



New trends and opportunities for BRT

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Meeting of the Minds, March 10th, 2015

Outline

What brought BRT?

BRT level of service and promise

BRT traditional components

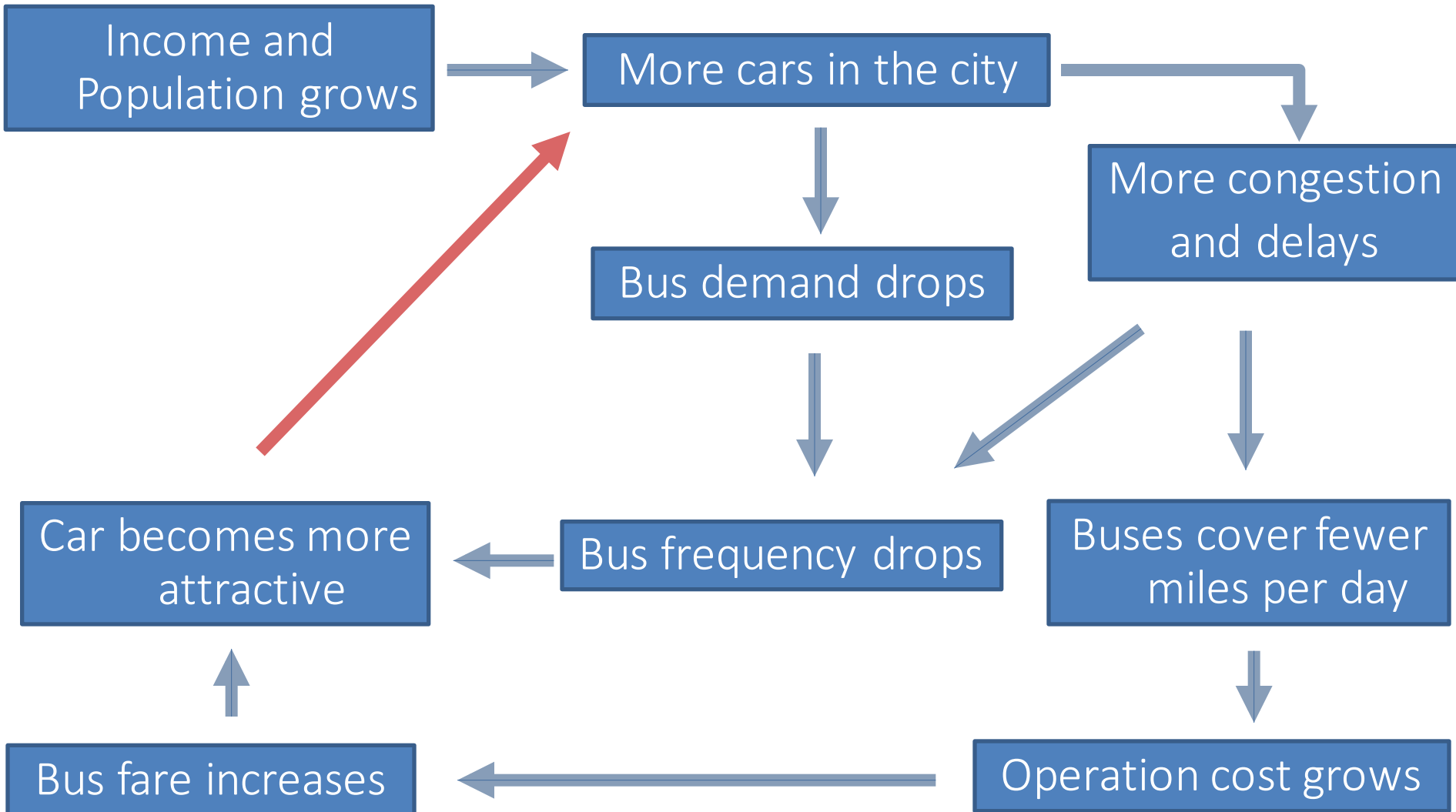
BRT in the Americas: Brazil, Colombia, Mexico, US

BRT of the future, **five** elements

What brought

BRT?

Public transport is victim of a vicious cycle



However, this cycle
doesn't affect **Metro** as much...



(luckily, cars don't go underground)

The BRT promise:

provide Metro-like service
on the surface



What are the most distinctive elements of Metro's level of service?

Fast

Low wait time

Comfortable

Reliable

Good information

Branding

Can we provide Metro-like service with buses?

Fast

Low wait time

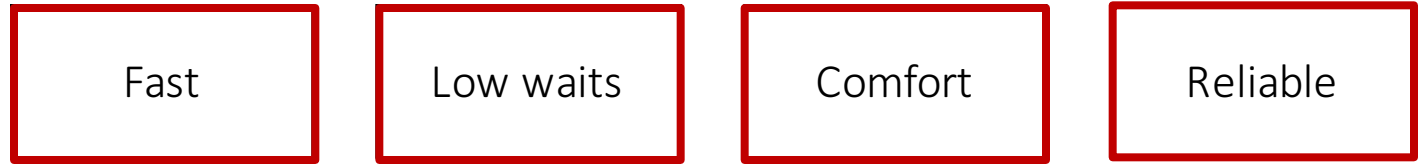
Comfortable

Reliable

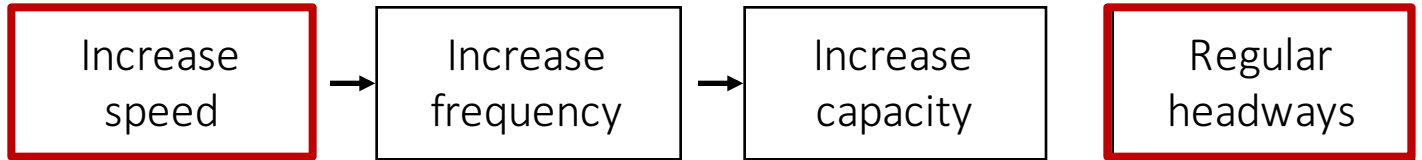
Good information

Branding

Metro attributes



Main drivers

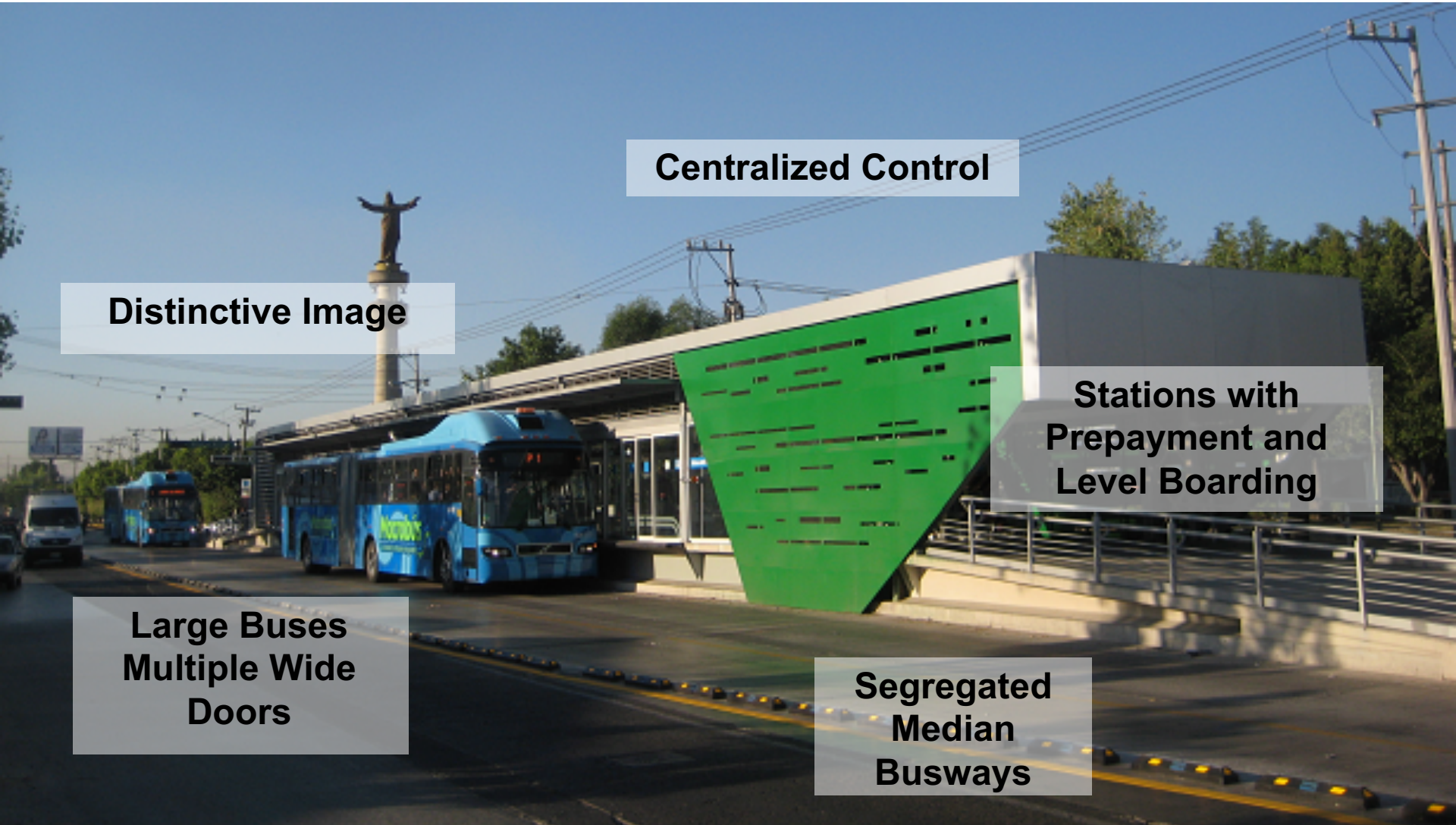


Actions

- Segregated ways/lanes
- Reduce dwell times
 - Fare payment off-bus
 - Buses with multiple doors
- Increase distance between stations
- Express services
- Traffic signal priority
- Improved headway control

And this is what BRT is about

BRT Key Components



Centralized Control

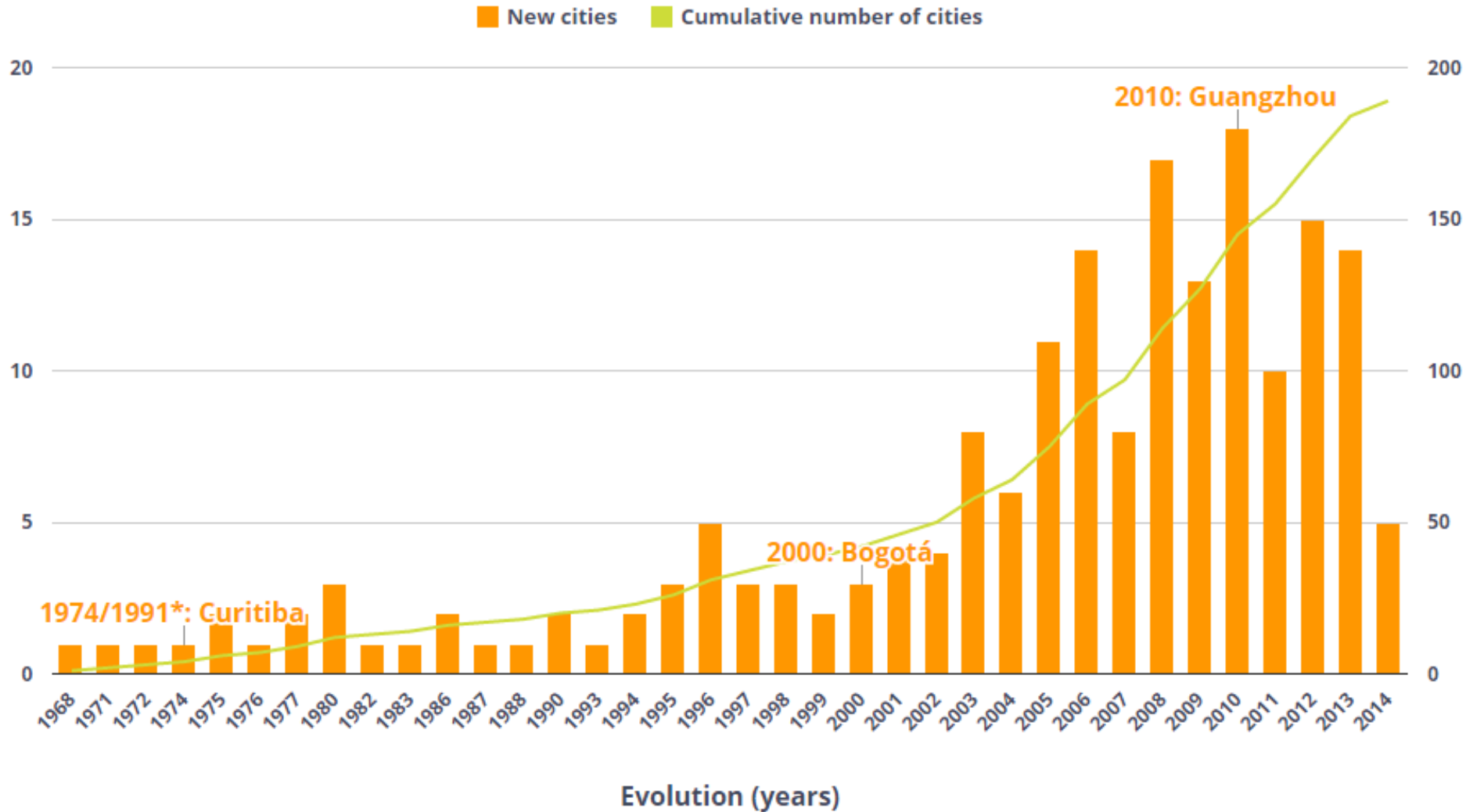
Distinctive Image

**Stations with
Prepayment and
Level Boarding**

**Large Buses
Multiple Wide
Doors**

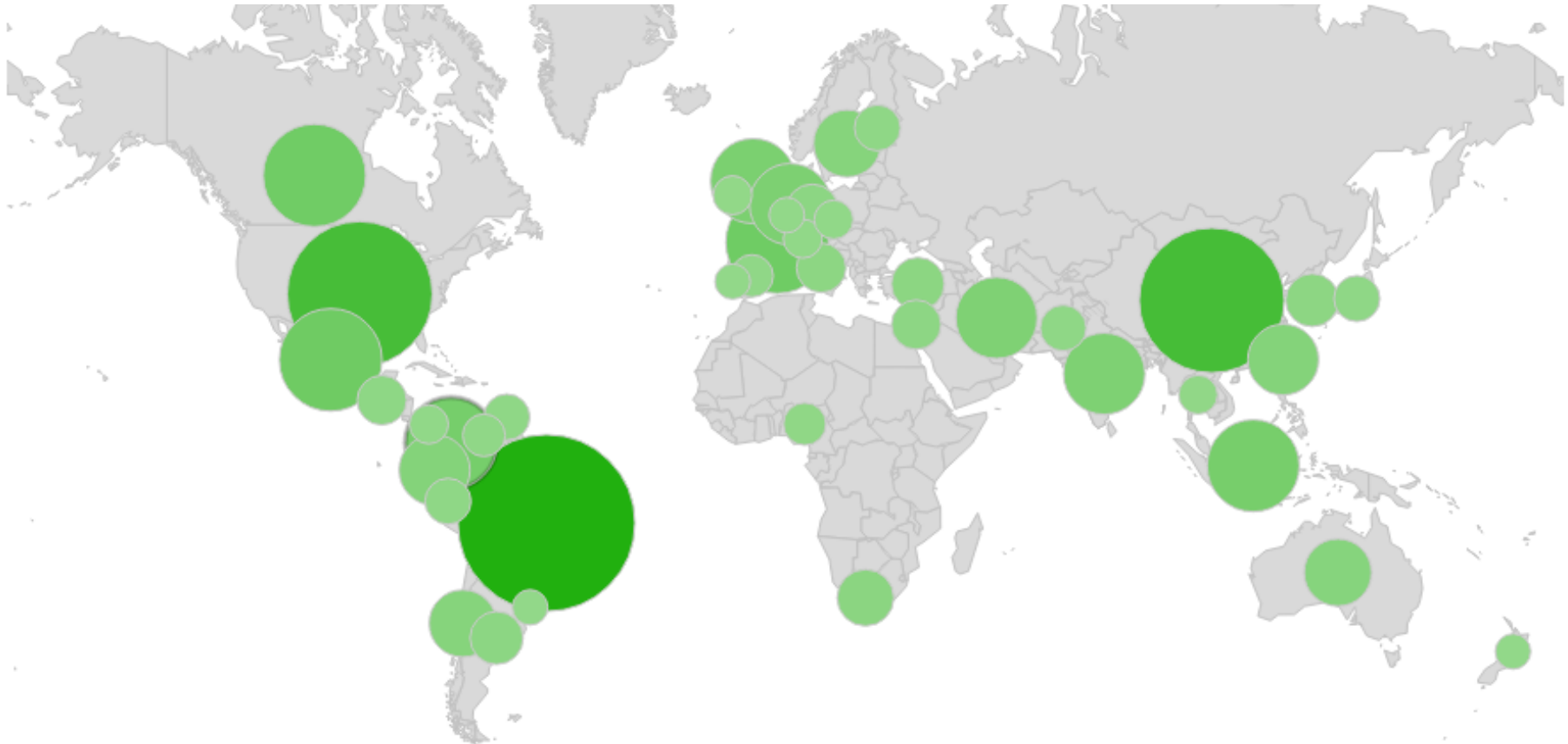
**Segregated
Median
Busways**

BRT evolution worldwide



brtdata.org

BRT Centre of Excellence brt.cl



5 km  835 km



31,374,854
PASSENGER/DAY



189
CITIES



379
CORRIDORS



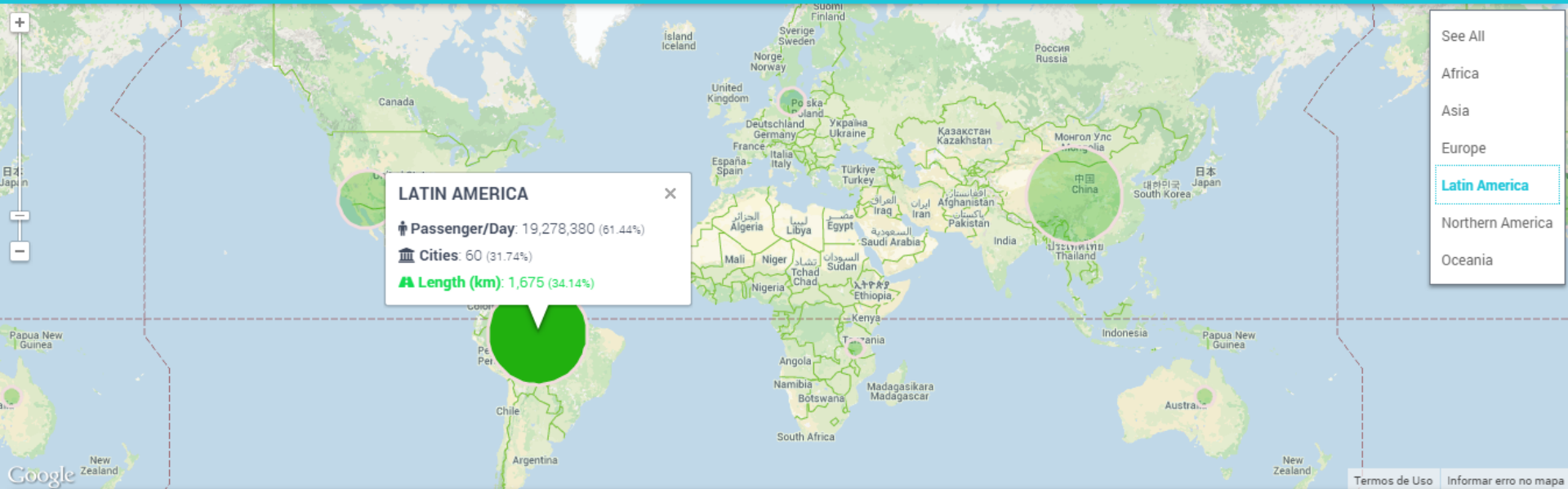
4,907 km
TOTAL LENGTH

http://brtdata.org/



GLOBAL BRT Data

- BY LOCATION
- BY INDICATOR
- BRT PANORAMA
- ABOUT BRTDATA



- See All
- Africa
- Asia
- Europe
- Latin America**
- Northern America
- Oceania

VIEWING NOW WORLDWIDE

Find your City or Indicator...

- EN
- ES
- PT

31,374,854
PASSENGERS PER DAY

189
CITIES

4,907 km
TOTAL LENGTH



http://brtdata.org/



GLOBAL BRT Data

- BY LOCATION
- BY INDICATOR
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- ABOUT BRD DATA



VIEWING NOW >> LATIN AMERICA

Find your City or Indicator...

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19,278,380
PASSENGERS PER DAY

60
CITIES

1,675 km
TOTAL LENGTH

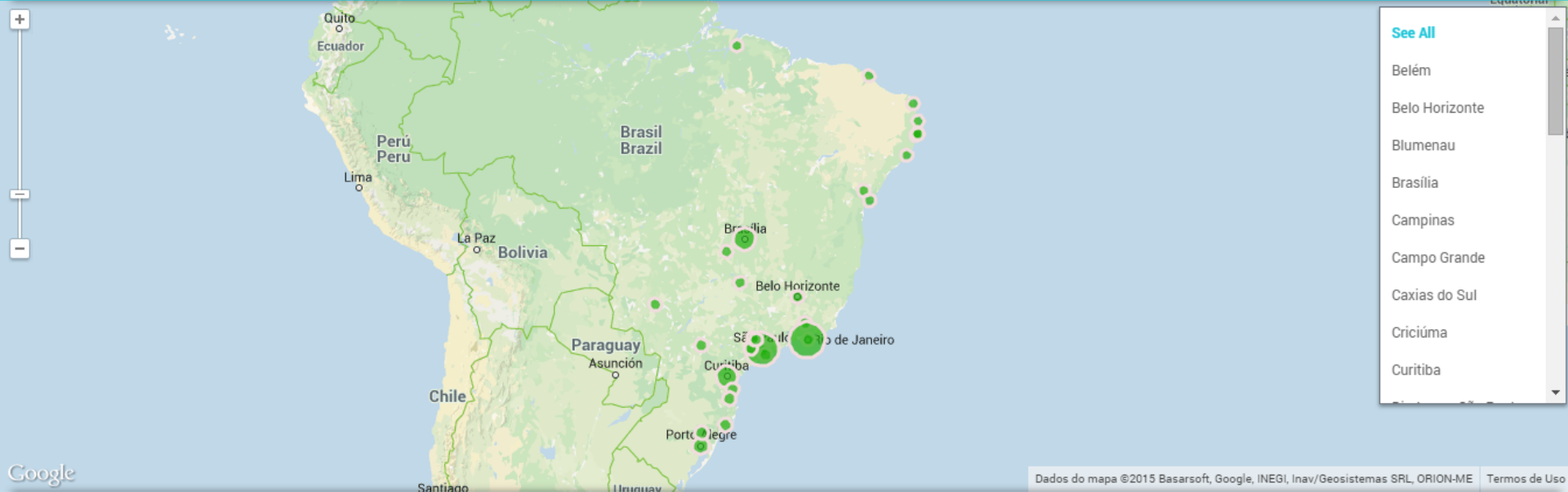


http://brtdata.org/



GLOBAL BRT Data

- BY LOCATION
- BY INDICATOR
- BRT PANORAMA
- ABOUT BRTDATA



VIEWING NOW BRAZIL

Find your City or Indicator...

- EN
- ES
- PT

11,590,749
PASSENGERS PER DAY

119
CORRIDORS

835 km
TOTAL LENGTH



BRT in the Americas

Latin America



Curitiba: the cradle of BRT

- Median bus-ways longitudinally segregated
- Tube stations with fare prepayment and level access
- Physical and fare integration
- Dispatch control at terminal stations.
- Differentiated services:
 - Expresso, Ligerao, Ligeirinho, Interbairros, Alimentador
 - Special services downtown, hospitals, touristic bus, schools



Curitiba showed that buses **can** operate like Metro





Colombia

Bogotá adapted the Curitiba concept for extremely high capacity

- Central corridors allowing overpassing
- Stations with multiple stops
- Regular and express services in the same infrastructure
- Off-board payment
- Large buses, lower emissions
- Image



Capacity: 48,000 pax/day-direction
Commercial speed: 26 km/h (regular service)

108 Km 2.4 million pax/day





1

1

1

2

1

1

2

1

1

1

1

40

1

1

2

2

1

1

1

1

1

1

1

2

1

1

1

1

1

140

140

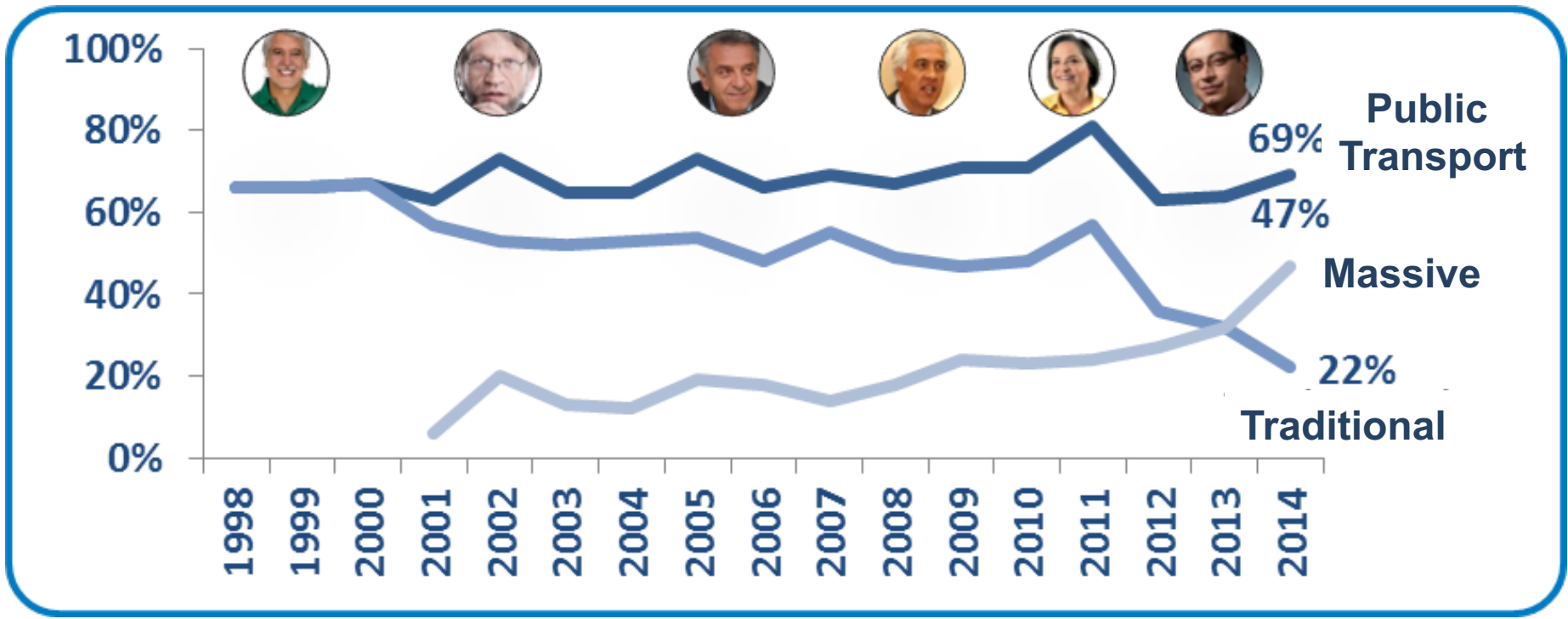
140

140



Photo ITDP

**Bogotá TransMilenio
Eje Ambiental Avenida Jiménez**



**Amazing achievement:
Bogotá manages not just to increase the modal share
of massive public transport,
but also to keep public transport modal share constant**

The main challenge is extreme overcapacity in buses and stations



**150+ passengers per bus in the most loaded segments
(aprox 7 pax/m²)**

User satisfaction has dropped to its historical minimum



15%
15%

-14

**de los usuarios, están satisfechos
con el TransMilenio**

(588 y 357 usuarios respectivamente)





Brazil

Brasília

Rio de Janeiro

Porto Alegre

Porto Alegre

Paraguay

Asunción

Chile

Santiago

Uruguay

Peru

Lima

Nuestra Señora de La Paz

Bolivia

Brazil

Quito

Ecuador

Belo Horizonte: MOVE

5.4 mi
inhabitants

23 km

BRT

3

corridors



50%

Trip time
reduction



700k

Pax/day



MOVE



Rio de janeiro

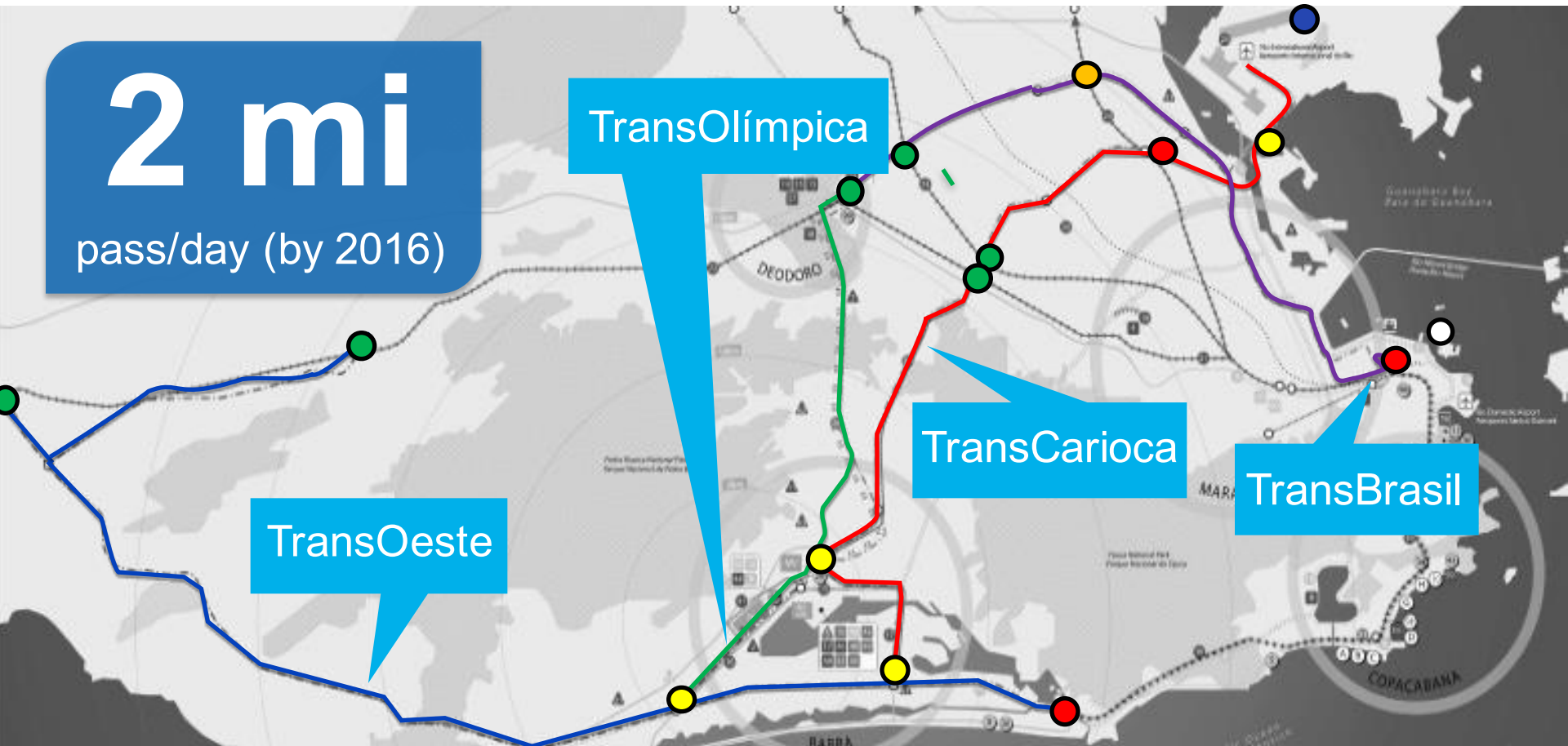
11.8 mi

habitantes

160 km

Red BRT

Four BRT corridors



2 mi
pass/day (by 2016)

TransOlimpica

TransCarioca

TransBrasil

TransOeste

Source: Rio de Janeiro Municipality

TransBrasil is being designed for 60,000 pax/hr-direction



Photo: EMBARQ Brasil



Photo: EMBARQ Brasil



Photo: EMBARQ Brasil



Photo: EMBARQ Brasil



Mercedes-Benz

TRANSOESTE LIGERÃO

Photo: EMBARQ Brasil

39 km



TransCarioca



450k

pass/day - TransCarioca



EMBARQ
Brasil

Before & After



Sustainable Transport Award 2015



Belo Horizonte, Brazil



Rio de Janeiro, Brazil



São Paulo, Brazil





Mexico

Las Vegas

Los Angeles

Phoenix

San Diego

Dallas

Atlanta

Houston

San Antonio

Mexico City

Havana

Cuba

Dominican Republic

Guatemala

Honduras

Guatemala

Nicaragua

Costa Rica

Panama

Maracaibo

BRT systems in México



2003

2005

2008

2009

2011

2012

Optibus
Leon,
Guanajuato

+Metobus
Insurgentes
Mexico DF

+ Metrobus
Insurgentes Sur

+Macrobus
Guadalajara

+Mexibus
Mexico State

+ Metrbus
Line 4

Length: 26 km
Fleet: 61

Length: 46 km
Fleet: 156

Length: 55 km
Fleet: 216

Length: 92 km
Fleet: 330

Length: 128 km
Fleet: 472

Length: 156 km
Fleet: 526



237,000
Pax/día



497,000
Pax/día



552,000
Pax/día



814,000
Pax/día



1,114,000
Pax/día



1,164,000
Pax/día

Evolución de BRT en México



Metrobús México DF

Mexico DF – Metrobus



5 Lines
105 km
900,000 pax/day

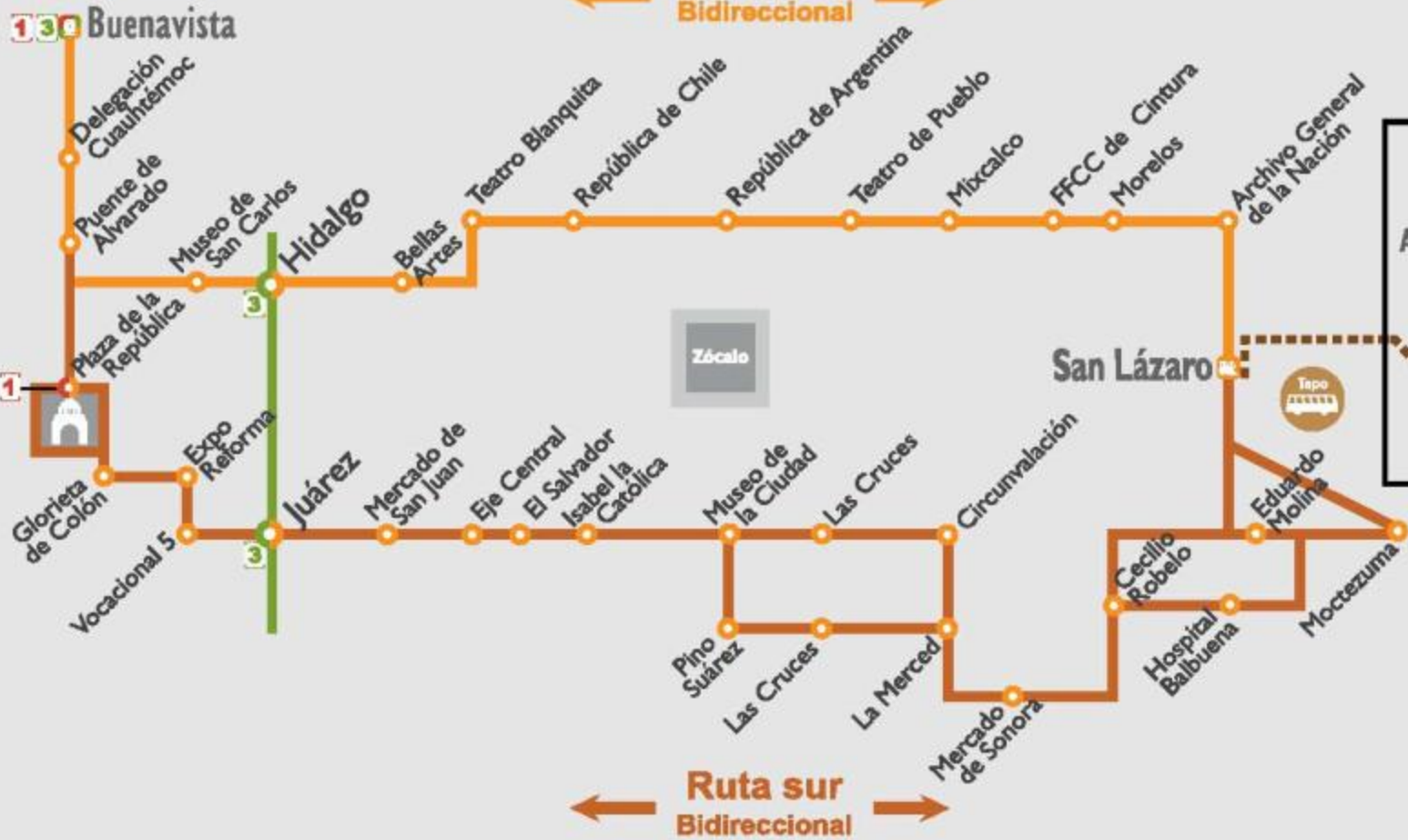
Metro	
Tren Suburbano	
Estación Ecobici	
Corredor Cero Emisiones	
Circuito Reforma Bicentenario	
Circuito Periférico	
Aeropuerto Internacional de la Ciudad de México	
Biciestacionamientos	
Servicio al AICM por RUTA NORTE	

Conexiones



Línea 4. Mapa Esquemático

Ruta norte
Bidireccional



Ruta sur
Bidireccional

Conexiones de Metrobús. *Selecciona una ícono para ubicar en el mapa >>*



MBL4

TERMINAL BUENAVISTA





ASCENSO DE PASAJEROS



ASCENSO
DIRECCIÓN
SAN LÁZARO
AEROPUERTO T1 Y T2



NO CRUCE
SIN SEÑAL
AMARILLA



PERMITA
SALIR ANTES
DE ENTRAR



SANTIANO



SANTIANO
DESCARROGADOS



SALIDA



Buenavista



ASCENSO PASAJEROS



NO PASAR
SIN SEÑAL
AMARILLA



SALIDA
LADO OESTE



Buenavista

MODULO DE
ATENCIÓN



HYBRID

Por una ciudad más verde

SALIDA

CALLE AMÉRICA 1110 - PUEBLO NUEVO

ENTRADA

-50%
CO₂

-30%
emisiones/ltroa

Híbrido

Centro Histórico
Downtown

MTB

70%





E2

RUTA SUR

BU

553

ESTACIONAMIENTO
TECHADO

Centro Histórico
Downtown
MEXICO



EFACCIONES
PRESORAS
MPUTADORAS

YUNTAMIENTO
#10

AQUI

POUNPUN

E2 RUTA SUR
SAN LAZARO

528

Centro Histórico
Downtown
ITB Metrolib







Línea 4



Centro Histórico a Centro



Mapa del Plan Maestro del Eje Histórico

Mapa de Línea



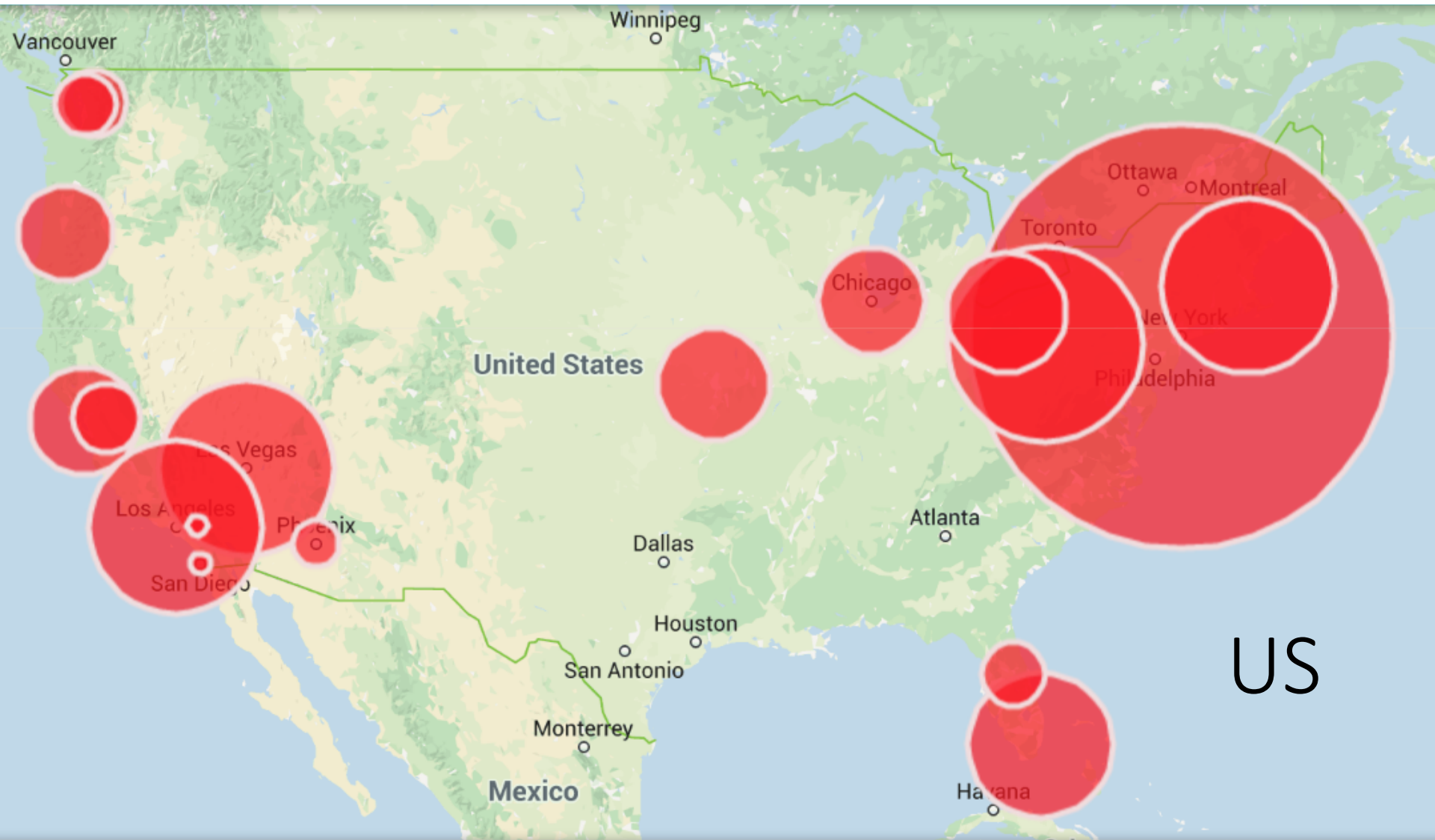
Mapa de Línea

HOTEL ROTBU

BUENAUISTA

543

Centro Historico
Downtown
Metrobús



US

USA and Canadian Context

- High automobile ownership and use create challenges for transit and shared streets
- Growing political support for flexible, incremental implementation of BRT(-lite) elements in wide range of cities
 - Select Bus Service “a proven winner”
 - Michael Bloomberg, former Mayor of New York City
 - BRT “one of the easiest and most cost-effective ways to expand and modernize our city’s transit network”
 - Rahm Emmanuel, Mayor of Chicago
 - “We want BRT, we want it to move forward”
 - John Curtis, Mayor of Provo, Utah (pop. 112,500)
 - BRT in Boston is “next big wave of investment”
 - Jim Aloisi, former Massachusetts Secretary of Transportation

Project Types – USA and Canada

- New and upgraded express corridors – stations along highways to downtown, dedicated high-speed infrastructure
 - Ottawa: Transitway
 - Los Angeles: Silver Line
 - Pittsburgh: Busways
- Arterial corridors – mix of station types, some median dedicated lanes
 - Arlington/Washington: Metroway
 - Cleveland: HealthLine
 - San Bernardino: sbX
- Rapid bus networks – limited transit priority, wide coverage
 - Los Angeles: Metro Rapid
 - New York: Select Bus Service



flickr: ansoncft

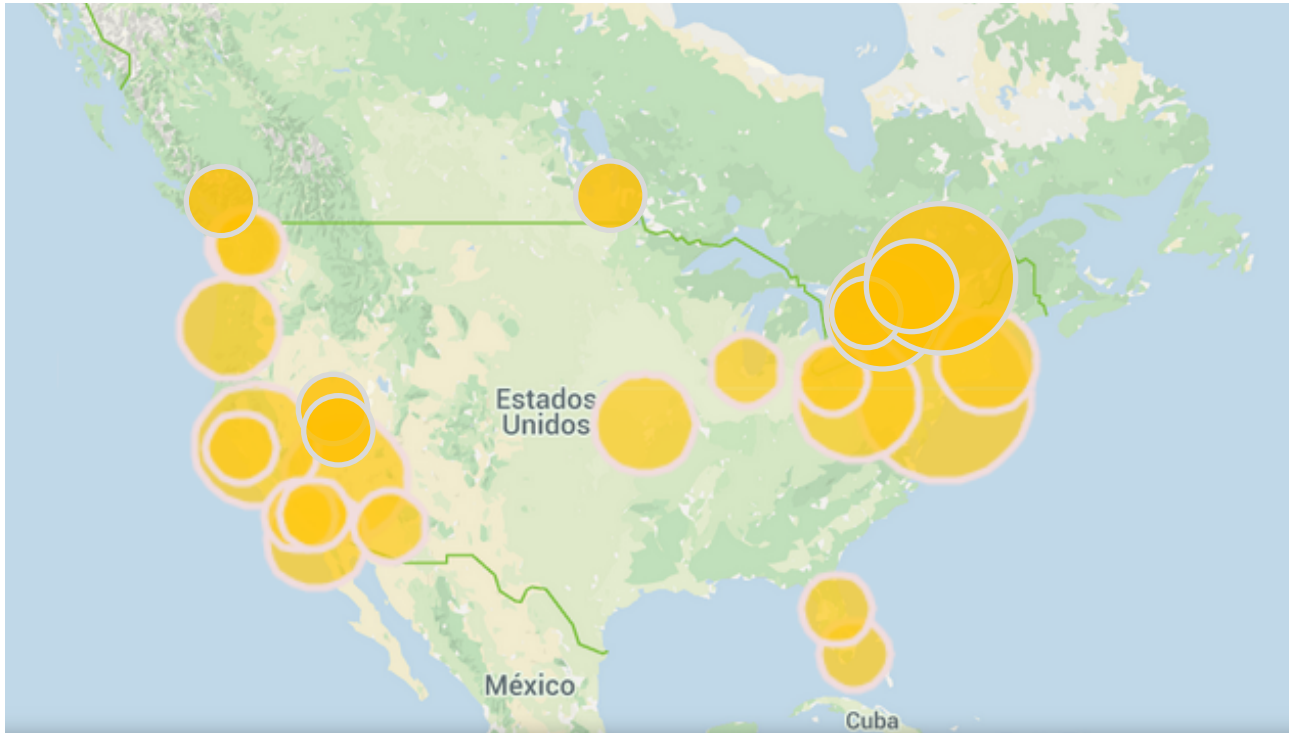


flickr: beyonddc



flickr: ansoncft

Opportunities – USA and Canada



- Successful demonstration projects in early 2000s
- Now more than 20 cities with BRT corridors, 10 added since 2010
- Emerging recognition of BRT benefits, in cities with and without developed rail transit

Challenges – USA and Canada

- Major conflicts over the allocation of street space, links to land use
- High-profile “top-down” projects undermined or halted
- Need for tools that can better
 - Communicate holistic project benefits
 - Inform and enhance public participation
 - Help build stakeholder coalitions
- Successful BRT-based TOD requires coordination across scales

STREETSBLOG USA
Podcast | Transit | Bike/Ped | Smart Growth | Contests

Friday, January 31, 2014 8 Comments

Fresno City Council Slams the Brakes on BRT
by Angie Schmitt

Sprawl and big money prevailed over progress last night in Fresno. The City Council dealt a major blow to local plans for smart planning and bus rapid transit, but stopped short of killing the project completely.

About \$50 million in federal and state grants have been secured to build a bus rapid transit system and operate it for the first three years. But council members — voting 4-3 not to fund the final design phases and hire a project manager — moved to delay the project indefinitely.

The council did vote 7-0 to adopt a state requirement that the project would not negatively impact the environment. That left the door open for it to continue, but it's possible the Federal Transit Administration will yank \$38 million if major changes are made to the agreement.



Fresno City Council members caved to specious arguments about BRT, delaying the project. Image: Fresno Bee

The MBTA's 28X Debacle, aka, Missed Opportunity
By Steve Pofak | Boston Daily | August 31, 2011 9:08 a.m.

What's the 28X? It was the MBTA's attempt to put a version of bus rapid transit on the existing 28 bus line.

Route 28X would have converted portions of the bus route, particularly on Blue Hill Avenue, into a dedicated bus lane. It would have implemented many of the principles of bus rapid transit, like the dedicated lane and more widely spaced station stops, to allow faster service and greater throughput for one of the system's most heavily used bus lines.

And it would have done it with the help of federal funds and at an incremental cost to the existing system (as opposed to a large greenfield capital expense). As this space has noted before, there's no money out there for major expansion projects and the only feasible system improvements take an incremental approach.

Bus rapid transit should be part of this toolkit. I'm sure that several readers will bring the flaws of the Silver Line to my attention, that's an important source of lessons for future bus rapid transit (which I'll address in a separate post).

Trending: Daredevil Dylan Polin Does Flip Over Red Line Tracks

So, what happened to the 28X? In short, the community rejected it. The roll-out was clunky — in their apparent haste to introduce a seemingly can't-miss project with an identified federal funding source — the Administration announced it at a news conference with community leaders, without informing the community leaders in advance.

STOP Ashland Ave. Bus Rapid Transit
GO Modern Ashland Bus



CTA's #9 Ashland bus is slow and ends at Irving Park Rd. Instead of improving the bus, Mayor Emanuel and CTA want:

- Eliminate Ashland's northbound & southbound center vehicle lanes and left turns
- Invest \$200 million bus rapid transit (BRT) in the center vehicle lanes
- Also continue operating #9 bus with no improvements in single traffic lanes
- Eliminate Ashland Avenue as one of Chicago's few north-south arterial streets

Ashland-Western Coalition wants a better bus without BRT. Modern Ashland Bus (MAB) is the best solution:

- Bus stops every 1/2-mile and traffic signal transponders for faster buses
- Heated bus shelters for Chicago's weather
- Citywide service past Irving Park Rd. to Clark St. in Andersonville
- Maintain Ashland's current lane configuration & left turns, save millions & millions in taxes

STOP Ashland BRT! GO Ashland MAB!

Get informed & sign our petition to Mayor Emanuel:
Go to www.SaveAshland.com.
Ashland-Western Coalition is a citywide advocacy group for better CTA buses on Ashland Avenue, Western Avenue and beyond. Visit www.SaveAshland.com today!

THE TENNESSEAN HOME NEWS COUNTIES SPORTS BUSINESS MUSIC TRAVEL LIFESTYLE USA TODAY

Tennessee Senate approves bill to block Amp bus

Chas Sisk, csisk@tennessean.com 3:09 p.m. CDT March 27, 2014



(Photo: Submitted)

The Tennessee Senate staked a hard line against The Amp on Thursday, passing a bill that would block the bus rapid transit project and any other like it in Nashville.

Lawmakers overwhelmingly approved a broad ban on mass transit projects in Nashville, moving ahead of their House counterparts, who have been working on a bill with fewer restrictions. The 27-4 vote followed a push by opponents of the project, including the libertarian group Americans for Prosperity, to bring about a Senate vote and keep proponents on their heels.

Democratic state Sen. Thelma Harper was the only Nashville senator to vote against the measure, an amended version of [Senate Bill 2243](#). State Sen. Douglas Henry, a Democrat, and state Sen. Steve Dickerson, a Republican, voted for the measure, as did state Sen. Ferrell Halle, a Gallatin Republican who represents a portion of eastern Davidson County.

The Amp: Complete coverage of Amp bus rapid transit project in Nashville

GET XFINITY® IN...
RELIABLY FAST SPEEDS
XFINITY INTERNET \$19.99 A MONTH / 12 MONTHS

MORE STORIES
Kroger in East...
March 2, 2015

How should BRT evolve to ensure that in the long term we **win** the Car vs Public Transport battle?

This battle is not won through low fares,
but through high quality of service.

Significant subsidies are needed.

Public Transport subsidies are
not just equitable.

Cities are more efficient with subsidies.

What do we expect from BRT in the
near future?

Can BRT offer features
that Metro can't?

1.- BRT must be **Rapid**

But... as cities grow, trips get longer

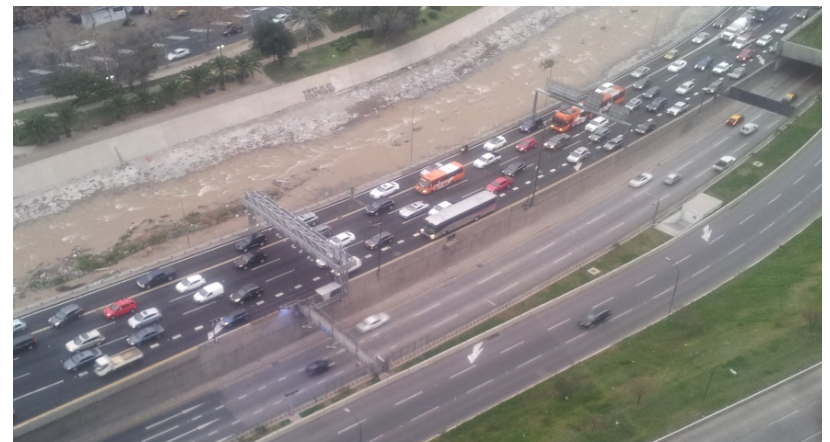
Express services are crucial:
Overpassing facilities are needed

Which is the **set of services** that we should operate in BRT corridors?

But... as cities grow, trips get longer

BRT should conquer urban freeways

Provide higher than Metro speeds
Safety issues



2.- BRT must be **Reliable**

Bus Bunching

- Santiago, Chile



Bus Bunching

- Bogotá, Colombia



Bus Bunching

- Beijing, China



Bus Bunching

- Bruselas, Belgium



Bus Bunching

- Boston, USA



Bus Bunching

- London, England



Pilot tests of a headway control system

The system has been successfully tested in middle to high frequency bus services in Santiago



The future of BRT must be written with
double R

BRRT

Bus **Rapid** and **Reliable** Transit

Modern Metro systems are driverless
or have drivers that do not drive

Driverless cars are already being tested

3.- While BRT buses move inside
corridors, they might be driverless too

Potential **benefits** of driverless operation

Headway regularity

Schedules

Smoother bus docking at stations

Eco-driving

Safety

4.- BRT must be **comfortable**.

We must stop designing 6 pax/m² systems

Remember that this is an average across many buses
and many areas inside the bus!

And operation is often exposed to incidents that make
things worst

5.- BRTs are often designed under a trunk and feeder structure

It is very cost effective!!

But.... passengers *hate* transfers

What can we do about transfers

Buses are much more flexible than trains. An **open system** avoids many transfers

Run **multi-corridor** services

Station capacity is critical. It is the most likely bottleneck to be triggered first. We must design them well.

Transfers can be an opportunity to turn the travel experience into **culture, commerce, fun**.

BRT challenges

- Rapid
- Reliable
- Driverless
- Comfortable
- Few transfers
- Be careful with the urban context
- Low emissions
- Make it fun

BRT in the Americas: New trends and opportunities

Juan Carlos Munoz

 @JuanCaMunozA

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