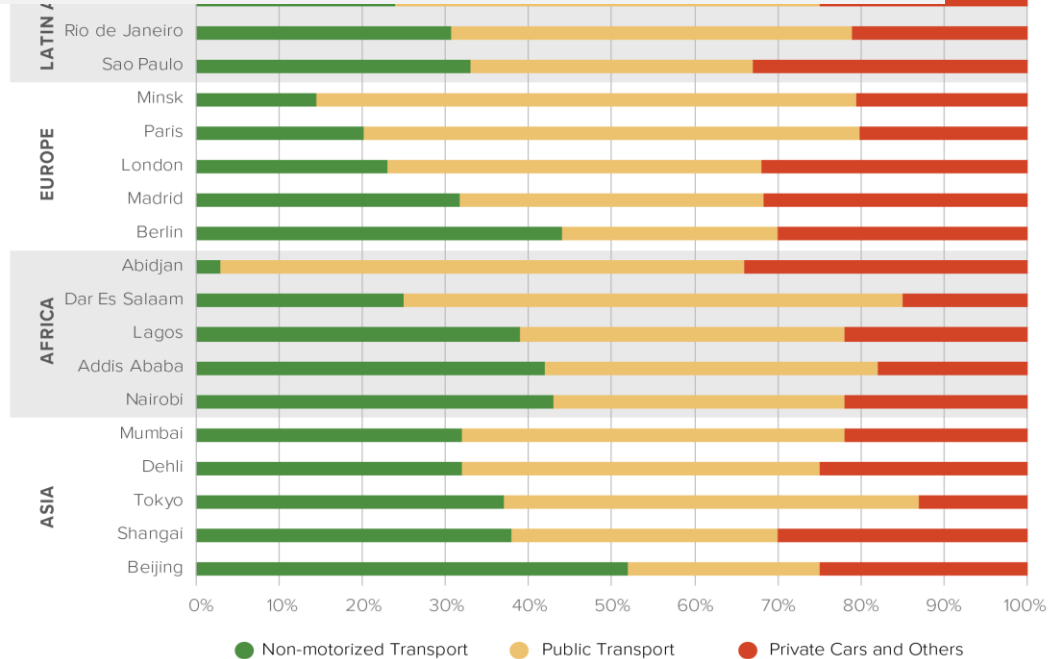
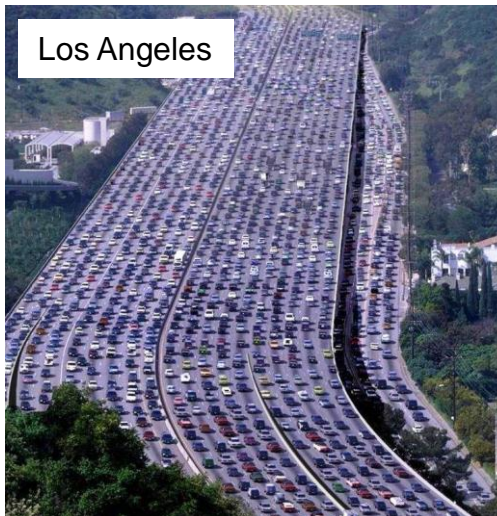
# Making Public Transport the mode of choice for all



Modal share for 5 of the 10 largest cities in each region (NMT, Public Transport and Private Motorized Options)

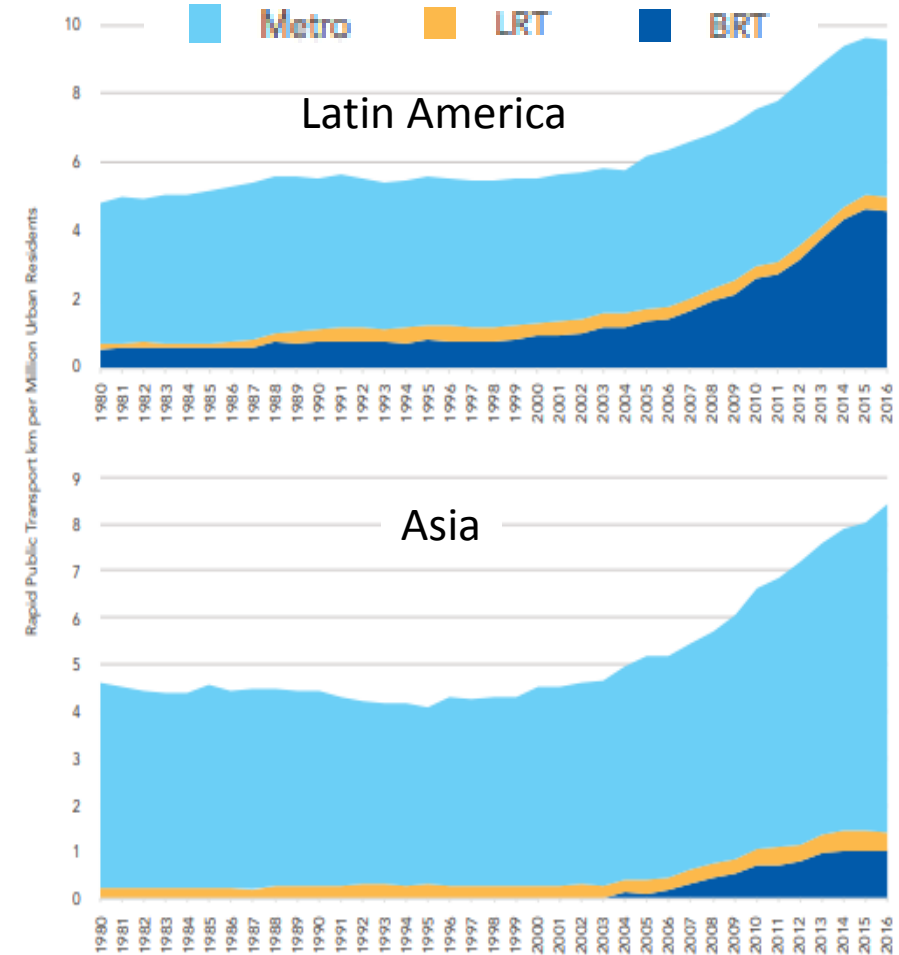


- Increase the capacity and coverage of public transport
- Improve the quality and attractiveness of public transport even for those who can afford a personal vehicle



Source: New Climate Economy, 2018 Report

The supply of rapid transit has increased relative to the urban population since 2000. BRTs in Latin America and Metros in Asia

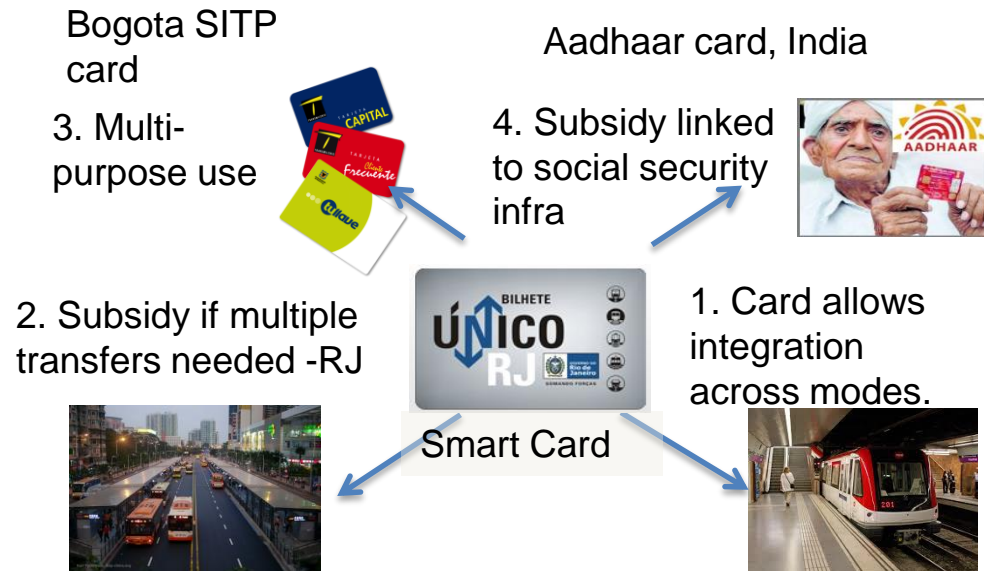


Source: Institute for Transport & Development Policy 2017. Rapid Transit Database



# Integrating transport systems with “whole trip” principles

## Smart cards for fare and subsidy integration

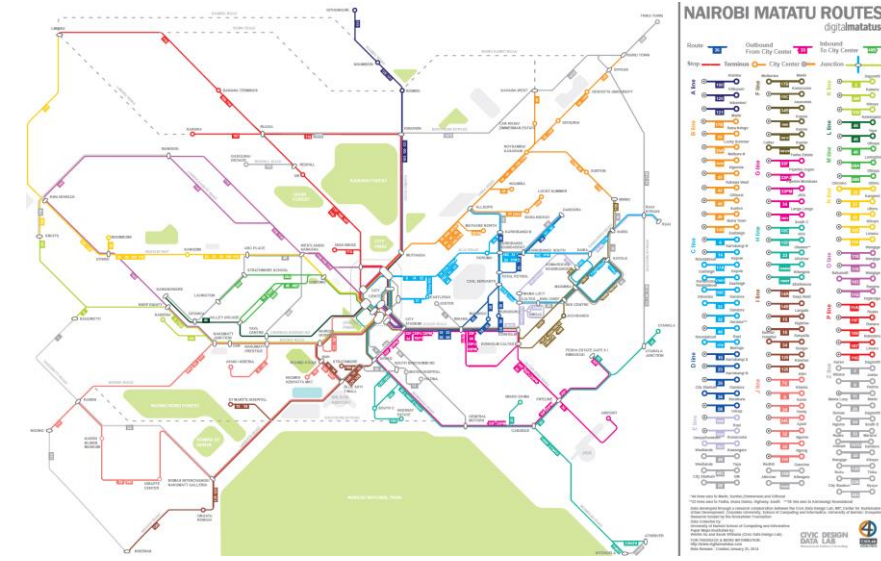


## Whole trip planning and scheduling



Source: WhereIsMyTransport

## Integrating with other formal/informal public transport means to expand reach



Digitization of Matatu routes in Nairobi

## Seamless travel through a multi-modal system for whole trip (from origin to destination)

- Physical and fare integration across modes and routes: requires integrated institutions, network design and passenger information, as well as cost and revenue sharing agreements.
- Complemented by a variety of first/last mile services –from walking to micro-mobility, biking, shared mobility.
- Digital platforms allow travel decisions in real time based on travel time, cost and convenience of whole trip.
- Increased attention to the role of “paratransit” services and the impact of transfers on people’s decisions.





Four trends are defining the future of transport. They bring both opportunities and challenges. Will the “new mobility” deliver sustainable urban transport for all?



# Technology is enabling the four trends defining the future of transportation



## Automated driving (AV)

From assisted driving to driverless cars within a decade, with pilots by 2020. Potential reach 5-20% of all driving by 2030. Shared-use should be prioritized



## Connected systems and networks

M2M connectivity, ability to collect data in real time from growing number of sources and on-line platforms enable integration (multimodal trips) and matching of supply and demand



## Shared Use

Proliferation of “mobility as service” from micro-mobility to car to transit, without ownership. Pooling reduces veh/km, fuel consumption, emissions. On-demand services bridge first/last mile gaps



## Electric Vehicles (EV)

From none a decade ago to 1.25 million in 2017, yet 0.1% of all vehicles. Uneven distribution: 5 countries account for 80%. Reduction of GHG emissions/air pollution

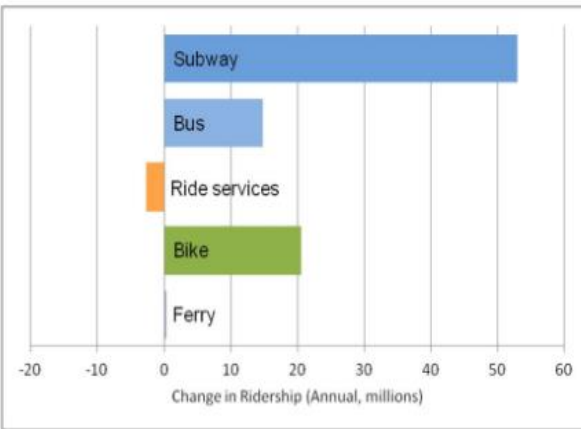
- Creative business models drive costs and revenues, impacting sustainability. They proliferate faster than policies & regulations.
- The convergence of these potential disruptions can deliver a more efficient and inclusive mobility system provided that sound policies guide their deployment to work efficiently together.
- Sharing at scale is what drives sustainability: it can reduce traffic if there is a critical mass of users (20-30% of total demand) so services can be optimized efficiently
- The perils are real – lots of uncertainty and unknowns around the transition and its consequences.



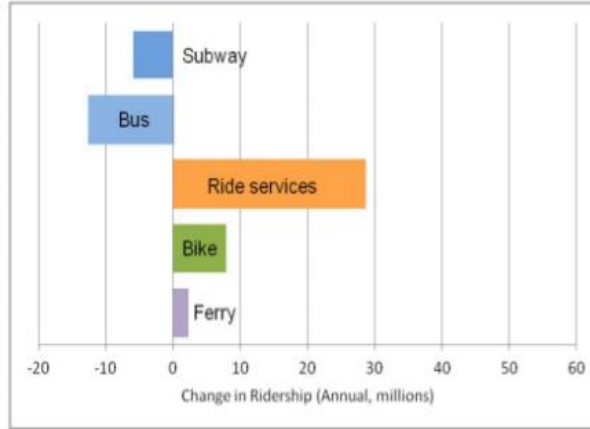
# The Perils are Real: Transition issues and unknowns

## The impact of ride sharing in New York

Changes in ridership by mode, 2012 to 2013



Changes in ridership by mode, 2015 to 2016



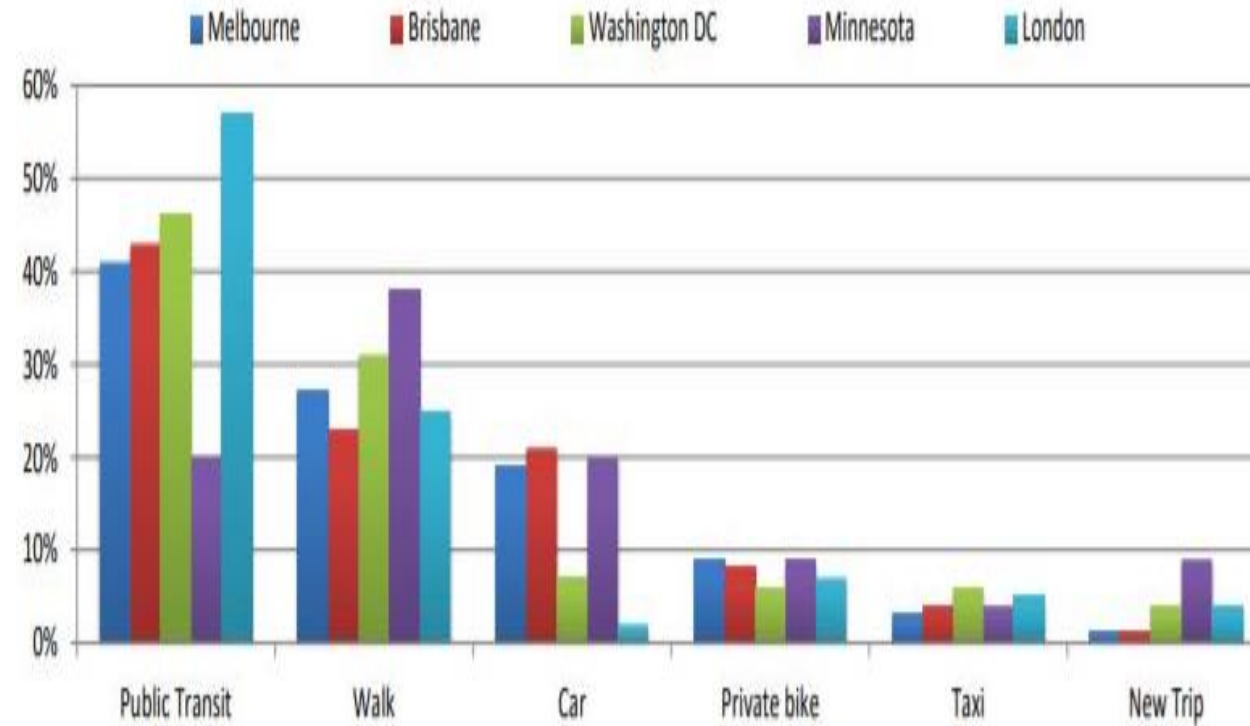
In 2013, the last year before Uber's presence was felt, use of subways, buses, and bicycles grew substantially. But by 2016, net growth in travel by Uber and other TNC's far outstripped growth in those modes.

Sources: nycstreetblog.com, Graphic: Bruce Schaller

 WORLD RESOURCES INSTITUTE

## Modal substitution from bike sharing in 5 cities

Reproduced from Fishman et al. (2014)



- Increasing risk of stranded assets due to technological obsolescence or the disruption of public transport (e.g., eroding the ridership and financial viability of mass transit)
- Autonomous vehicles may increase number and length of car trips as disincentive for driving removed



# The Perils are Real: Transition issues and unknowns

Washington Post, Nov. 2018

## Scooters are fun! Let's regulate them.

**F** SANTA MONICA, CALIF. lectric scooters are a little like Q-Tips. In both cases, the products waking up in the emergency room with a fractured skull and possible permanent brain damage. "They're very handy. The problem



Protestors against Uber in Madrid



Bike-sharing leading to chaos?



- Convergence between innovation and regulation is challenging: authorities find difficult to come to terms with new business models; consequences not well known
- Social acceptance (job suppression) and equity issues: benefits of new options may not be evenly distributed if deployment of technology in marginal areas is not inclusive or not affordable to the poor.
- Data privacy/protection concerns.



# “New Mobility” entails profound changes in sector governance, new capabilities



A transformation in the way governments, service providers, and citizens interact among themselves:

- *New sector governance*, with sensitive issues such as data sharing and privacy. Multiplication of actors as sector becomes more interconnected with technology. More ways to engage intelligently with users/customers (e.g., MaaS platforms). Interoperability of data is essential. Countries embracing “open data” policies will go further. Open data standards allow communities to participate in improving processes and co-creating solutions.
- *New means of service delivery*, sometimes disruptive, require understanding the policies and business models that make them viable as well as the consequences particularly for existing public transport services.
- *New usage patterns* emerging from the new mobility options and the resulting behavioral changes, with potential major impacts on public transit, transportation infrastructure, land use and urban form (e.g., sprawling)





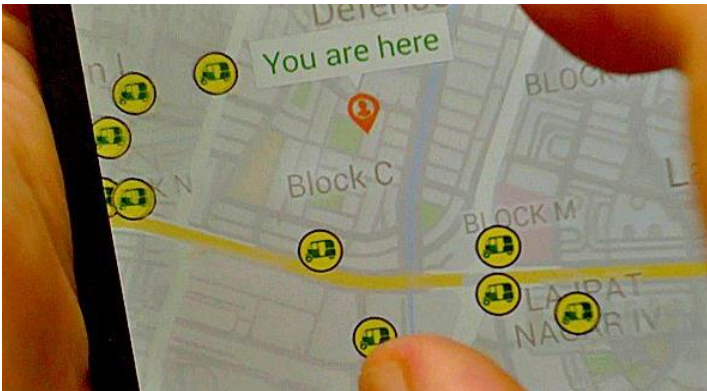
The way forward requires greater coherence and integration of policies and institutions within and across sectors, and strong leadership

# Greater coherence and integration of policies within and across sectors

Wider policy packages and key paradigm shifts are needed to make urban mobility truly sustainable and compatible with cities' livability aspirations and global warming below 2°C

- Managing for a broad set goals –access for all, efficiency, safety, air quality, resilience, minimizing overall GHG emissions from transport, land use, energy - rather than a narrow focus on traffic flows/congestion. Planning together the movements of people and goods increasingly important with e-commerce.
- Prioritizing public transport over personal car. Investing in public transport alone neither efficient nor sufficient. Managing demand is essential: promoting mixed land-use to reduce need for long trips, giving priority to NMT, public transport and *shared mobility* when allocating road space, charging vehicles based on space use and occupancy, introducing car-use restrictions...
- Making public transport the mode of choice for both those who can afford a personal motor vehicle and those who can not implies improving its coverage, quality, reliability and overall travel experience
- Focusing on integrated transport systems with a “whole trip” concept that incorporates first and last mile, and seamless transfers across modes, rather than on specific segments.
- Transitioning out of fossil fuel engines will be necessary to maintain air quality and mitigate GHG emissions. Fuel efficiency improvements and electric mobility have a large mitigation potential. National targets, car-restrictions, low emission zones, tax/price incentives, investments in charging infrastructure can accelerate the transition. Realizing the full benefits of electric mobility needs cross sectoral policies that increase the share of renewable/clean energy in the energy matrix and the ability to charge vehicles when renewables are in use.

# Institutional and financial resources in line with evolving needs



This policy agenda will also imply reforms in the way urban transport is planned, managed and financed

- Bottom-up consultations with all stakeholders to design a “people centered” transport system that better caters to the aspirations and mobility needs of city dwellers. An effective two-way communication is essential to leverage support for reforms. Yet many reforms have failed for lack of communication
- Expanding the sources of financing through a “beneficiaries pay” approach as user fares not enough to cover the costs and public budgets face increasing demands: fuel taxes, land value capture, congestion charging, employment tax, commercial exploitation of property, creative PPPs.

Cities in developing countries will continue to deal with the old challenges that beset urban transport delivery, but will increasingly face the opportunities and disruptions emerging from “new mobility” options embraced by their citizens

- Learning from rapidly emerging solutions
- Updating outdated and fragmented regulatory frameworks to accommodate innovation that can make urban transport more sustainable in the long run



# Are cities prepared for the change? Local leadership/institutions matter

## Institutional Labyrinth

designing a way out for improving urban transport services: lessons from current practice



While cities can learn from each other, their path to transformation, pace and options for managing mobility for sustainability will differ depending on:

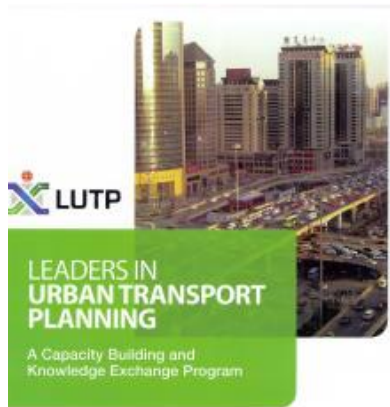
- Initial conditions such as how prosperous, densely populated, compact, connected they are...
- How developed their public transportation system is...
- The capacity of political leadership and institutions to change behaviors and stay on course

Policies and solutions that worked in one context must be tailored to local conditions before adoption but *keeping intact the paradigm shifts* that made them succeed.

Breaking silos through cooperative agencies that work across modes, jurisdiction boundaries, and between public and private sector, to ensure integration:

- *Hierarchical*: multiple authorities coordinate vertically (national, regional and local levels) and horizontally, with clear planning and implementation responsibilities and accountability.
- *Functional*: transport and land use planning conducted in unison.
- *Spatial*: demand determined by the mobility needs of citizens, not municipal boundaries; projects across jurisdictions build support for establishing a Metropolitan Authority.
- *Modal*: seamless transfer across modes at minimum cost and with highest possible efficiency.

A National Policy framework helps give direction to downstream planning functions and support long-term solutions. Developing local capacity at scale an issue.



**Thank you!**

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