Bus Rapid Transit Systems

Experience from India

Future Perspectives

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Delhi

Prof. Shivanand Swamy
Executive Director
Centre of Excellence in Urban Transport, CEPT University

Structure of the presentation

- BRTS
  - Worldwide
  - India
- India initiatives
  - NUTP
  - JnNURM
- India issues
- Future perspectives

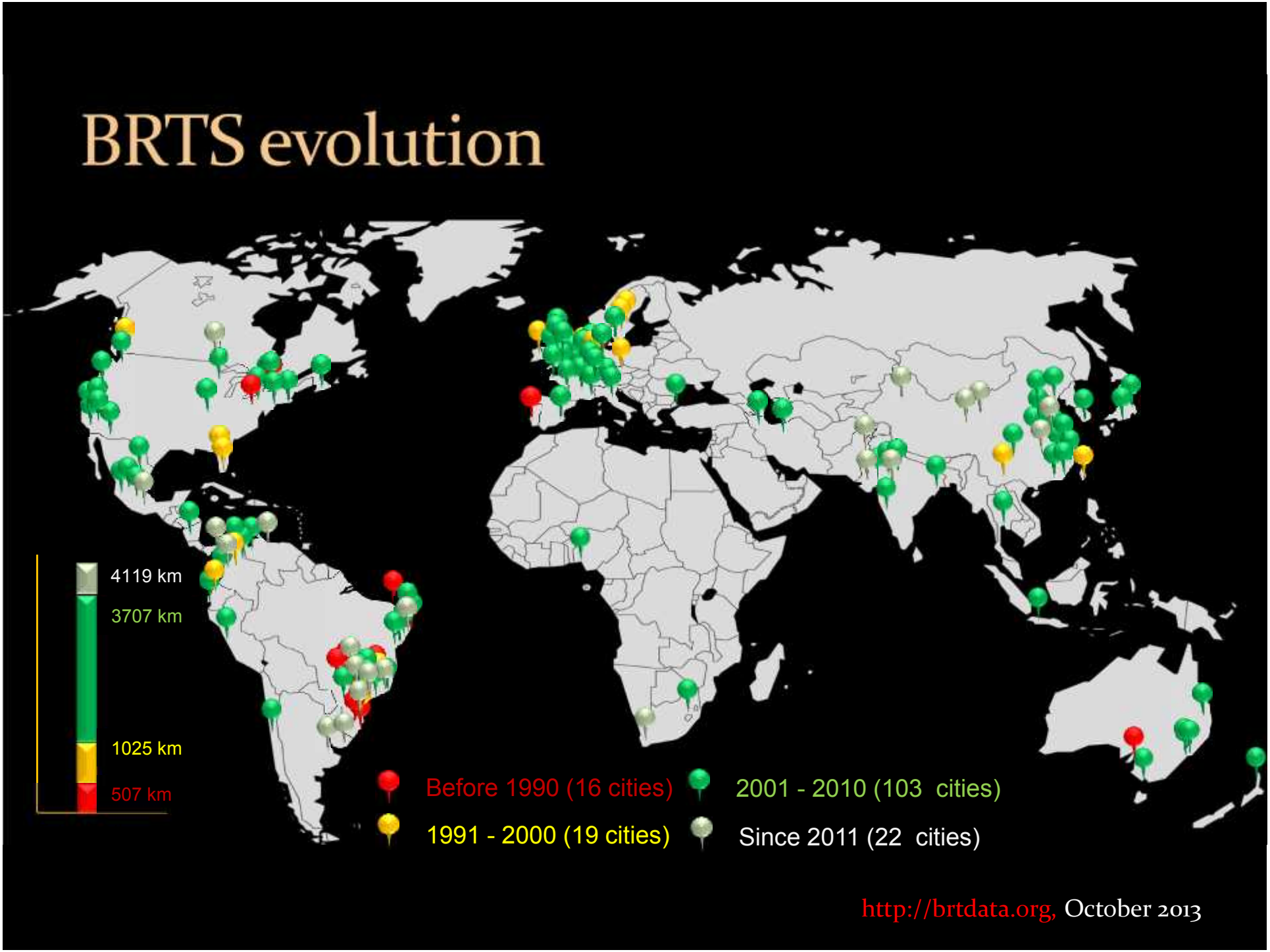
BRTS

Worldwide

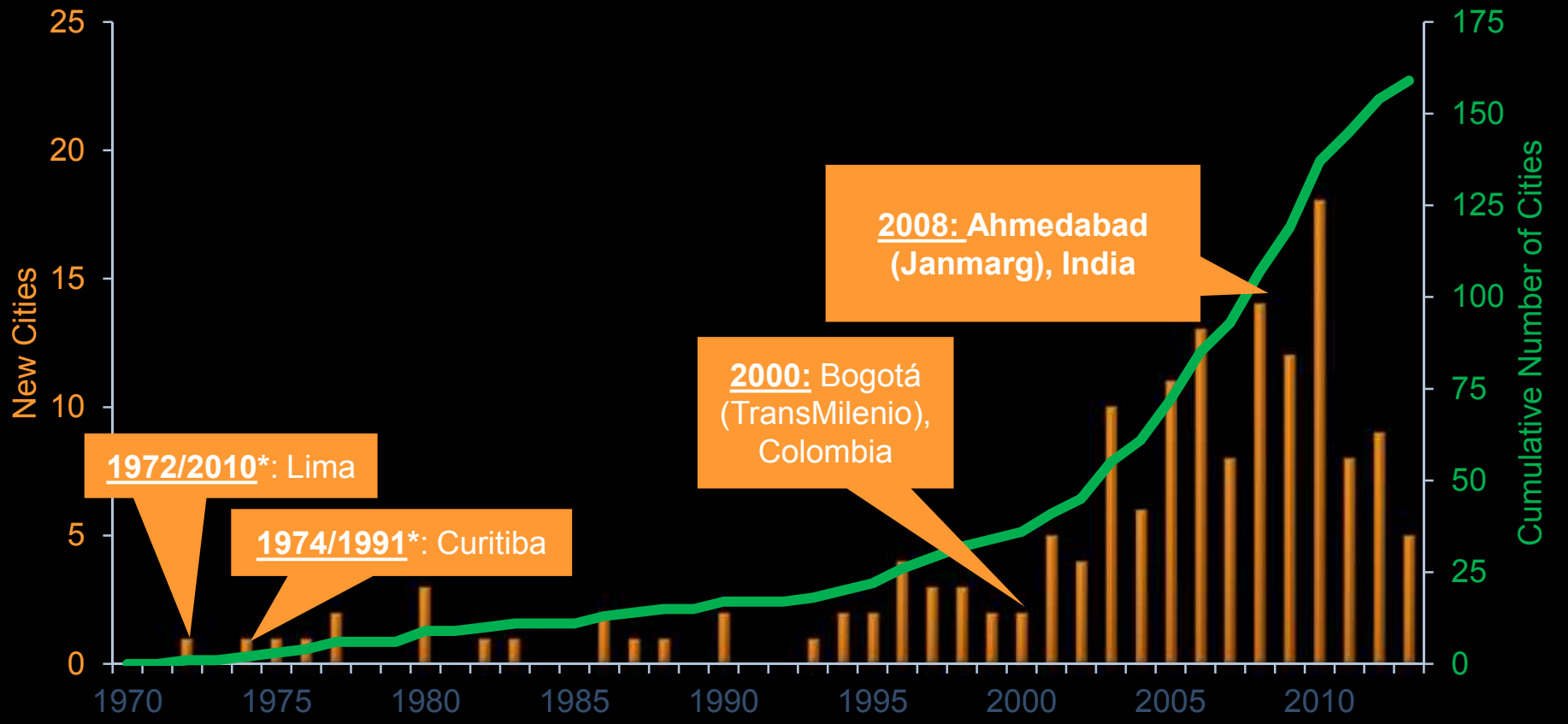
BRTS status today

Region	Number of cities	%	Passengers per day	%	Total length in km	%
Africa	3	1.92	238,000	1	62	1.53
Asia	30	19.23	6,275,622	24.5	1037	25.69
Europe	43	27.56	1,656,966	6.46	688	17.04
Latin America	53	33.97	16,326,783	63.66	1347	33.37
North America	20	12.82	819,685	3.19	576	14.27
Oceania	7	4.48	327,074	1.27	326	8.07
World	156	100	25,644,130	100	4036	100

http://brtdata.org, October 2013

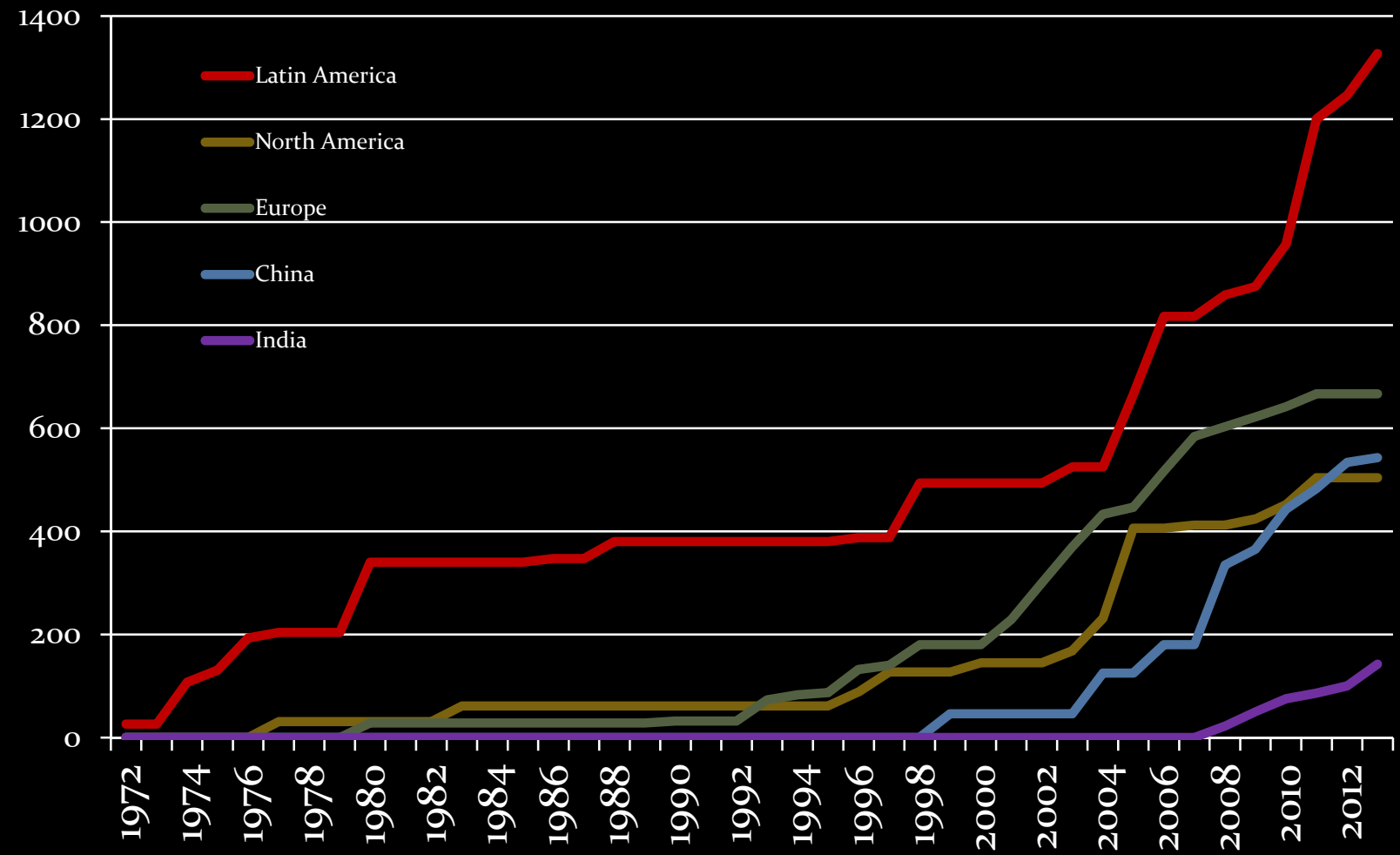

BRTS evolution
4119 km
3707 km
1025 km
507 km
Before 1990 (16 cities)
1991 - 2000 (19 cities)
2001 - 2010 (103 cities)
Since 2011 (22 cities)
http://brtdata.org, October 2013

BRTS evolution



http://brtdata.org, October 2013

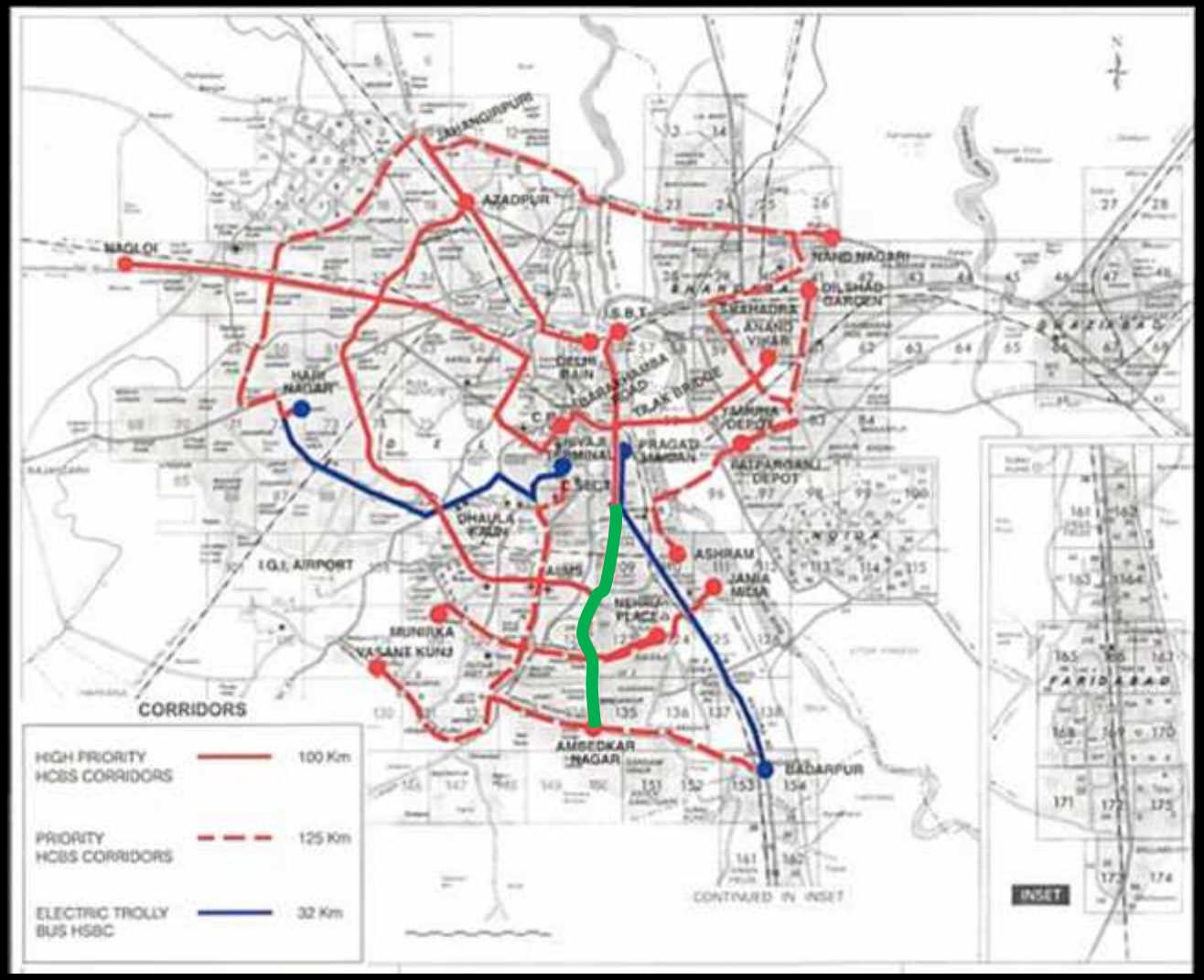
BRTS growth across regions/ countries



BRTS

India

Where did it begin?



Delhi

Proposed network of 257 km

City wide coverage

Designed as open system

5.5 km operational in 2008

No addition to network since

Map courtesy: TRIPP, IIT Delhi

Where did it begin?

- In 2004, the Gujarat government initiated a feasibility study for BRTS in Ahmedabad
- In 2005, CEPT University's feasibility study recommended BRTS in Ahmedabad
- In 2005 and 2006, two initiatives by the Central Government gave an impetus to BRTS
  - The Jawaharlal Nehru National Urban Renewal Mission (JnNURM) in 2005
  - The National Urban Transport Policy (NUTP) in 2006

The JnNURM, 2005

- Main focus on efficiency of urban infrastructure and service delivery mechanisms
- Identified requirement of 28 billion USD investment in urban infrastructure in 63 cities
- Urban infrastructure projects include water supply and sanitation, sewerage, solid waste management, road network and urban transport

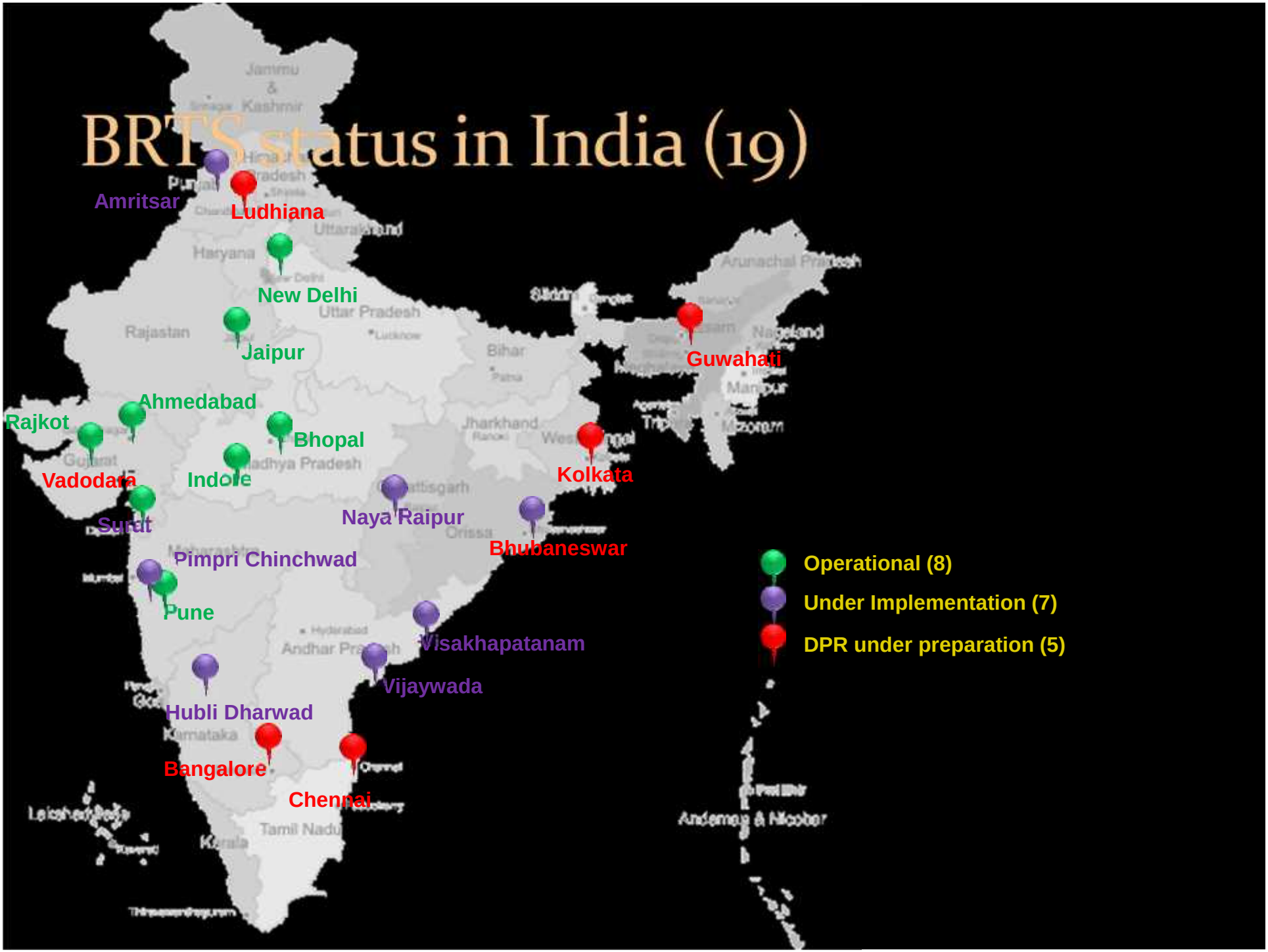
The NUTP, 2006

Overarching objective:

- Safe, reliable, affordable, quick, comfortable, reliable and sustainable access

Key Objectives

- To incorporate urban transport as an important parameter in urban planning
- To bring about more equitable allocation of road space with people rather than vehicles as the main focus
- To encourage greater use of public transport and non-motorized modes of transport


BRTS status in India (19)
Amritsar
Ludhiana
New Delhi
Jaipur
Guwahati
Ahmedabad
Rajkot
Bhopal
Vadodara
Indore
Kolkata
Surat
Naya Raipur
Bhubaneswar
Pimpri Chinchwad
Pune
Visakhapatanam
Vijaywada
Hubli Dharwad
Bangalore
Chennai
Operational (8)
Under Implementation (7)
DPR under preparation (5)

Summary of India BRTS

City	Length km	Sanction date	Amount in Rs crore	Progress	Operational km
Indore	11.65	Aug 2006	98.45	complete	11.65
Bhopal	42.19	Nov 2006	247.12	85%	23
Pune	115.67	Aug 2006, Oct 2006 Mar 2007 Aug 2008	1050.46	95%	17
Pimpri Chinchwad	41.28	Dec 2007 Nov 2008 Nov 2008	738.16	70%	0
Ahmedabad	88.5	Aug 2006 Oct 2006 Aug 2008	981.45	90%	82
Surat	29.9	Mar 2008	469.02	55%	11

Summary of India BRTS

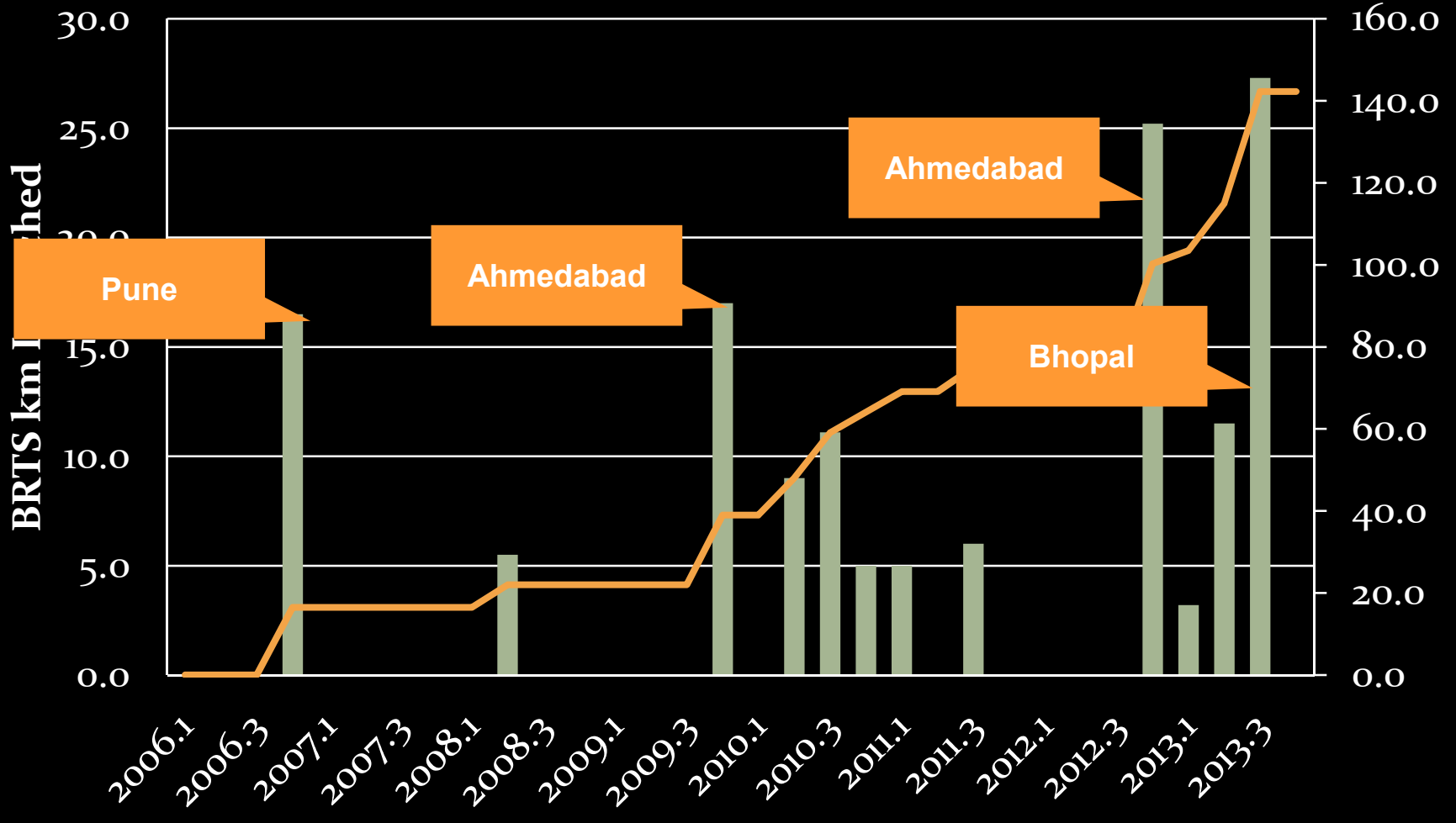
City	Length km	Sanction date	Amount in Rs crore	Progress	Operational km
Rajkot	10.7	Jul 2007	110	complete	10.7
Vijaywada	15.18	Mar 2007	151	70%	0
Vishakhapatnam	45.2	May 2007	452.93	75%	0
Jaipur	39.45	Jul 2007 Dec 2007 Nov 2009	479.54	NA	7
Amritsar	30	2013	459	NA	0
Delhi*	257				5.6
Hubli Dharwad	22.25		452	40	0
Naya Raipur	42.5		1791.93	NA	0
Total	**534.47**				**157**

* Delhi's network has not been added

BRTS in India

- A total of 534.47 km BRTS network has been sanctioned in India, most of it under JnNURM, since August 2006
- A total of 157 km of BRTS is operational in 2013, half of which is in Ahmedabad
- The first projects to be sanctioned were in Aug 2006 (Indore, Pune and Ahmedabad) and the last in 2013 (Amritsar)

BRTS in India – Growth in network



Ridership in BRTS

City	Operations	Population	Km operational	Daily ridership
Ahmedabad	2009	5,726,000	82	150,000
Pune	2008	5,010,000	17	96,750
Bhopal	2013	1,843,000	24	70,000
New Delhi	2008	17,015,000	5	53,500
Indore	2013		11	22,200
Rajkot	2009		11	7,500
Jaipur	2010	3,136,000	7	6,622
Surat	2013	4,500,000	11	8,000
Total			157	396,572

India BRTS

Issues

What are the issues?

- Except Ahmedabad, no other city has increased network after initial operations

- PILs were filed against Delhi, Indore and Ahmedabad systems
  - In Delhi, the High Court (HC) initially allowed cars to use bus lanes and asked CRRI to evaluate situation before and after. Finally, the HC ruled that only buses can be allowed inside
  - In Indore, the HC allowed cars to use bus lanes, leading to operations, management and safety issues
  - In Ahmedabad, the HC refused to admit the PIL, citing the prerogative of the AMC to take the final decision


Delhi BRTS after cars were allowed inside bus lanes

What are the issues?

- Structural
  - NUTP and JnNURM were central government initiatives
  - Urban transport is a state subject
  - Public Transport is not an obligatory function of ULB
- Policy and plan non-integration
  - There is no attempt to disincentivise private transport. On the contrary, cities are funding road projects (widening, flyovers) through internal budgets
  - A pre-condition to JnNURM funding was that cities implement parking policies. No city has a comprehensive parking policy
  - Development plans do not take into account specific needs of BRTS projects

What are the issues?

- Political
  - Very few leaders are ready to weather criticism
  - Rail based systems are considered more likely to please voters
  - Bus priority removes parking spaces
- Bus image
  - Deteriorated over last 40 years; very difficult to change
- Capacity
  - Lack of trained personnel to plan, design and implement as well as operate BRTS

What are the issues?

- Bus supply
  - Few bus manufacturers
  - Very high demand from cities, especially after bus funding scheme
  - Tax issues with bus procurement
  - Quality BRTS bus – It took AMC 5 long years to convince manufacturers to make quality buses
  - We still don't have an Articulated Bus manufactured in India

What are the issues?

We have made big strides in the last decade in building infrastructure

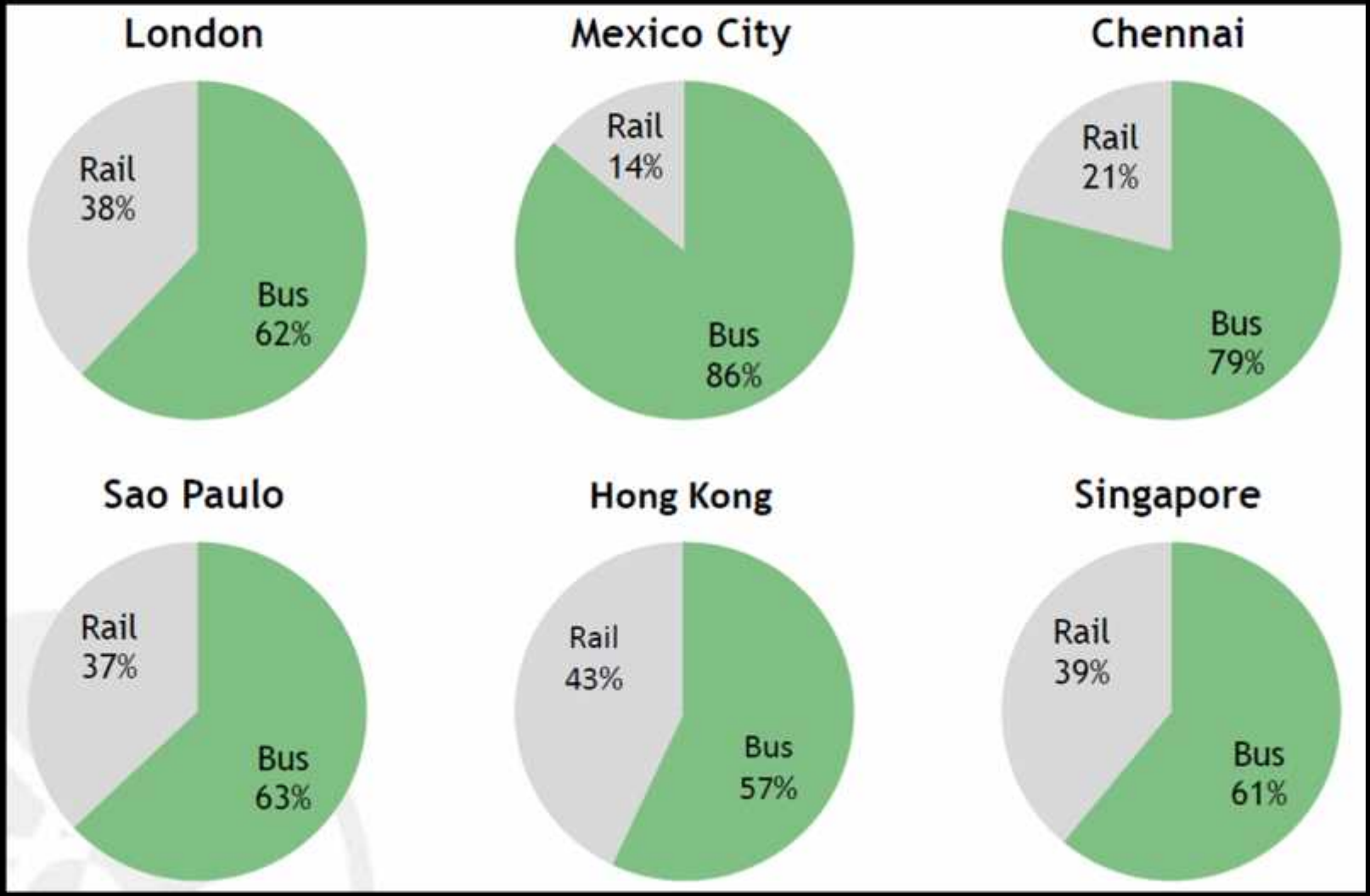
- However, maintenance is missing
  - Infrastructure is crumbling
  - There is no maintenance regime
  - Budget for maintenance is minimal

Future perspectives

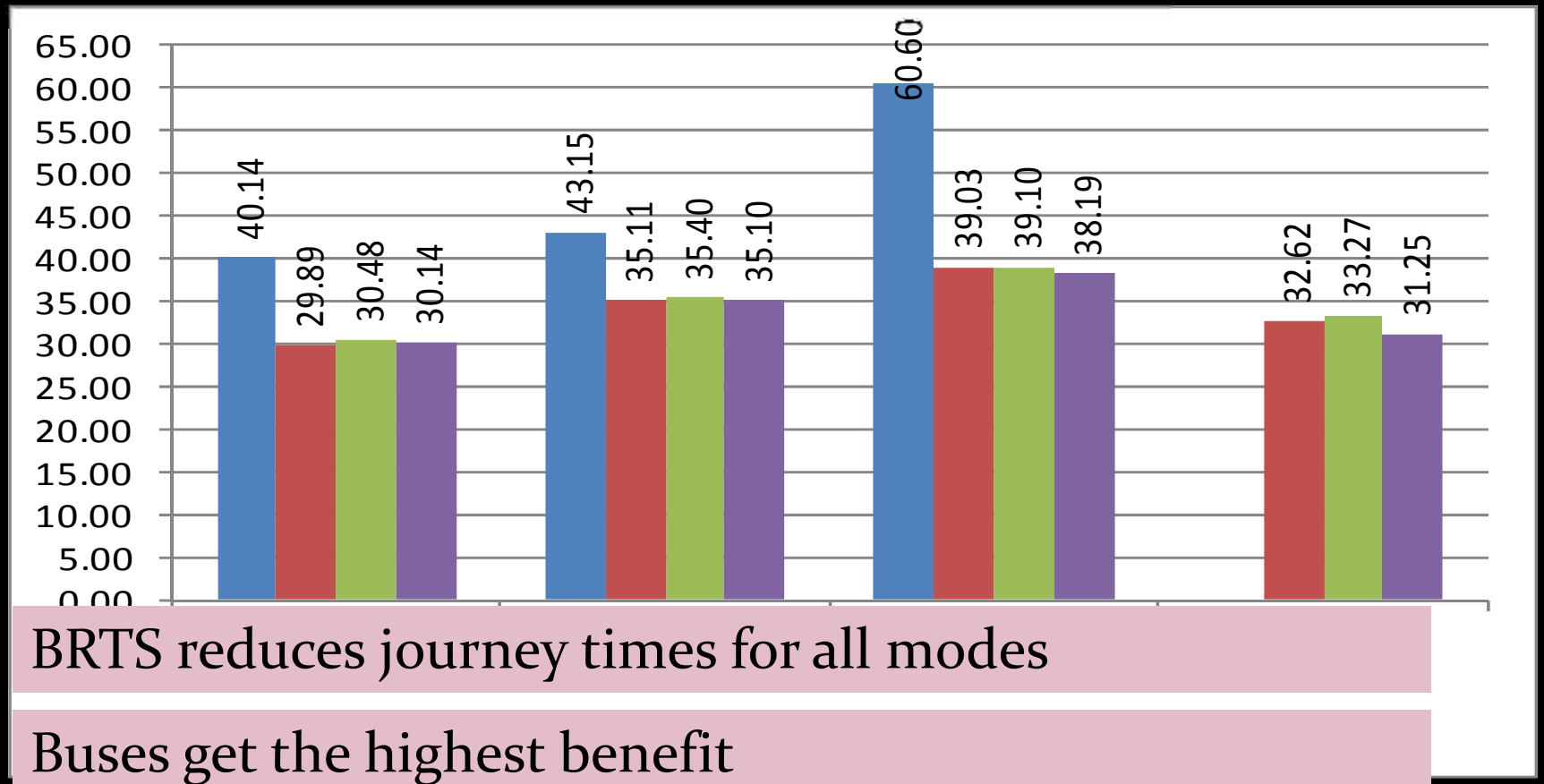
1. BRTS IS UNAVOIDABLE

- Our cities may build metros, they may even be necessary
- However, buses will always remain the backbone of our PT systems
- Buses and metros must co-exist, complement and support each other

Bus share in major cities



Whom does BRTS benefit?

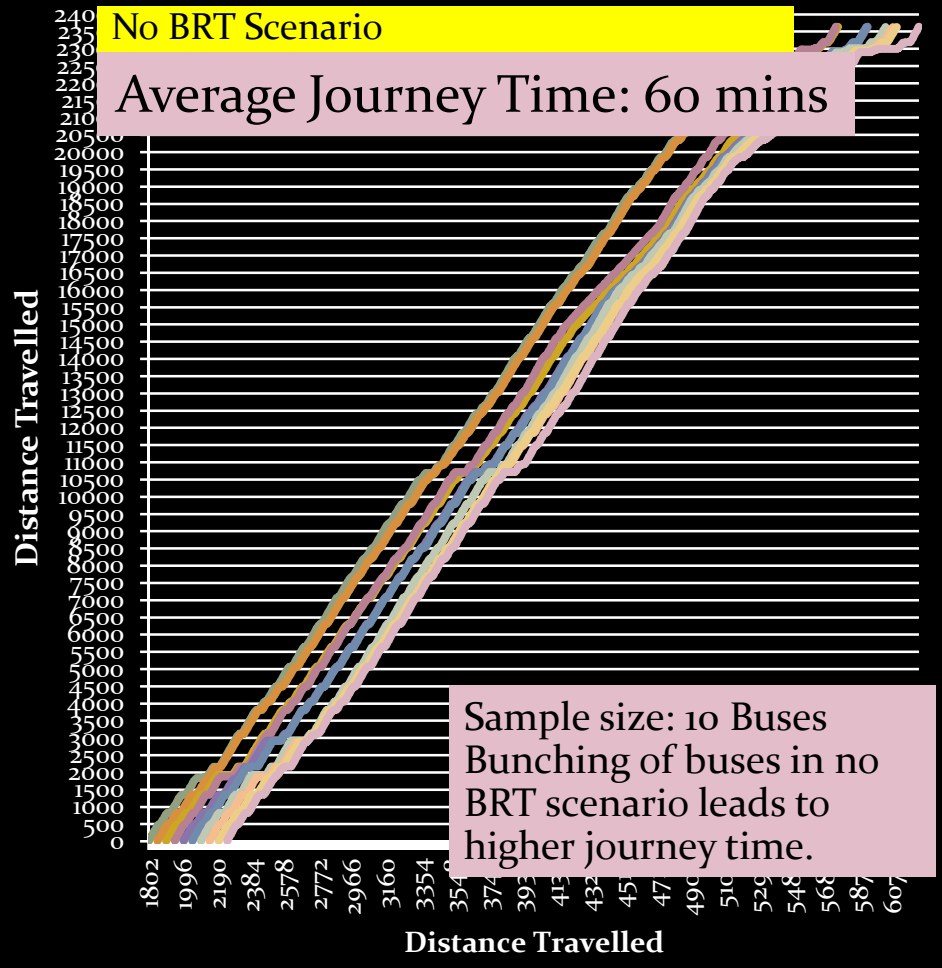


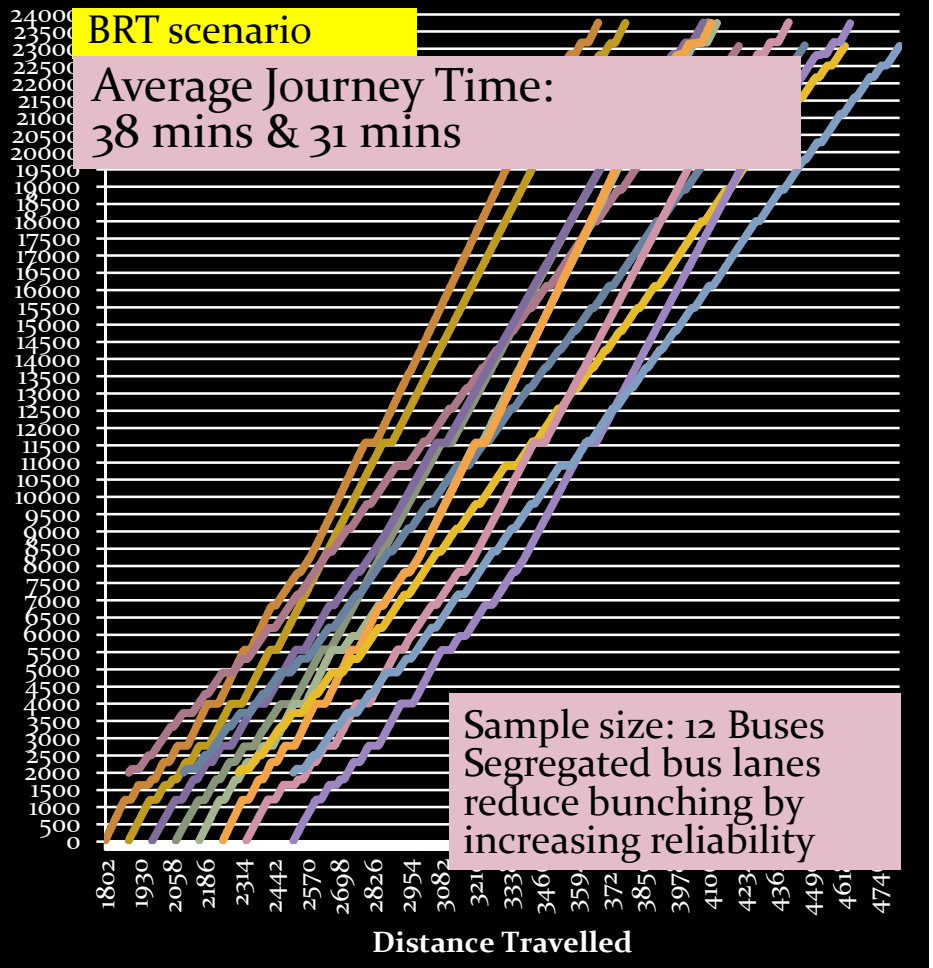
BRTS reduces journey times for all modes

Buses get the highest benefit

Hubli to Dharwad

Bus trajectory record





Janmarg – Present situation

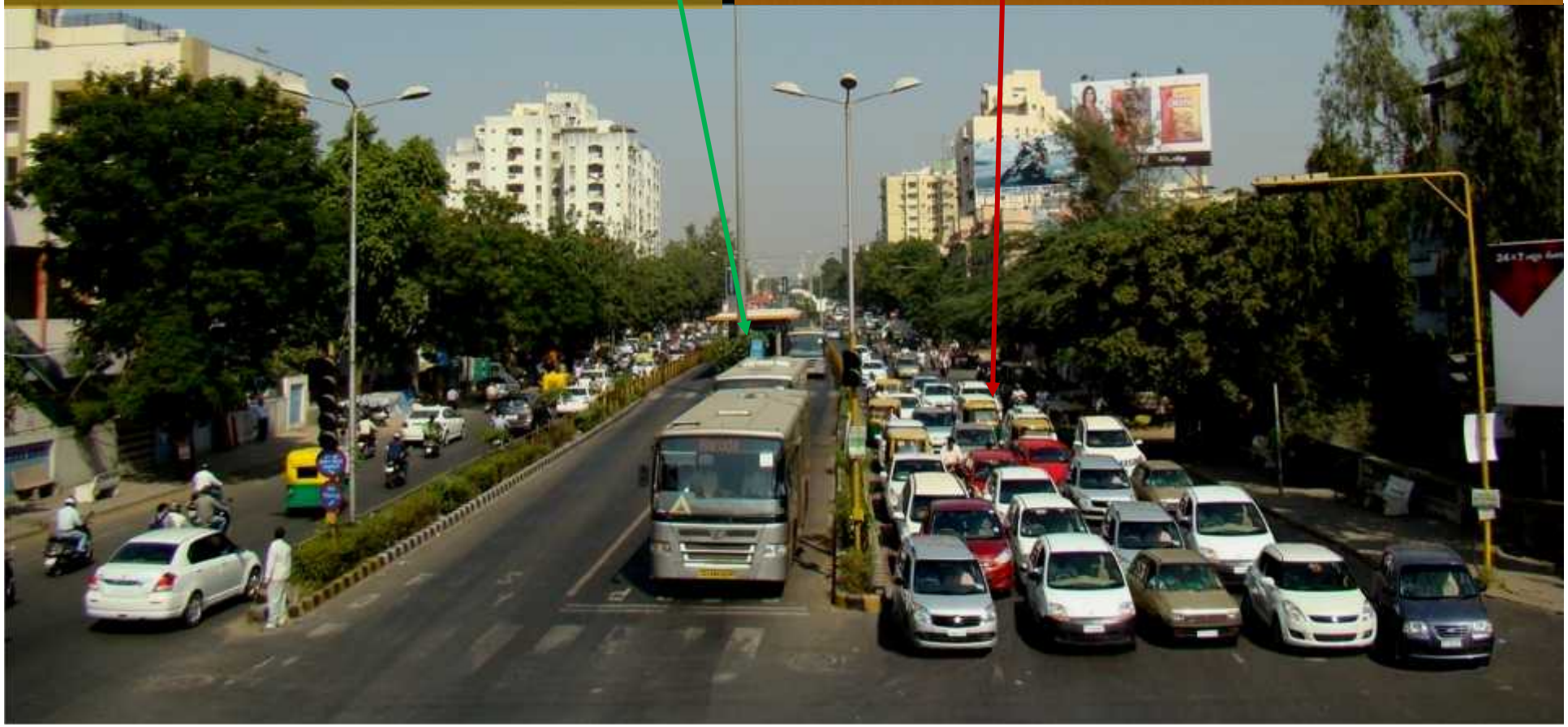
People moved : 150
Area occupied – 84 sq. m
Queue length – 24 m.

People moved :77
Area occupied – 486 sq. m.
Queue length - 54 m.
Phase Time – 40 Seconds
Cycle Length – 120 Seconds

If cars increase....over same area

People moved – 150
Area occupied – 84 sq. m
Queue length – 24 m.

People moved -45
(Reduction from 77)
Area occupied – 486 sq. m.
Queue length - 54 m.



Cars to cater to same no of people

People moved – 150

Area occupied – 84 sq. m

Queue length – 24 m.

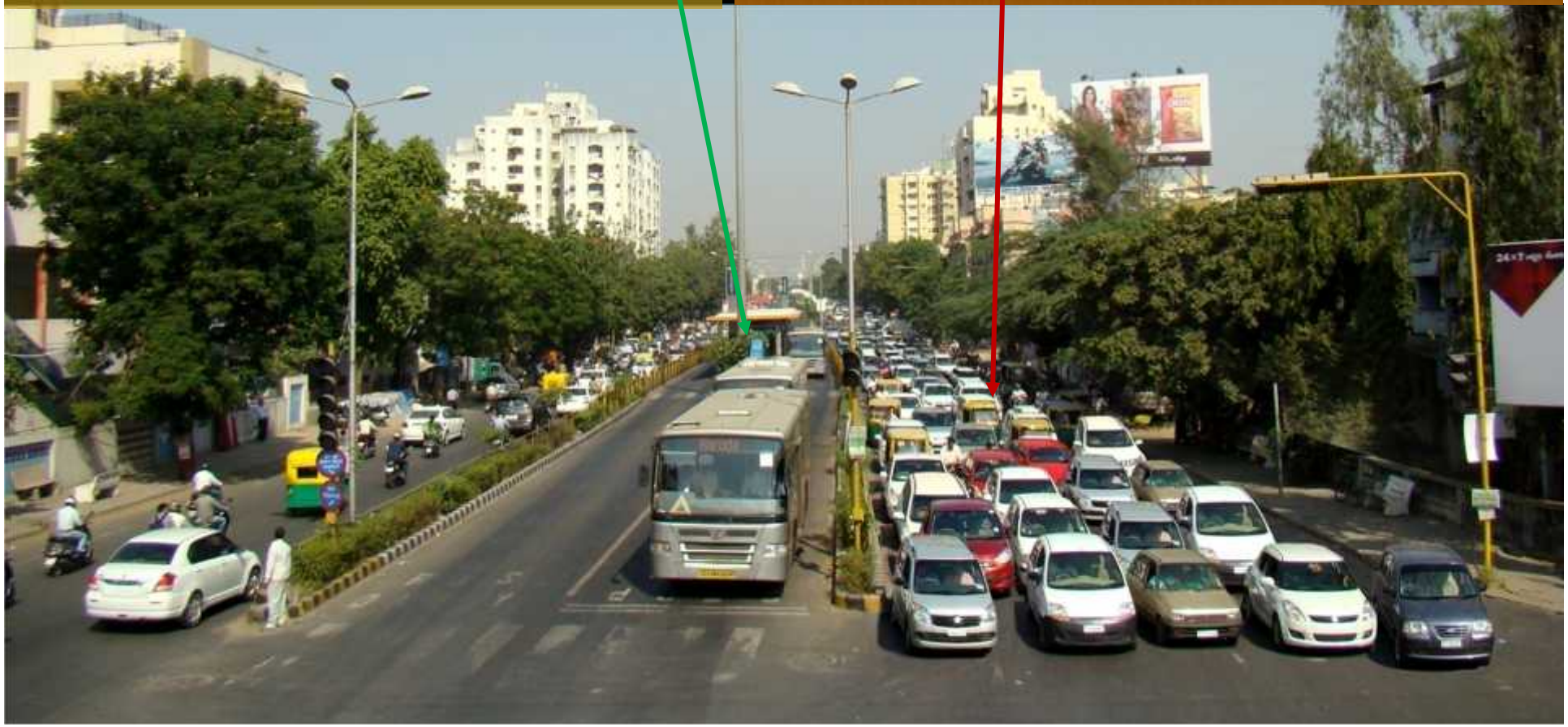
People moved -77

Queue length - 183 m.

(Increase from 54 meters)

Phase time – 70 Seconds

Cycle Length – 180 Seconds



No BRTS....

People moved -240

Queue length - 165 m.

(Increase from 54 meters)

Phase time – 180 Seconds

Cycle Length > 180 Seconds (Not Desirable)

No BRTS....and traffic doubles

People moved -610

Queue length - 630 m.
(Increase from 210 meters)
Phase time – 200 + Seconds
(At-grade operation impossible)

Total -Section length –537m

With BRTS....and traffic doubles

People moved – 280

Area occupied – 135 sq. m

Queue length – 37 m.

18 M ARTICULATED BUS
CAPACITY- 140

People moved -155

Queue length – 210 m.

Phase time – 70 Seconds

Cycle Length – 180 Seconds

How do we use our roads?

	Planned		On site situation	
Element	**Width**	**% covered**	**Width**	**% covered**
Footpath	2.25m	15 %	2.25m	15 %
Carriageway	9.25m	50%	7m	22%
BRT lane	3.65m	25 %	3.65m	25 %
BRT Stop	1.9m		1.9m	
Parking	2.25	8 %	6m	36%

2. BASIC ELEMENTS ARE NON-NEGOTIABLE

- Segregation is critical; stretches of mixed running BRTS affect performance and efficiency
- Bus stations are critical; segregated busways with no bus stations is as good as not having a BRTS!
- Level alighting and boarding are critical; mismatched levels increase dwell times and have safety implications

3. DEMAND MANAGEMENT IS CRITICAL

- Experience suggests 'supply' of high quality BRTS needs to be complemented by demand management
  - Cities need to focus on parking restrictions (less on street parking, time restrictions) and charging for parking

- Cities need to balance their priorities. Public transit, NMT facilities should get higher share in municipal budgets

4. CAPACITY BUILDING IS KEY

- Dearth of trained professionals to operate bus systems
  - Frequent training programs for in-service officers
  - Education programs
- BRTS Design is not a traffic engineering exercise
  - Dearth of consultants who understand BRTS and are not 'usual' traffic engineering consultants

5. THE NEXT LEVEL

If we consider 25 km of BRT network per million population (and that is a conservative estimate!)

and

If we consider our top 50 cities,

We need 3500 km of BRT network in the next 10 years

Which means 350 km of BRT network every year

And these are base year estimates!!

5. THE NEXT LEVEL – KEY QUESTIONS

So,

what are the next steps?

1. We need huge investments to build BRT systems
   - Can the private sector invest in infrastructure?
   - How can government make it viable for them? (especially with issues in private sector participation in metro projects)
   - How can government regulate such participation?

5. THE NEXT LEVEL – KEY QUESTIONS

So,

what are the next steps?

2. We need to create consultants and advisors to work with government
   - Can we create more institutes that offer post graduate programs in urban transport?
   - Can we create more dedicated training programs across India for in-service professionals?

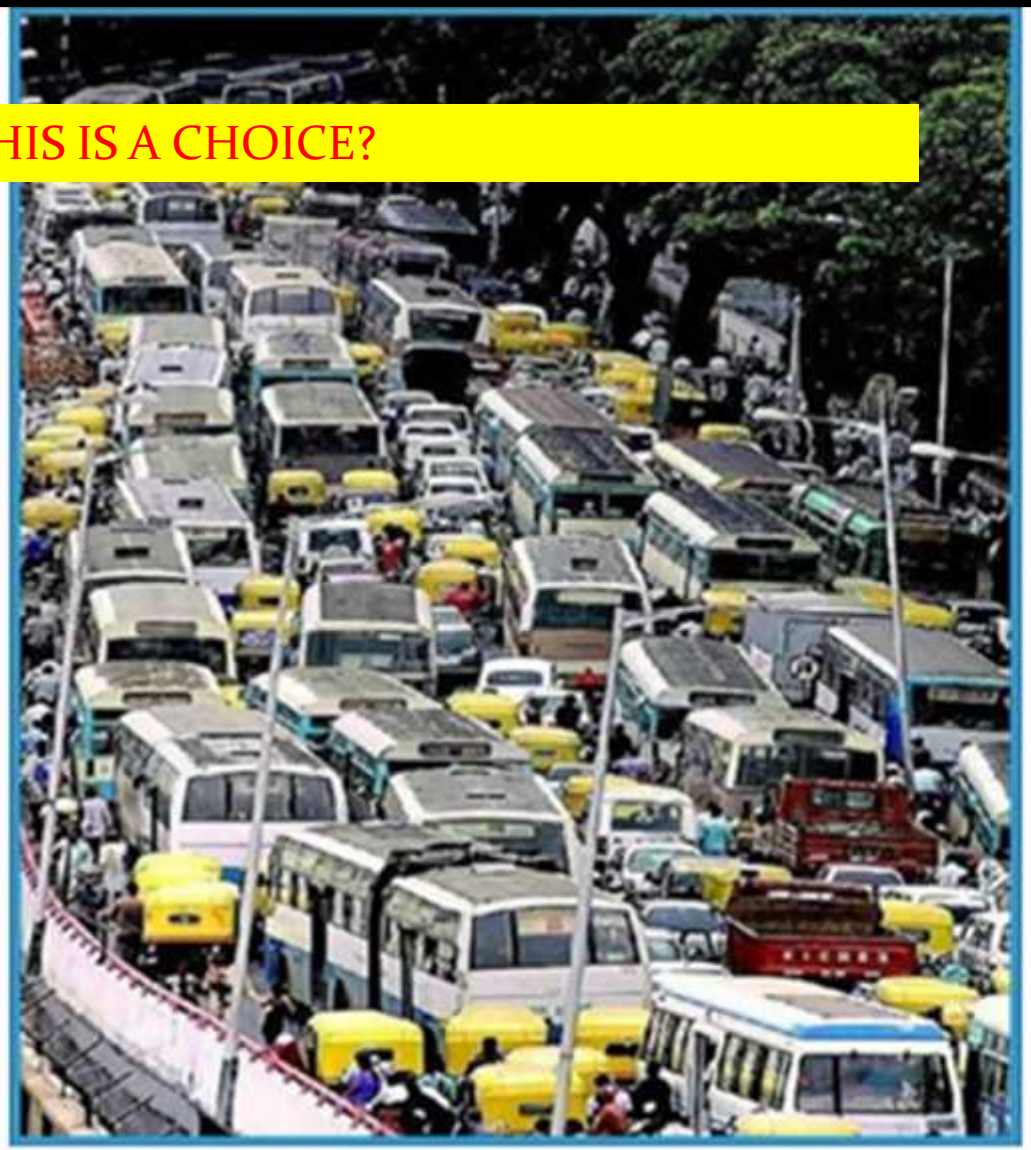
LAST THOUGHTS...

- BRTS is inexpensive to build. (That does not mean it is cheap!)
- But, BRTS is difficult to implement and operate (That does not mean it is not possible to build)
- Hard decisions!
- Given Population Density and Area under Roads, BRTS is also inevitable

AND.....

DO WE REALLY HAVE A CHOICE?

IS THIS IS A CHOICE?



This is also not a choice!!

This is quality Public Transport

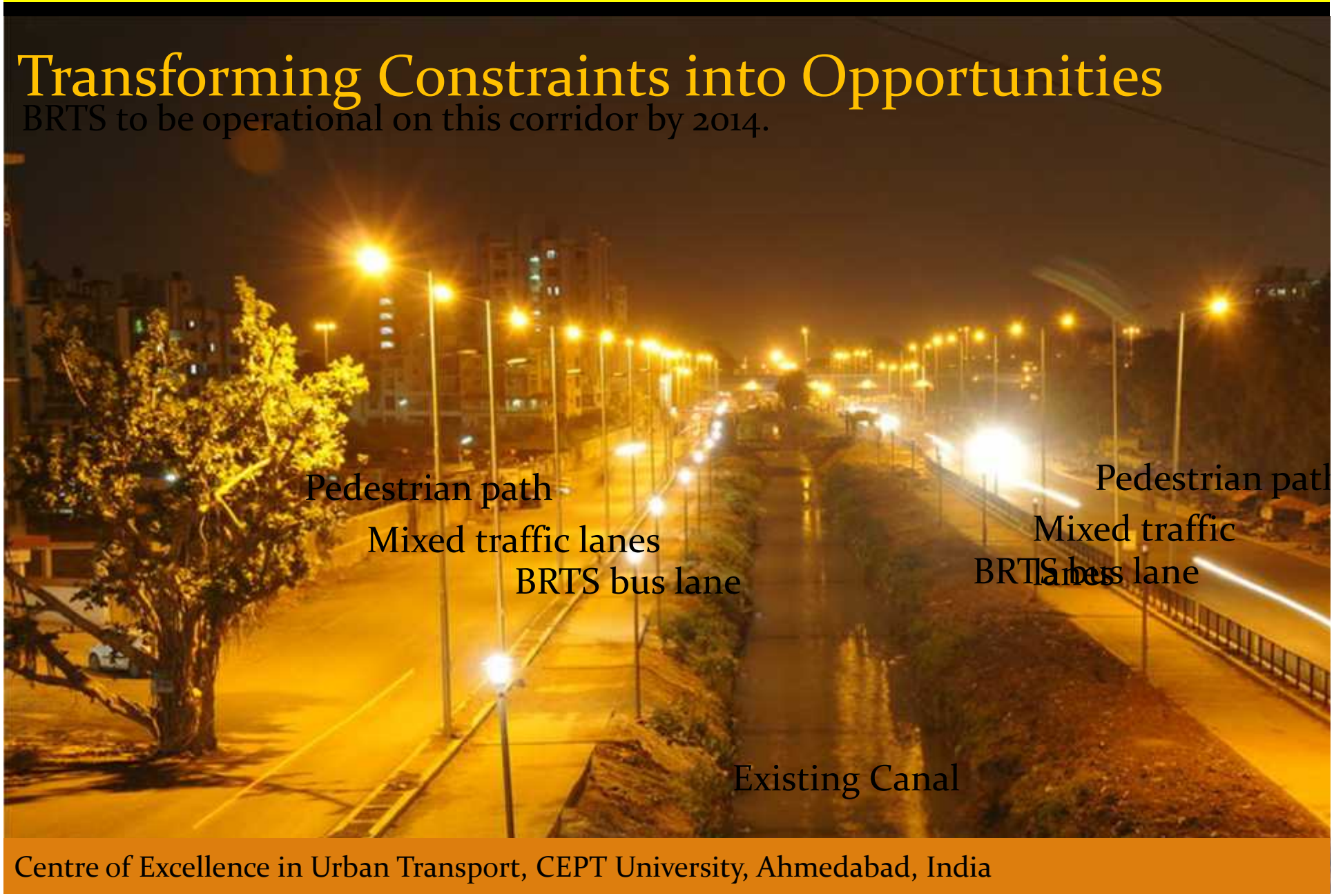
JANMARG Today

Centre of Excellence in Urban Transport, CEPT University, Ahmedabad, India

This is a choice

This is what it was

This is what you can make



Thank you…