SESSION III

Role of Intermediate Capacity MRTs in Mega Cities

Sumitra Iyengar
President – IMA
Director – Geodesic Techniques

GEODESIC
A NEW PARADIGM IN DESIGN & CONSTRUCTION

INTERNATIONAL MONORAIL ASSOCIATION

Urban Transportation in Large Cities

- Substantial growth & development in cities
- Severe congestion in inner city/CBD
- Exponential vehicular growth with limited increase in RoW
- Increased travel time due to vehicular congestion & longer trip lengths
- Overcrowding of existing public transport systems
- Escalating pollution levels
- Pedestrian movement increasingly restricted & unsafe

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Mass Transit Options in Large Cities

- Metro is a rail based system with an ability to serve high levels of demand
- **Monorail** systems have rubber tyres that run on elevated beams and serve intermediate levels of demand
- Light Rail/Tramway Systems are similar to Metro but have lower capacity
- **Elevated Busway** is a newer mode with buses that run on grade-separated guideways and serve intermediate levels of demand
- Buses / BRTS use pneumatic tyres running on existing roads and serve lower levels of capacity
- Personalized PTS such as taxis and autos are an essential part of the network and serve low levels of demand

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Role of Metro in Large Cities

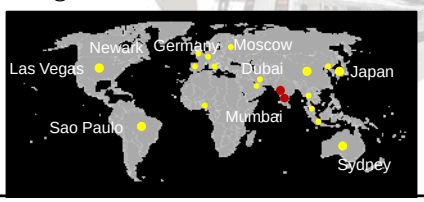
- Designed to be the primary public transportation mode
- Capable of moving upto 50,000 passengers per hour per direction
- Provides connectivity to the CBD & suburbs
- Provides an all-weather, all-season transport with reliable travel times
- Creates poly-centric cities (Satellite Towns) with multiple city centers alleviating demand of CBD
- Facilitates greater mobility & increased economic activity
- Reduces emission of greenhouse gases
- Increases commuter safety

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Intermediate Capacity MRTS - Monorail

- Vehicles are straddled or suspended or maglev
- Monorail vehicles are “wider” than the guideway that supports them
- Environmentally friendly
- Relatively smaller footprint
- Short implementation period due to simpler guideway structure
- Combination of modular, circumferential and radial alignments



GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Monorail Technology

- Composite body and interior panel
  - Lightweight, durable, less energy consumption
- New bogie system and structure
  - Enhanced ride comfort
- Improved propulsion and control system
  - Light, efficient, reliable
- Regenerative and pneumatic brake system
  - Effective, smooth, cost efficient
- Safety and Reliability
  - Design nature that wraps around its tracks makes derailment virtually impossible
  - Allows for efficient emergency evacuation

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Monorail Benefits

- Safe – No derailment/collision, accident free operation
- Turning radius as low as 50m against 120m for rail
- Handles gradients upto 6% against 1% for rail
- No pollution; minimal vibration & noise
- Segregates the vehicles from existing roads
- Increases capacity of roads to run buses more effectively
- Provides a complementary service to the Metro in the form of an effective feeder and dispersal system
- Can be a primary public transport mode in tier-2 & 3 cities

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Monorails in India

- Concept of monorails as an intermediate capacity MRTS introduced in 2004 by Geodesic Techniques
- Monorails proposed in Mumbai, Bengaluru, Delhi, Goa, Pune, Chandigarh, Chennai, Dehradun, Ahmedabad, etc.
- First monorail being implemented in Mumbai (2009)
  - Jacob Circle to Wadala – implementation in progress
  - Thane-Bhiwandi-Kalyan – Corridor proposed
- Bengaluru
  - Proposal submitted under Swiss challenge (PPP) (May 2008)
  - Total corridor 60Kms (15.7 km has been approved as the Phase I by the Hon. Chief Minister, GoK)
- IMA established in 2009 - First President is an Indian
- Monorailex 2011 – October, Mumbai

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Bengaluru Monorail

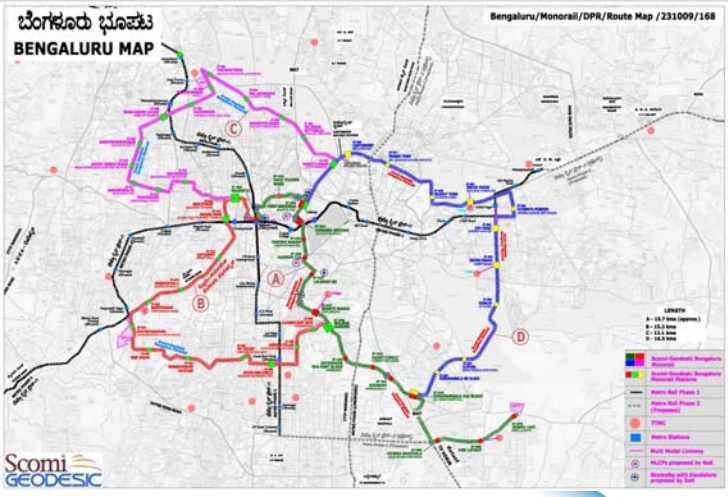
The corridor of 60 km covers 25 planning districts, 172 zones and directly links (approximately):

- Metro stations (Phase 1 and 2): 12
- Railway stations: 03
- TTMCs: 03
- KSRTC Terminals: 02
- Hospitals: More than 100
- Educational Institutions: More than 140
- Office Buildings (Government and Private): More than 850
- Restaurants & Hotels: More than 350
- Malls & Markets: 30 & Theatre Complexes: More than 15
- Parks (incl. Lal Bagh & Cubbon park): More than 30
- Public Places (worship, community halls, etc): More than 295
- 57 stations would also serve as skywalks

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Bengaluru Monorail



GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Intermediate Capacity MRTS - BRTS

BRT Initiatives

- Dedicated bus lanes to segregate traffic
- Reduced construction costs
- Relatively simple technology
- Successful working models around the world
- Ahmedabad BRT functioning with positive reviews
- Affordable people mover system

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Elevated Busway in India

- Concept of EB as an intermediate capacity MRTS introduced in 2006 by Geodesic Techniques
- Proposal submitted to BMTC in 2006
- Paper presented at Structural Engineering World Congress, May 2010
- EBs proposed in Maharashtra, Karnataka, Delhi, Gujarat, Rajasthan, etc.
- First EB being implemented in Rajkot (Jan, 2011)
  - MOU signed during Vibrant Gujarat
  - Proposal submitted under Swiss challenge (PPP)
  - Total corridor 30Kms

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Intermediate Capacity MRTS - Elevated Busway

- Dedicated elevated bus lanes for traffic segregation including junctions
- Prefabricated steel–composite structures
- Integration of innovative and environmentally sustainable technologies
- Adding capacity of RoW
- Ability to handle gradients upto 20%
- Feeder system for tier 1 cities & standalone system for tier 2 cities
- Pedestrian friendly system
- Minimal land requirements

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Elevated Busway - Technology

- Structure
  - Steel intensive construction – 90 % Reusable and Recyclable
  - Elevated wayside Stations
  - Guideway structure - Minimal geometric footprint
  - Multiple configurations for different locations
  - Elevated Roundabouts
- Energy Efficient Technology
  - Clean & Green Power
  - Advanced Rolling Stock
  - Eco-friendly material - Steel

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Elevated Busway - Benefits

- Flexibility of alignment
  - Compact Structure with Minimal Footprint – 60% lower than RCC
  - Over medians or footpaths
  - Requires only easement rights
  - Old cities and narrow roads
- Energy Efficient Rolling Stock – Higher mileage
- High safety measures – Guidance systems
- High Fuel Savings
- Substantial decrease in pollution
- Completes the hierarchy of city public transportation

Summary

- No single mode of transport can address the entire need of a city in providing connectivity to places of work, shopping, leisure or social destination
- Analysis of traffic & transportation needs should be system-agnostic
- Mass transit solutions should consider the need, demand forecasts, appropriateness of technology, resource availability and financial constraints of the respective Governments
- Role of private players & support available under PPP needs to be better defined
- Multiple modes of transport will ensure
  - Essential redundancies in travel options
  - Seamless interchanges & flexibility in reaching origins and destinations
  - Affordable & appropriate choices for all sections of population

Chennai Master Plan

- Integrating land use and urban transportation
- Priorities to non-motorized transport
- Optimizing the existing road and transport infrastructure
- Redefining the role of Para-transit
- Segregating freight traffic from passenger traffic
- Deploying various travel demand management (TDM) measures
- Putting in place an environmental development management mechanism
- Setting up a unified institutional framework encompassing all modes
- Promoting other transit options – Monorail, LRT, ETB, Skybus, etc
- Promoting innovative technologies / practices

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Choice of People Mover Systems

Parameters	Metro	Monorail	Light Rail	Elevated Busway	Bus Rapid Transit
No. of systems in the world	~ 146	~ 76	~ 90	2	~ 66
No. of systems in India					
Existing/In Progress	5	1	0	0	5
Proposed	7	8	0	9 (Proposed by Geodesic)	45
Power supply	Electricity	Electricity	Electricity	Solar Electric, Renewable	Fossil Fuel
Screen Capacity **	24,000 – 48,000	11,000 – 25,000	6,000 – 10,000	3,000 – 4,500	1,100 – 1,800
RoW, m	~ 10	~ 8	~ 9	7	~ 7
Investment Cost, INR Cr/km	210 – 275 (Elev.) 350 – 420 (U/G)	125 - 175	80 - 250	45 – 85	15 - 25
Maintenance	High	Medium	High	Low	Medium
Pollution	Low	Low	Low	Zero Emission	High
Safety	High	High	Medium	High	Low
Noise	High	Low	High	Low	High

****** -> Peak Hour Directional Screen Volume

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Data shown above is extracted from documents available on the internet
Geodesic Techniques is not responsible for the authenticity/accuracy of the data

Thank You

Sumitra Iyengar
Ph: +91-80-41524030;
Fax: +91 80 41524037;
Mob: +91 9845025619, +91 9980912148;
Email: sumitra@geodesictechniques.com

No.1, Prince of Wales Road, Off Queens Road
Cantonment, Bangalore - 560 052 INDIA
Tel : +91 80 41524030
Fax :+91 80 41524037

INTERNATIONAL MONORAIL ASSOCIATION

International Monorail Association

Mission

- Organise global monorail sector
- Promote application of monorail
- Publish information
- Initiate & support standardisation processes of monorail for public mass transport infrastructure

INTERNATIONAL MONORAIL ASSOCIATION

International Monorail Association

Executive Council

Appointed by institutional meeting on 26th November 2010, Wuppertal, Germany

- **President:** Ms. Sumitra Iyengar
  Geodesic Techniques Pvt. Ltd., India
- **Secretary:** Mr. Jaap Ketel
  Ketel Consulting Agents BV, Leusden, Netherlands
- **Treasurer:** Mr. Paul Tulp
  Arcadis BV, Amersfoort, Netherlands
- **Board Members:**
  - Scomi Group, KL, Malaysia
  - Bombardier, Berlin, Germany

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

International Monorail Association

Who should join IMA?

- Officials & others looking for PT solutions
- Metropolitan & city authorities
- PT companies
- PT consultants
- Monorail system suppliers & subcontractors
- Monorail experts

JOIN NOW!!

GEODESIC

INTERNATIONAL MONORAIL ASSOCIATION

Bus Rapid Transit Systems
Advantages and Concerns

Ravi Gadepalli,
iTrans Pvt. Ltd.,
TBIU, IIT Delhi

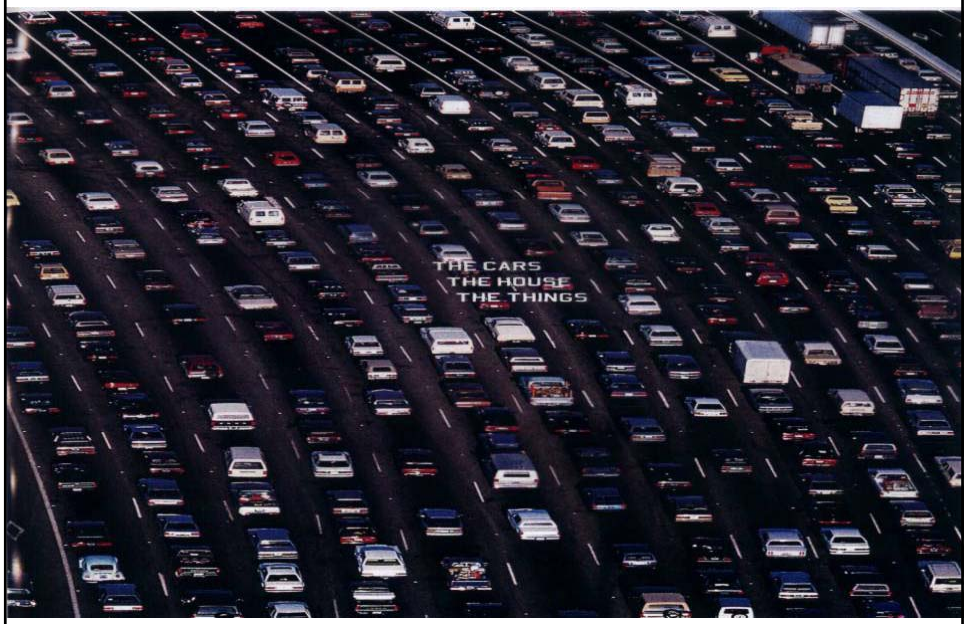
On Behalf of

Dr. Geetam Tiwari
Indian Institute of Technology Delhi(IITD)
New Delhi, India

Lessons from the past

- *1939 Magic Motorways (freeways) will make congestion a thing of the past in cities of 1960s* : Designer of GM Futurama exhibit New York world fair
- If we build enough highways "we can lick congestion good bye" Robert Moses 1960

Conventional solution and promise.....



Why do cities invest in Public transport?

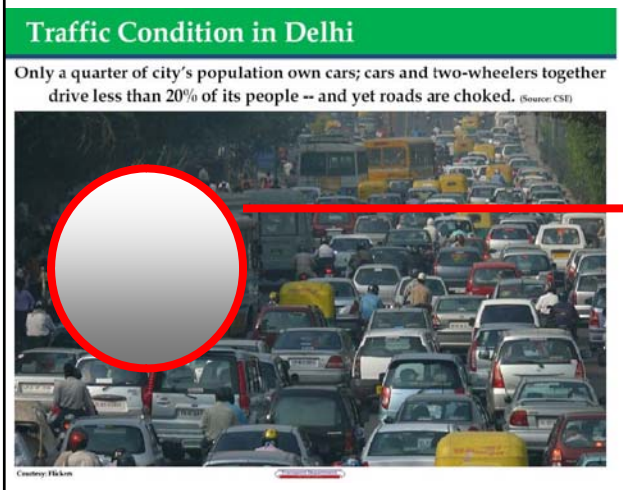
- "reduce" congestion
- Improve air quality
- Control sprawl
- Provide mobility choices

This requires attracting people using cars and two wheelers

What do people Want?

- Access to Work/ Schools/ Health
- Less time on the travel
- Good level of service

Congestion Solution: Bus exclusive lane



Short term:

Congestion free movement to majority people

Improve safety and convenience of PT users, pedestrians and bicyclists

Current modal shares can be maintained

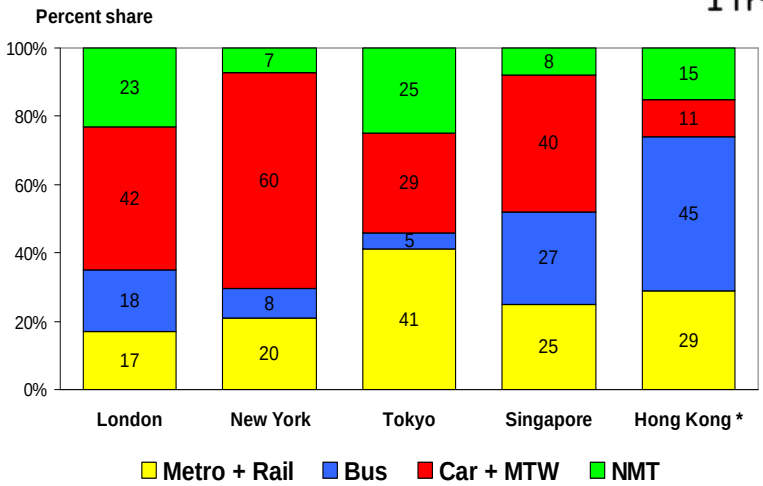
(~30:30:30, NMV:PT:PRSVEH)

long term

increase in PT, pedestrians and bicyclists is possible

Examples of Improved PT Systems
Closed vs open systems

Travel patterns – old world cities



IIT Delhi 2008

Travel patterns – old world cities

City	Modal share, percent		
	Car + MTW	Public Transport	Walking and bicycling
Bristol, UK	65	12	23
Leeds, UK	61	36	3
Nantes, France	58	14	28
Helsinki, Finland	54	20	26
Marseille, France	53	12	35
Edinburgh, UK	52	29	19
Newcastle, UK	48	19	33
Brussels, Belgium	44	18	38
Frankfurt, Germany	42	21	37
Stuttgart, Germany	36	25	39
Amsterdam, Neth's	32	16	52

MTW- motorized two-wheeler, PT – Public transport
W&C – Walking and cycling

IIT Delhi 2008

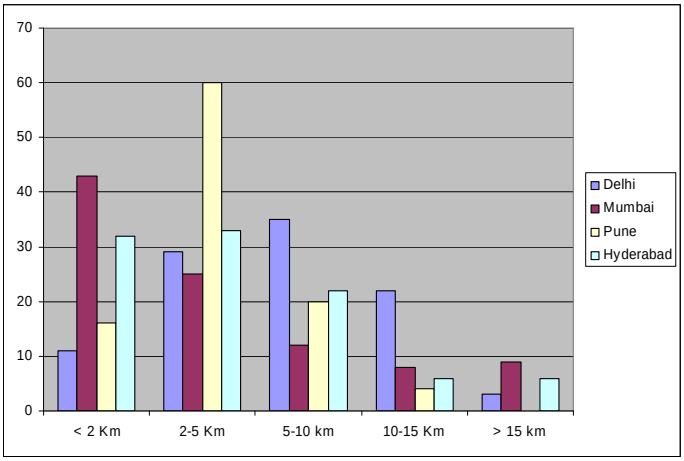
Indian city characteristics

- Cities have mixed land use patterns. Therefore short trip lengths
- Relatively low rise development with planned multiple business districts. Central City is not the main destination.
- Two Wheeler ownership 40-50%
- Marginal cost of operating a motorised two-wheeled vehicle is about Rs 1 per km
- This determines the maximum fare box levels for public transport

Therefore, there may be no need for very high capacity(>20000 phpdt) transit systems

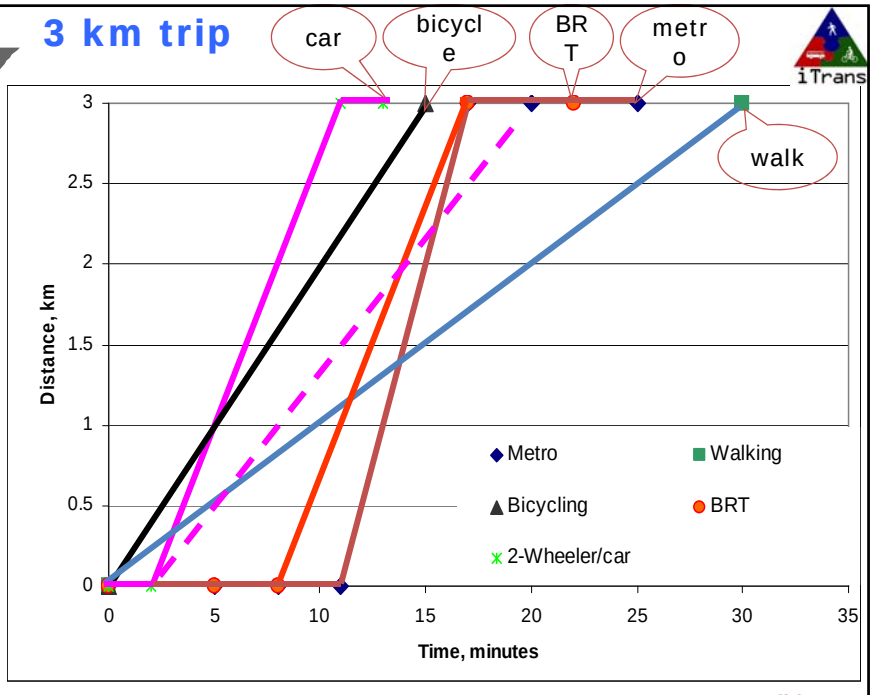
IIT Delhi 2006

TRIP LENGTH DISTRIBUTION IN OUR CITIES

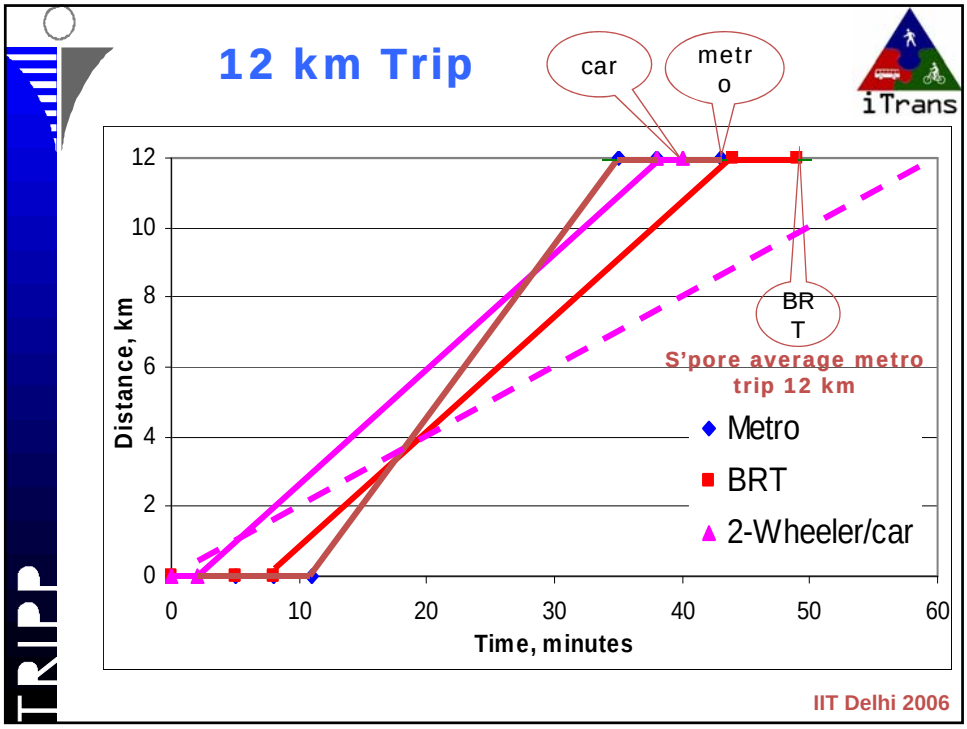


85% trips are less than 10 km long

3 km trip



IIT Delhi 2006



Bus systems--Network connectivity

- O-D are connected by direct service
- Some routes go off the arterials near the destinations
- Bus stop spacing 500 m providing short access trips

But they are stuck in the jams along with cars

TRIPP

How do you reduce door to door journey time?

- Reduce Waiting time~ increase frequencies
- Door to door travel that is faster than driving~ increase direct service and express service

Pedestrian connectivity

Why BRT?

- Improves flow of all modes—PT, NMV, Pedestrians and *even Cars*
- Serves as a high capacity mass transit corridor
- Complements Metro, if it exists
- Promotes Transit Oriented Development

16

BRTS

Bus Rapid Transit is high-quality, customer-orientated transit that delivers fast, comfortable and low-cost urban mobility.

Segregated busways(20-35% increase in efficiency with new road designs, existing fleet)

Comfortable shelters and stations Rapid boarding and alighting(vehicles and bus stops)(15% increase eff.)

Efficient fare collection

Modal integration

IT based vehicles and operations(20%)

17

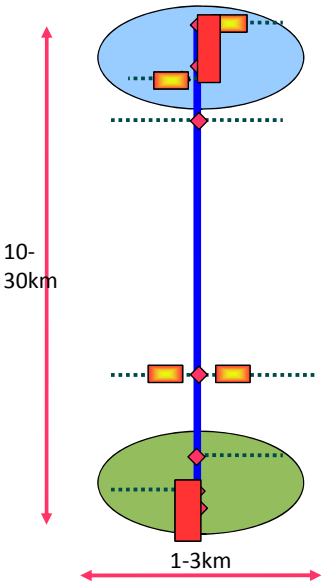
Closed or Trunk & Feeder System

PROS:

- Gives a brand image to public transport
- Ensures high service quality and reliability
- Allows ease of control and enforcement
- Fare structure and fare collection system is generally simpler and uniform.
- Simpler Junction design and signal plan. Can be managed in maximum of 4-5 phases as turning buses is controlled

CONS

- Heavy dependence on feeder infrastructure
- Transfers are increased, increasing journey time
- Suitable for cities with majority trips are more than 10km ~
- Not suitable for corridors with high segment demand variations.
- High quality feeder network is essential
- Restricts use by non BRT public transport modes
- Needs a new and independent institutional mechanism



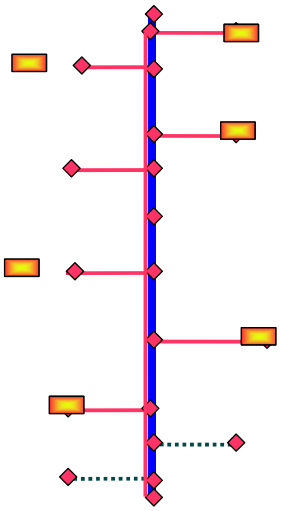
Open System

PROS:

- Increases the catchment area of buses
- Transfers are minimised, decreasing journey time.
- Does not need separate feeder network
- Suitable for cities where majority trips are less than ~10 km.
- Works well in corridors with high segmental demand variations
- Extends segregated lane benefits to all public transport and high occupancy modes on the corridor.
- Can work within the existing institutional and regulatory framework using the existing operators.

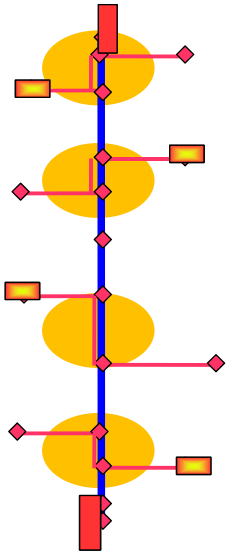
CONS:

- Predictability and reliability of public transport is decreased because the buses have to move in mixed conditions
- Difficult to regulate and control
- Has generally complex fare structure and fare collection system
- Signal cycle design required more phases as turning is allowed for buses. A minimum of 6 phase signal cycle is required.



Hybrid System

- **HYBRID SYSTEM – Combines benefits of Open and Closed System**
- In the same corridor a route is reserved only to ply on the corridor. Other buses move in and out of the corridor and this will be city bus service
- Minimum standard/frequency is met by BRTS operations, higher segmental demands are met by city buses.
- Provides reliability and high service quality as well brand image along with flexibility and convenience.
- Fare collection and control within corridor may be simplified by providing closed shelters with off-board ticketing



Bus stops

Bus Stop – Delhi BRT

Bus Stop – Ahmedabad BRT

Seating and tactile on BRT Bus shelters Delhi

NMV Tracks

- Raised crossing established cyclist and pedestrian priority at un-signalized junctions
- Textured ramps for vehicles – different surface treatment at crossing

Hawker Spaces and Landscaping

•Hawker spaces defined by benches and bollards located outside pedestrian path and cycle track

Impacts

Short Term

- Bus speed 20km/h, car 12-15 km/h
- Urban rejuvenation – landscaping and beautification of complete corridor benefiting all residents
- Whole corridor made accessible to disabled people as required by law
- Zero Fatal Accidents involving buses January 2009-January 2010

IIT Delhi 2003

Impacts

LongTerm

- Increase in PT users because Bus speed 20km/h, car 12-15 km/h
- Increase in pedestrian and bicycle trips because of safe network
- Reduction in vehicular emissions because of smoother driving cycle

Reduction in GHGs because of high share of low carbon modes of transport

IIT Delhi 2003

Concerns about BRT

- Do we have enough road space?
- Negative impression on bus systems
- Do we really need NMV infrastructure?
- What happens to the car users?
- Inter departmental co-ordination

Innovative Approach to BRT Corridor Selection: Mixing with General Traffic over Short Sections

Quito

Beijing

Quito

Bogota

TRIPP

Thank You

Bus Rapid Transit
Ahmedabad & Guangzhou

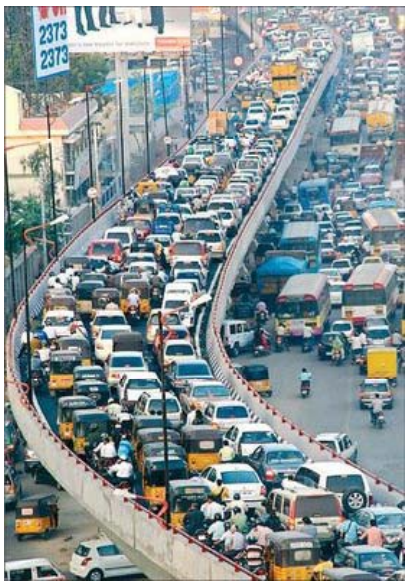
A new paradigm in urban mobility

Shreya Gadepalli
Senior Program Director (India)

ITDP
Institute for Transportation & Development Policy

Traffic Jams are unavoidable

It does not matter what is done, expanding roads or building flyover, traffic jams will become worse;
...unless a radically new model is adopted.



The only solution is Public Transport

Not just for those with lower incomes, but for everybody.

What is Bus Rapid Transit (BRT)?

Bus Rapid Transit is *high-quality, customer-orientated transit* that delivers *fast, comfortable and low-cost urban mobility.*

It is not business as usual.

"Think rail, use buses!"

Bus Rapid Transit can give the same quality of service as Metro to a large number of citizens across the city at relatively low cost.

Our cities require a few hundred kilometers of Mass Rapid Transit. BRT can serve the purpose.

Why create BRT?

Transmilenio BRT in Bogota carries more passengers than 7 lanes of private motorcar traffic at thrice the speed

With growing traffic congestions, public transit service will deteriorate.

BRT provides rapid, high quality service like metro rail connecting large parts of the city at low cost.

BRT is quick to construct and easy to expand or modify quickly based on passenger demand.

Implementation of BRT

Business as usual

What gets done

- Physical infrastructure

What may get done

- Procurement of high quality buses
- Procurement of partial IT systems (not integration)

What gets missed out

- Institutional Structure & Regulatory Mechanism
- System Optimization
- Institutional Capacity Building
- Leveraging Private Resources - Efficiency for public good

State owned operations

- Regulator and operator are the same
- Often, poor capacity in planning as well as operations
- Monetary leakages in operations & maintenance
- High operating cost and poor service quality

- Top management's energy wasted in fire fighting
- No incentive to improve operations since government bails out of debt

Eventual collapse because of no fresh investment

A New Paradigm

Provide high quality public transit to citizens

...not the ability to maintain and operate buses well

Focus on core objectives

- Understand the needs of passengers.
- Plan system to optimize resources.

Outsource all mundane tasks

- Bus operations and maintenance
- Fare collection

Monitor that those tasks are performed well

Janmarg BRTS

System

Janmarg BRTS was conceptualized as high quality public transit system, not bus operations improvement. Operations planning & scheduling, appropriate infrastructure, ITS systems, Electronic fare collection

Passenger studies

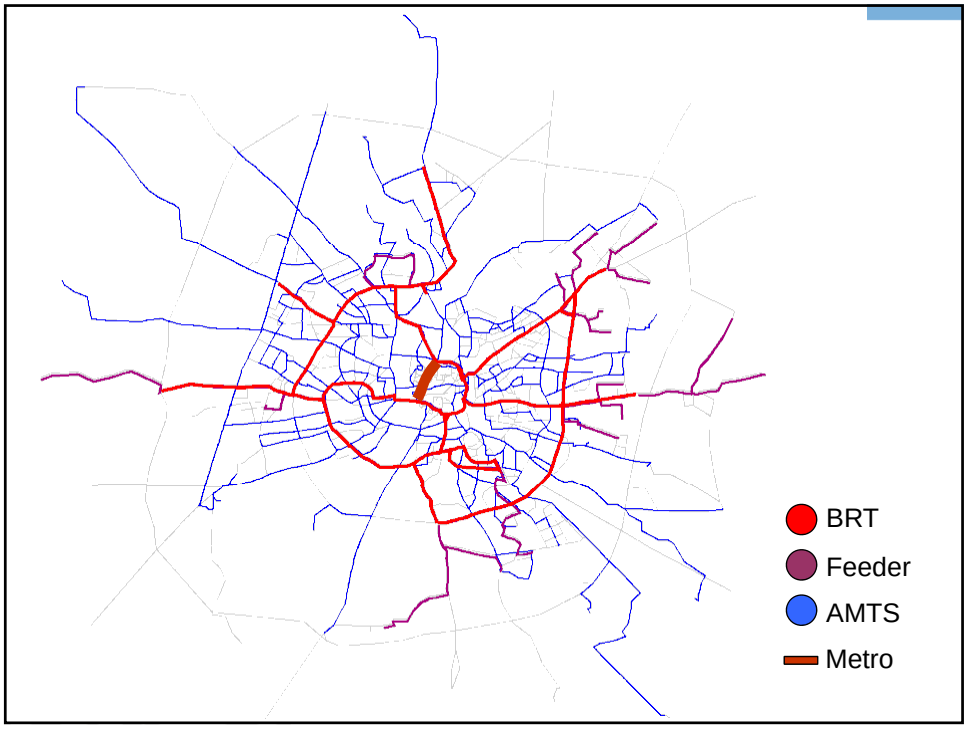
Extensive passenger studies were done to assess existing demand and future growth patterns. A comprehensive model was created to test future scenario. Ongoing system optimization from ridership data.

Network

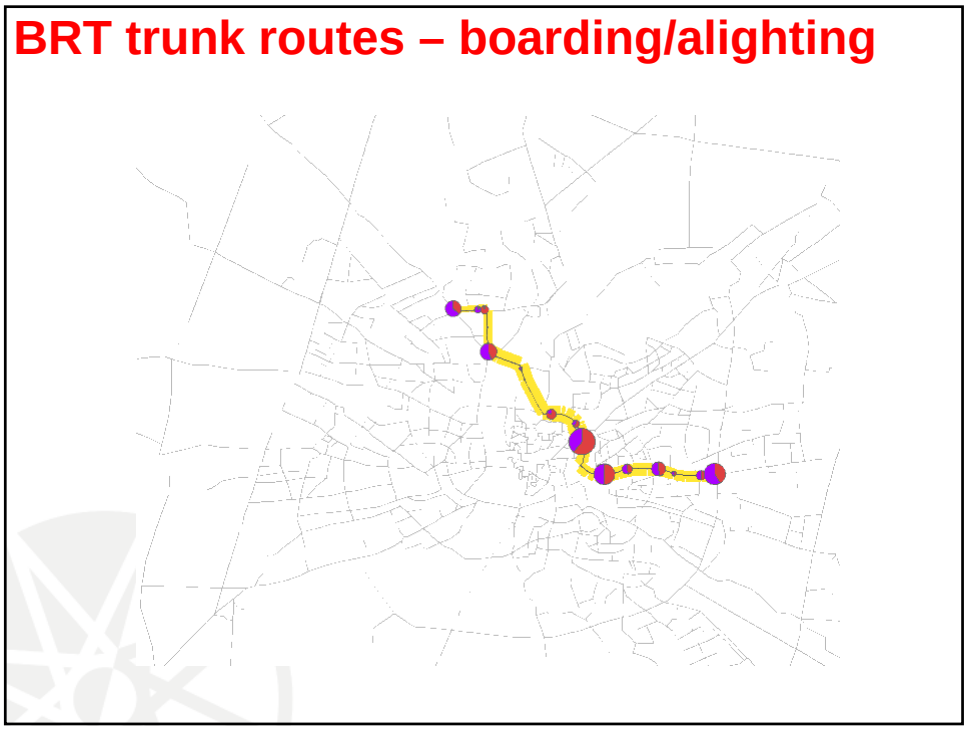
A large integrated network has been created based on passenger studies, road infrastructure attributes, existing land use and future development plans.

Ownership

Primary ownership of Ahmedabad Municipal Corporation. Government of Gujarat, AUDA and Police have provided full support to the initiative. Support was sought and gotten from various stakeholders like media, influence groups



BRT trunk routes – boarding/alighting



1. Dedicated central bus lanes

High speed

With no interruptions from other vehicles, buses move at high speed. Large number of buses can move at high speed.

BRT systems manage up to 45000 passengers per hour in one direction at over 25kmph

High safety and low conflict

Central lanes are essential since they reduce conflict with slow moving vehicles, turning vehicles and parked vehicles. Drivers fatigue reduces and productivity increases.

2. Special buses and stations

Specially designed stations

Bi-directional median stations

Adequately sized

Comfortable & safe

Special buses

High level right side door

Air-conditioned

Articulated for high capacity

Easy boarding & alighting

Elderly, Women & Children

People with special needs

3. Efficient fare collection

Higher system speed

Removing ticketing activity from inside bus and managing fare collection at stations allows bus to move at higher speed

Convenience for passengers

especially when integrated with other transit modes (single fare media)

Prevents monetary leakage

Point of money collection and fare validation are different. Fewer places of money transaction

Automated ridership data

This data can be used for ongoing route rationalization

4. Reliable on-time service

Real-time fleet management

With use of GPS-GPRS modules on bus and information analysis at control center, buses can be controlled

Real-time information

Passengers can get accurate information on routes and arrival through electronic means

5. Hybrid BRT – best of both worlds

Both side entry buses

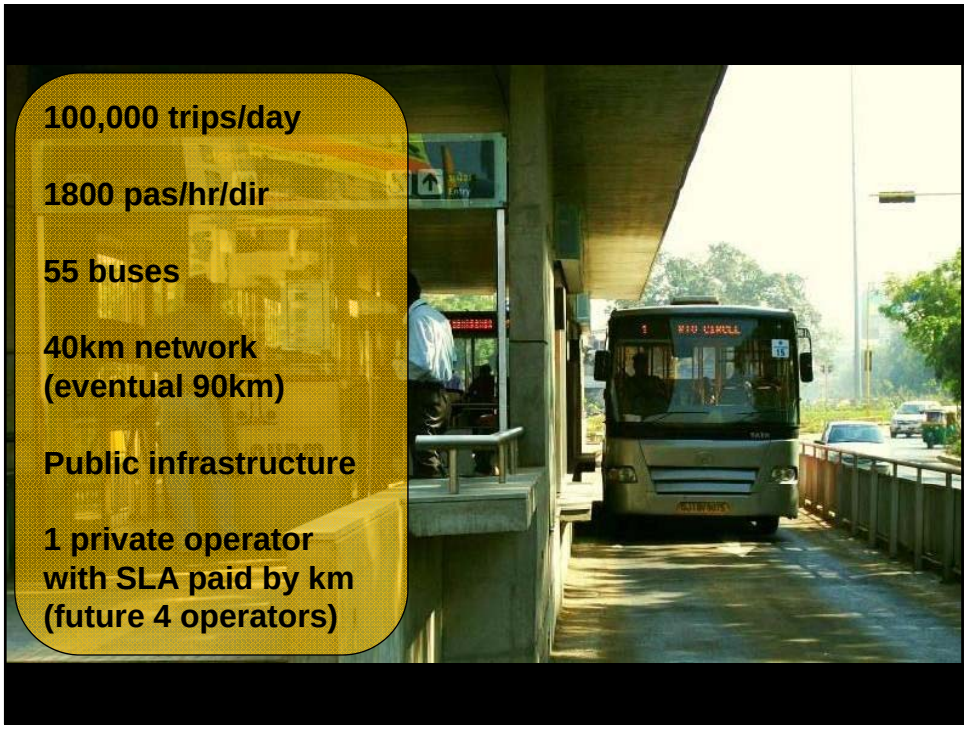
Like Metro rail coaches, BRT buses with both side doors are useful for flexible operations inside and outside dedicated corridor network.

Right side for step-less boarding at BRT stations

Left side for boarding outside on regular streets where BRT operations extend to provide close to doorstep services

BRT station side entry from right side door

Outside corridor entry from left side door



Janmarg BRT cost and operators

Infrastructure cost around $2 million per kilometre (not including buses). Rs 1000 cr for 90km.

Buses procured, maintained and operated by private operators. Fare box collection is more than payment to operator at present.

Regulatory authority controls the bus frequency, with payment per bus-kilometre, not per passenger. Payment is also adjusted according to service levels

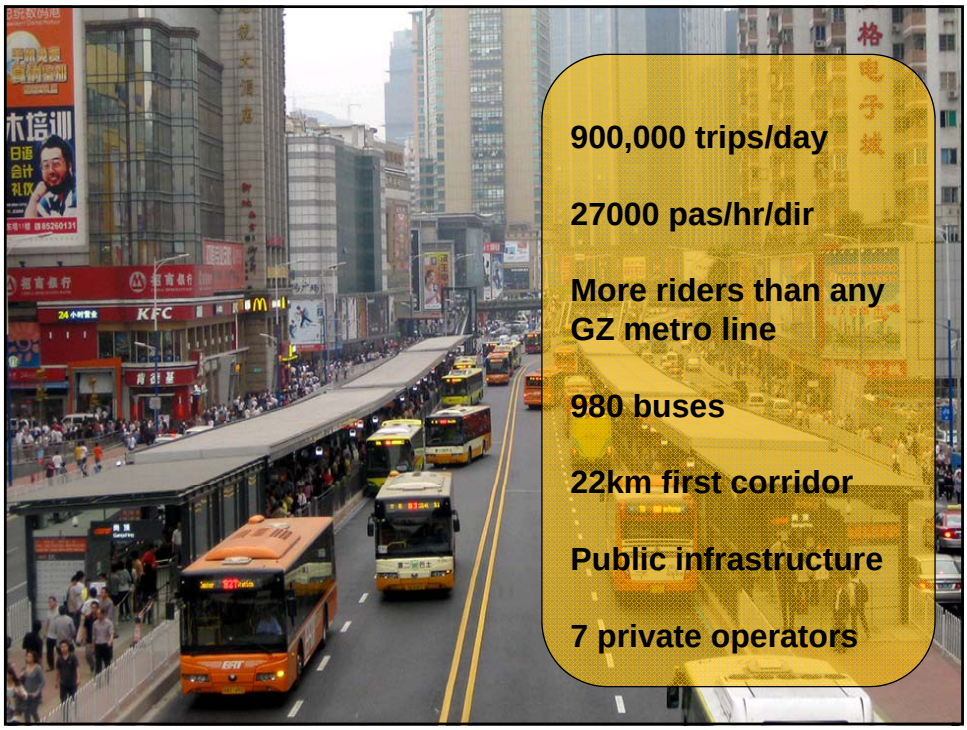
Operational efficiency
(Ahmedabad BRT)

	AMTS	BRTS	% incr.
Passenger trips/day/bus	850 passengers	1800 passengers	**110%**
Average Bus Speed	18.1 km/hr	24 km/hr (BRT)	**30%**
Kilometers/day/ bus	190km	240km	**25%**
Average occupancy (load) / bus	24 passengers	42 passengers	**75%**
Income per bus km	17 rupees	38 rupees	**125%**

High capacity BRT planning, implementation & operation:

Case study of the Guangzhou BRT

A typical scene at Gangding BRT station before the BRT implementation.



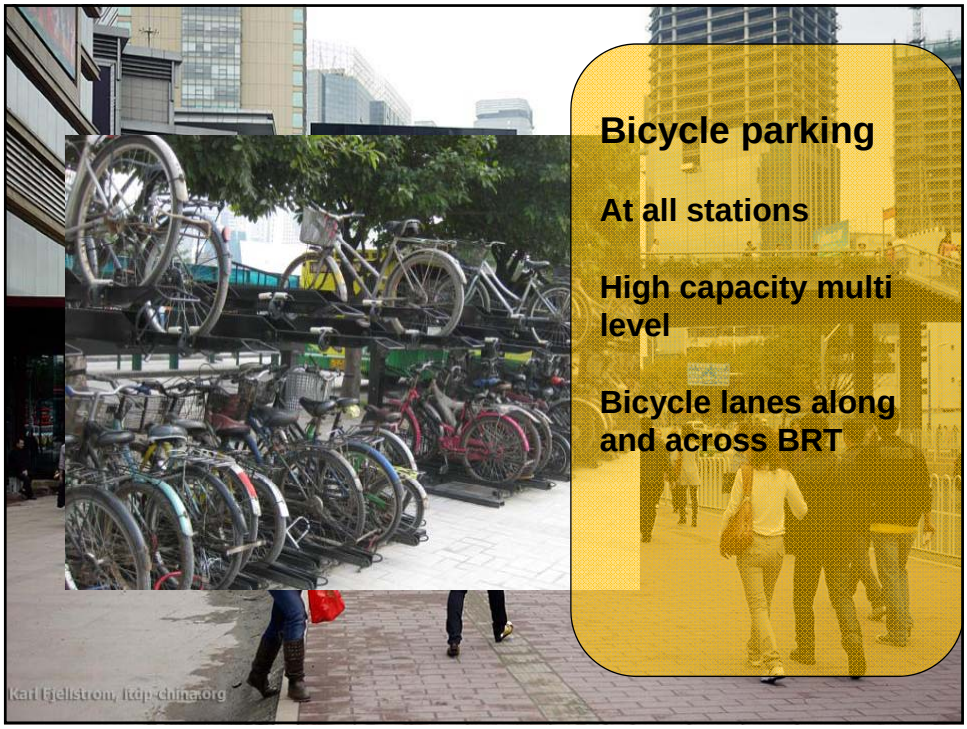
GZ BRT cost and operators

Infrastructure cost around $5 million per kilometre (not including buses)

7 bus operating companies in 3 corporate groups. All companies have representatives at the BRT control centre

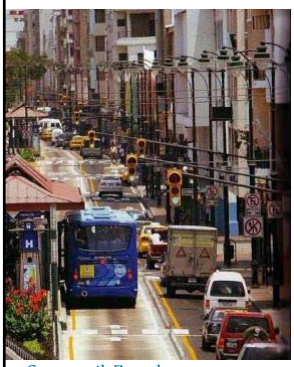
Regulatory authority controls the bus frequency, with payment per bus-kilometre, not per passenger. Payment is also adjusted according to service levels

Modal integration METRO-BRT



Dongpu BRT station. At-grade station access at both ends

Does BRT require large streets? - **NO**


Guayaquil, Ecuador

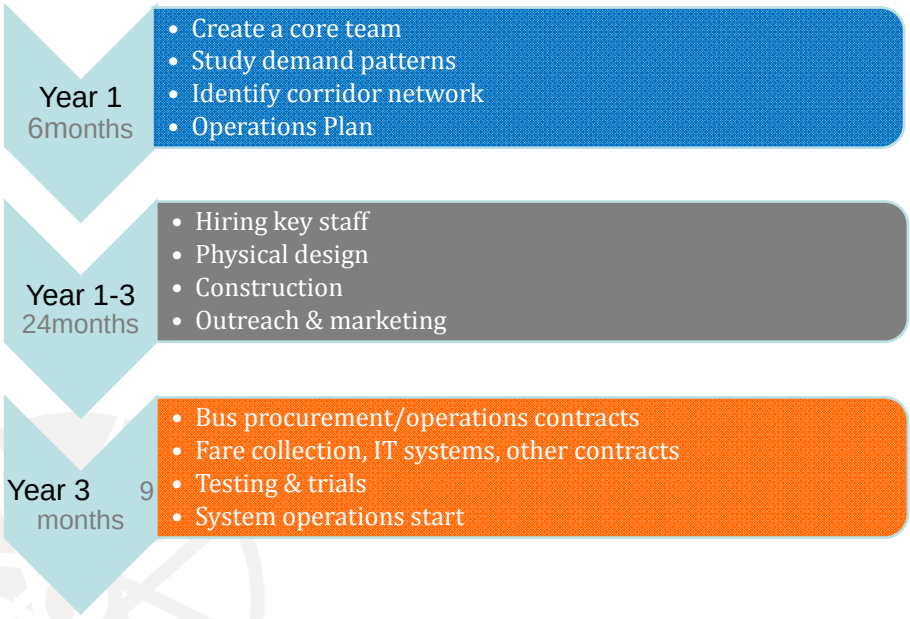

Ahmedabad, India


Quito, Ecuador

Solutions exist to make BRT in streets as small as 50ft/15m.
Examples of such systems exist in Colombia, Ecuador, Mexico etc.

BRT is about giving priority to mobility, not private motor vehicles.

Process of BRT implementation



The entire process of implementation can be done in 2-3 years.

Adequate time for initial planning and design can save time in construction and implementation

Process of BRT implementation

Year 1 6months

- Create a core team (this team drives the planning process)
- Study demand patterns (consultant with support from advisors)
- Identify corridor network (decision maker with support from advisor)
- Operations Plan (Firm up system definition & key specifications)

Year 1-3 24months

- Hiring key staff (Essential that staff be involved in system)
- Physical design (Design will be based on operations plan)
- Construction (Roadway, Stations/Terminals, Pedestrian access)
- Outreach & marketing (System success depends on public acceptance)

Year 3 9 months

- Bus procurement/operations contracts (Performance based contract)
- Fare collection, IT systems, other contracts (Secure systems)
- Testing & trials (Give time for people to experience and fix problems)
- System operations start (Open for commercial operations)

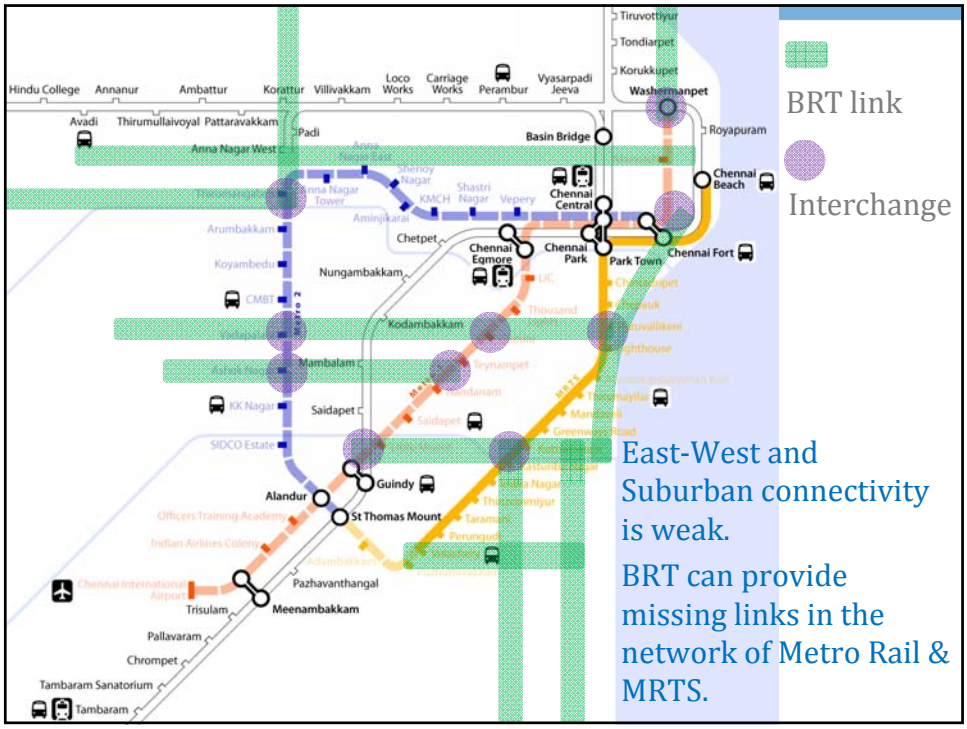
Key learning

Clear political vision

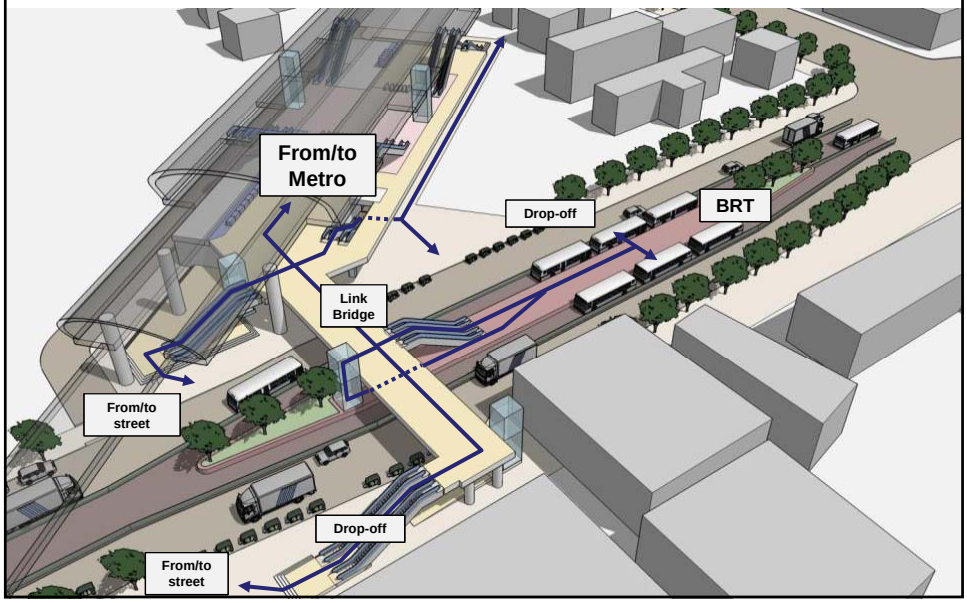
Coherent public administration

Good planning and project management

Transparent engagement of private partners



Modal integration METRO-BRT



What BRT is and is not?

BRT is a new way of delivering service to citizens so it becomes a mode of choice, not mode of compulsion. It should be developed as a full system.

BRT is NOT a checklist of

- ~~Making dedicated bus lanes~~
- ~~Procuring low-floor buses~~
- ~~Putting IT modules on buses~~
- ~~Marginal improvement to existing bus transport.~~

ITDP
Institute for Transportation & Development Policy

Institute for Transportation and Development Policy
is an international not-for-profit organization that is a leader in promoting environmentally sustainable and socially equitable transportation worldwide.

www.itdp.org
www.ourcitiesourselves.org
www.twitter.com/#!/itdpindia

For further information please contact
india@itdp.org

ITDP key program areas are

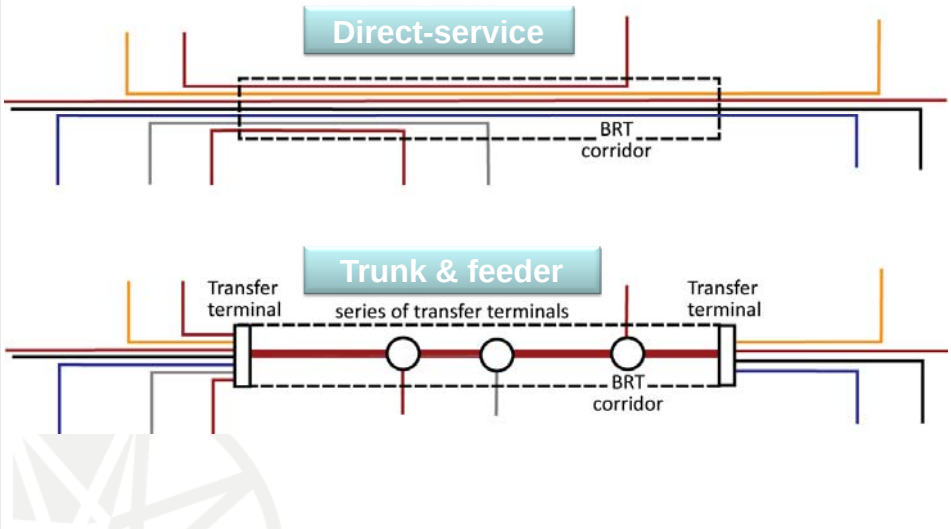
Public transit:
Investing in modern, attractive public transit systems, specifically bus rapid transit, to provide a higher quality of life in cities

Non-Motorized Transport:
Making streets safer and more convenient for cyclists and pedestrians, improving the quality of affordable non-motorized vehicles, and promoting bike use

Travel Demand Management:
Reducing air pollution, congestion, and CO2 emissions by reducing private car use through parking regulations, access management, and road user charging

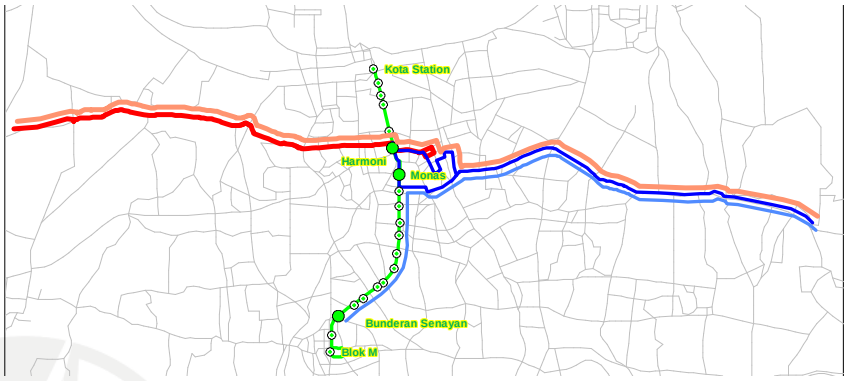
Urban Accessibility:
Reinforcing urban centers by encouraging pedestrian-oriented real estate development, urban design, and public space management

Sustainable Transportation Investment:
Ensuring necessary funding is available for sustainable transport projects and support the formation of effective governance framework.



Trunk & feeder vs direct-service operations. The Guangzhou BRT does not require any transfer terminals or interchanges

Flexible operations



Not restricted to corridors

BRT routes can be combination of multiple corridors, providing passengers direct services rather than having to transfer at terminals

IMPROVING MASS MOBILITY THROUGH BUS TRANSIT

BY
R.BALASUBRAMANIAN
DIRECTOR
CENTRAL INSTITUTE OF ROAD TRANSPORT,PUNE

POPULATION VS BUSES

	CHENNAI	BANGALORE	DELHI	MUMBAI
POPULATION (in Millions)	*CITY - 5 CMA - 7.5 to 10*	*5.48*	*18*	*21*
BUSES	*3421*	*6122*	*3106*	*3380*
PASSENGERS/DAY (in Millions)	*5.529*	*4.3*	*2.2*	*4.5*
COLLECTIONS/DAY (in Million Rupees)	*20.533*	*34*	*-*	*25*

STATUS OF MTC IN 2006

- *Fleet - 2350.*
- *Break down – 400 buses / day.*
- *Collection – 90 lakhs/day.*
- *> 8 yr old buses – 80%.*

STRATEGIES ADOPTED TO IMPROVE BUSES IN 2006

- *Replacement of 1000buses/yr thro' Govt. subsidy.*
- *Introduction of semi deluxe, vestibule buses and A/C buses.*
- *Differential fare for ordinary, semi deluxe and A/C buses.*
- *Collection per day 160 lakhs.*
- *Increase in operational area.*
- *Direct connectivity to industrial towns.*

KEY ISSUES IN BUS TRANSPORT

- *The compulsion to provide low fares as a social obligation results in poor financial status of the STUS.*
- *The huge accumulated losses has prevented timely replacement of Buses.*
- *The reliability of bus service was at stake due to frequent breakdown of buses.*
- *Lack of support from financial institutions.*

KEY ISSUES IN BUS TRANSPORT

- *Provision of free bus passes to weaker section of the society, students etc.*
- *Inadequate professional management.*
- *Increase traffic congestion in lower productivity of buses.*
- *Inadequate involvement of the workers and labour union.*

ROLE OF GOVT. OF INDIA

- ***Responsibility of management of urban transport vest with state government.***
- ***The Road transport corporation Act 1950 provides equity participation to the road transport corporations by the government of India. however after initial contribution there is no financial support by government of India.***
- ***The public transport system in countries like U.S.A, Europe, China, Japan and other developed countries the grants from federal government is substantial along with tax revenue.***

ROLE OF GOVT OF INDIA

- The launching of JNNURM by urban ministry of government of India to support replacement of old buses, improvement in Bus stations, BRTS system is a milestone in the history of urban transport. in India.
- The tax structure is not uniform for the public transport buses and in some states higher tax is levied on buses.
- The need for a Regulatory Authority is a long time demand from the state transport undertakings for fixation of uniform fare commensurate with the cost of operation.

ROLE OF GOVT OF INDIA

- ***The need for various types of services like ordinary, deluxe, air conditioned buses etc shall be introduced in all the cities with differential fare.***
- ***The use of four wheelers and two wheelers shall be discouraged by higher taxation and other measures.***

Los Angels Metropolitan Transport

Funding		***US $million***
• *Fare revenue*	-	*264*
• *Federal grant*	-	*547*
• *State grants*	-	*472*
• *Interest*	-	*179*
• *Other revenue*	-	*123*
• *Sales tax*	-	*1278*
TOTAL	-	*2863*

National Urban Transport Policy

- *Urban population will increase from 30% to 60% of the total population.*

- *From 1981 to 2001,*

  Population increase-1.9times

  Vehicle increase-7.75 times.

  Fatal accidents- 25400 to 80,000.

  Accident Rate- 1.6 to3.9 lakhs.

BRTS

- *Mexico*
- *Sao Paulo*
- *Bogotá*
- *Santiago*
- *Lima*
- *Beijing*
- *Taipei*
- *Hanoi*

INDIAN CITIES

- *Delhi*
- *Pune*
- *Ahemedabad*
- *Rajgot*
- *Surat*
- *Indore*
- *Vijayawada*
- *Vizakapattinam*

INTELLIGENT TRANSPORT SYSTEM

- *The Ministry of road transport and highways has allocated Rs 75 crores to improve the ITS in STUS .*
- *The JNNURM Bus specification has stipulated LED display, use of hand held electronic ticketing machines, Low floor buses.*
- *Introduction of unique Smart card in all modes of transport.*

CONCLUSION

- *Public transport should be given priority over personal mode of transport.*
- *Adequate grants shall be given by state and central govt.*
- *Tax concessions by state and central Govt.*
- *Formation of regulatory authority.*
- *Participation by corporate private sector in public transport.*

THANK YOU