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BRT in Brazil: **State of the practice as from the BRT Standard**

June, 20, 2018 - 6th TRB BRT Conference - Los Angeles
Breakout Session - Optimal BRT Design

Goals of this presentation

- Assess the state of the practice in 16 operational Brazilian BRT corridors, drawing out the common challenges faced in their implementation and operations and best practices identified.
- Debate with the audience on the applicability of a common Standard to evaluate BRT corridors in one country and around the world.

Structure of this presentation

1. Introduction
2. BRT Standard
3. Results in Brazilian Cities
4. Exchanging Experience and Tackling Common Issues



About ITDP



- Non-profit organization.
- Founded in NY, in Brazil since 2003.
- Promotes sustainable and equitable transportation worldwide.
- Articulation with public institutions and civil society.



1.

Introduction

Global Context

- Bus Rapid Transit has **nearly quadrupled** over ten years.
- Of the 2,580 km of BRTs currently operating, about 1,849 km were built between 2004 and 2014.
- In this period of 10 years, the extension of BRTs in the Brazilian territory practically doubled in relation to the year of 2004.



Bus Rapid Transit Nearly Quadruples Over Ten Years
[ITDP, 2016](#)

Even though we can find
many good examples
around the world...



Yichang, China



Ahmedabad, India



Félix Cuevas



Mexico City, Mexico



Belo Horizonte, Brazil

... Many conventional bus services in mix traffic were launched being called BRT



Lagos, Nigeria



Kansas City, USA

Low consensus
on what BRT
was and which
user experience
it would deliver...

This context led to
the creation of the
BRT Standard

2.

The BRT Standard

BRT Standard

Created from a global agreement between leaders and experts on BRT design and implementation in 2012. Currently in the fourth version of the tool.

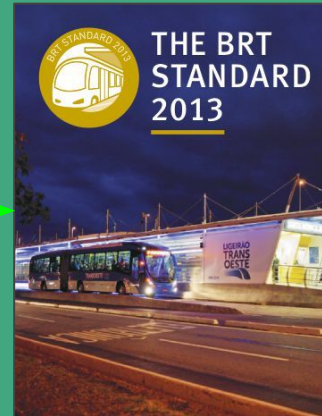
BRT Standard Technical Committee

Manfred Breithaupt, *GIZ*
Paulo Custodio, *Consultant*
Dario Hidalgo, *WRI Ross Center for Sustainable Cities*
Walter Hook, *BRT Planning International*
Wagner Colombini Martins, *Logit Consultoria*
Gerhard Menckhoff, *World Bank (retired)**
Juan Carlos Muñoz, *BRT Centre of Excellence, PUC Chile*
Aimée Gauthier, *ITDP (interim)*
Carlos Felipe Pardo, *Fundación Espacio*
Scott Rutherford, *University of Washington**
Pedro Szasz, *Consultant*
Lloyd Wright, *Asian Development Bank**

Institutional Endorsers



2012



2013



2014



2016

BRT Standard

Goal:

- Defines the characteristics for a corridor to qualify as a BRT corridor and set levels of qualities.
- It recognizes best national and international practices.
- Allows comparison between corridors around the world.
- Evaluates design and operation.



BRT Standard



Gold:
above 85 pts.



Silver:
70 - 84,9 pts.



Bronze:
55 - 69,9 pts.

Categories

BRT Standard Project - 100 points / Operations - up to -60	BRT Basics	Items considered essential by the Technical Committee to qualify a corridor as BRT.
	Service Planning	Items that improve the attendance of passengers' travel desires.
	Infrastructure	Items that bring sustainability to the infrastructure and the system in the medium and long term.
	Stations	Items from the BRT corridor station and the interface between buses and the platform used for boarding and alighting.
	Communications	Items related to the communication to the population of the system branding and the planned service information.
	Access and Integration	Items of access by walk or by bicycle, of universal accessibility and of integration with other modes of transport.
	Operation Deductions	Items related to the operations, verified from the beginning of the system's operation.

Global Context

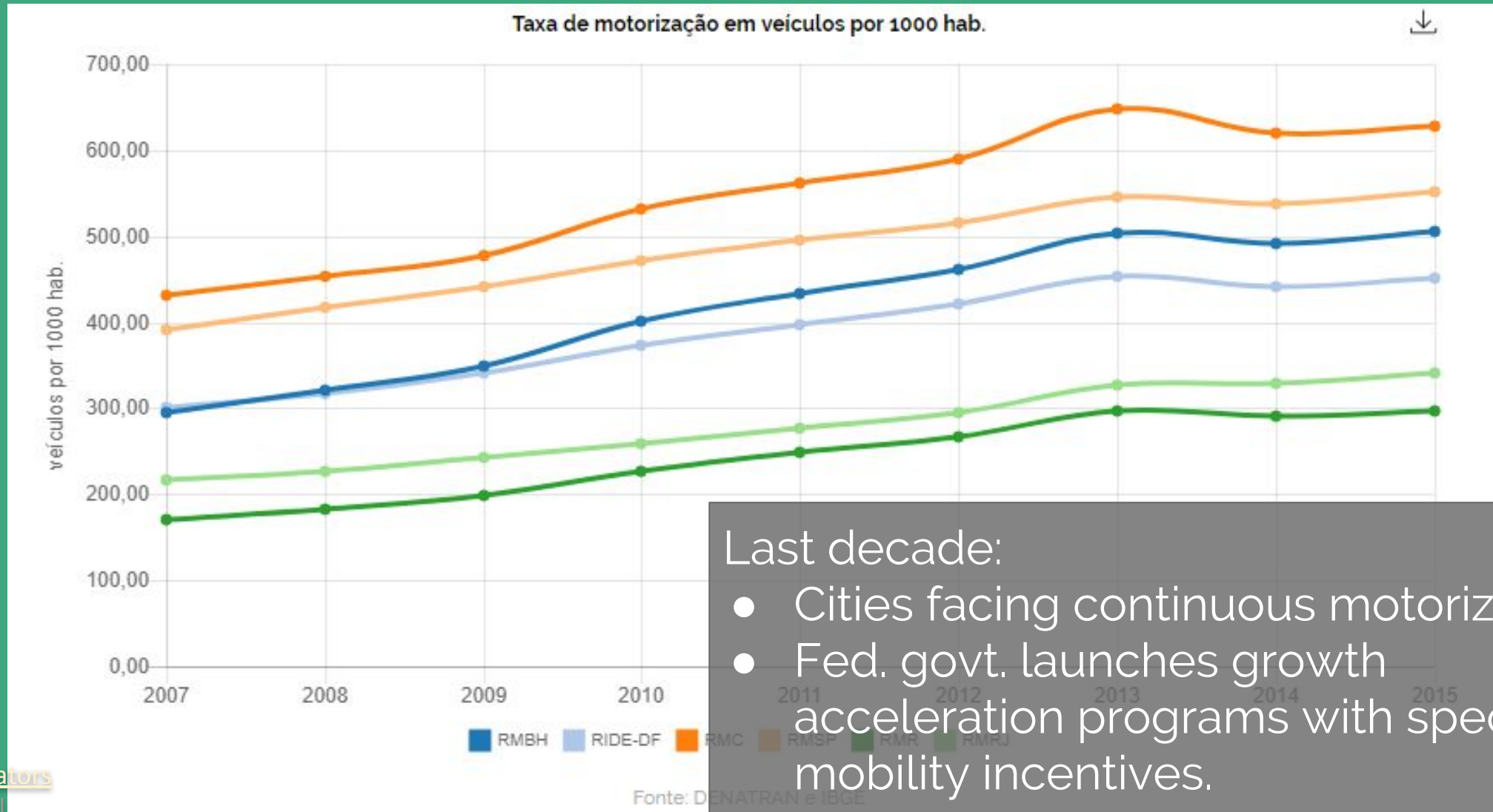
About 100 corridors already ranked in over 60 cities in the world.



3.

Results in Brazilian Cities

Brazilian Context



Last decade:

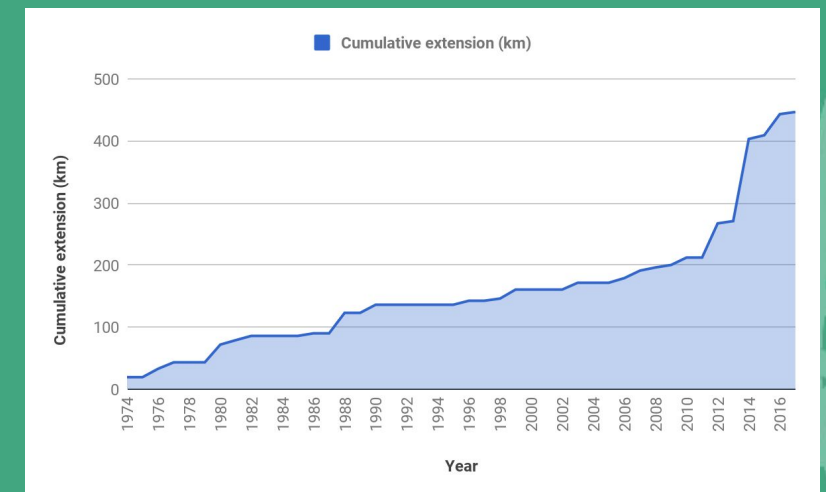
- Cities facing continuous motorization.
- Fed. gov. launches growth acceleration programs with specific mobility incentives.

Brazilian Context

16 Brazilian BRT Corridors evaluated with the BRT Standard from 2013 to the present date.

Validated:

- Belo Horizonte: MOVE Cristiano Machado e MOVE Antônio Carlos.
- Brasília: Expresso DF Sul.
- Curitiba: Rede Integrada de Transportes e Linha Verde.
- Goiânia: Eixo Anhanguera
- Recife: Via Livre Norte/Sul e Via Livre Leste/Oeste.
- Rio de Janeiro: TransOeste, TransOlímpica, TransCarioca.
- São Paulo: Expresso Tiradentes, ABD Diadema e ABD Extensão Morumbi.
- Uberaba: VETOR Leste-Oeste.
- Uberlândia: Estrutural Sudeste.



Curitiba, 1974-1990 - Rede Integrada de Transporte (47.1 mi)

city ~ 1.9 million inhab. // MA ~ 3.5 million inhab.



Goiânia, 1972 - Eixo Anhanguera (8.4 mi)

city ~ 1,3 million inhab. // MA ~ 2,5 million inhab.



São Paulo MA, 1988 - ABD Diadema (20.5 mi)

city ~ 12,1 million inhab. // MA ~ 21,3 million inhab.



Uberlândia, 2006 - Estrutural Sudeste (4.7 mi)

city ~ 650k inhab.



São Paulo, 2007 - Expresso Tiradentes (elevated busway) (7.5 mi)

city ~ 12,1 million inhab. // MA ~ 21,3 million inhab.



Gabriel T. de Oliveira, ITDP

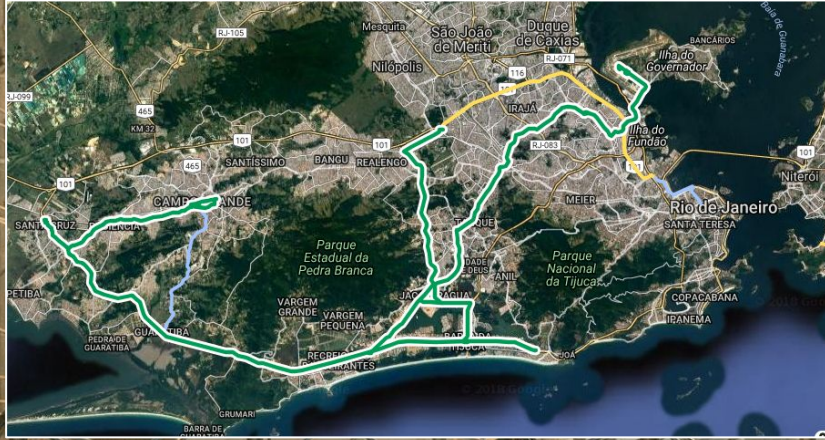
Rio de Janeiro, 2012 - BRT TransOeste (32.2 mi)

city ~ 6,5 million inhab. // MA ~ 12,3 million inhab.



Rio de Janeiro, 2014 - BRT TransCarioca (24.2 mi)

city ~ 6,5 million inhab. // MA ~ 12,3 million inhab.



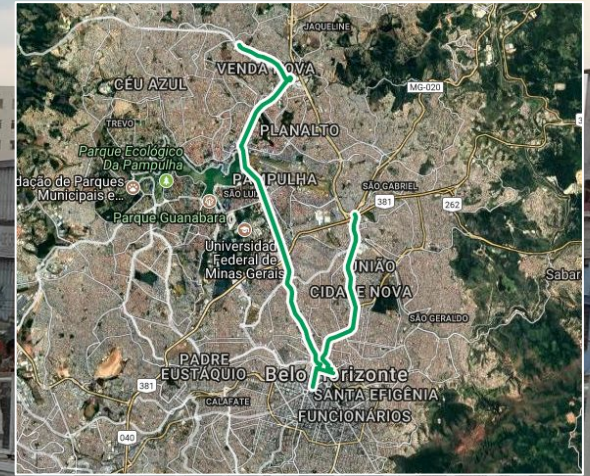
Belo Horizonte, 2014 - BRT MOVE Área Central and São Gabriel (5.2 mi)

city ~ 2,5 million inhab. // MA ~ 5,8 million inhab.



Belo Horizonte, 2014 - MOVE Antônio Carlos BRT (9.1 mi)

city ~ 2,5 million inhab. // MA ~ 5,8 million inhab.



Brasília, 2014 - BRT Expresso Sul

city ~ 3.0 million inhab. // MA ~ 4.3 million inhab.



Recife, 2014 - BRT Via Livre "E-W" & "N-S" (18.9 mi)

city ~ 1,5 million inhab. // MA ~ 4,0 million inhab.



Uberaba, 2015 - VETOR Leste-Oeste ("E-W") (3.1 mi)

city ~ 300k inhab.



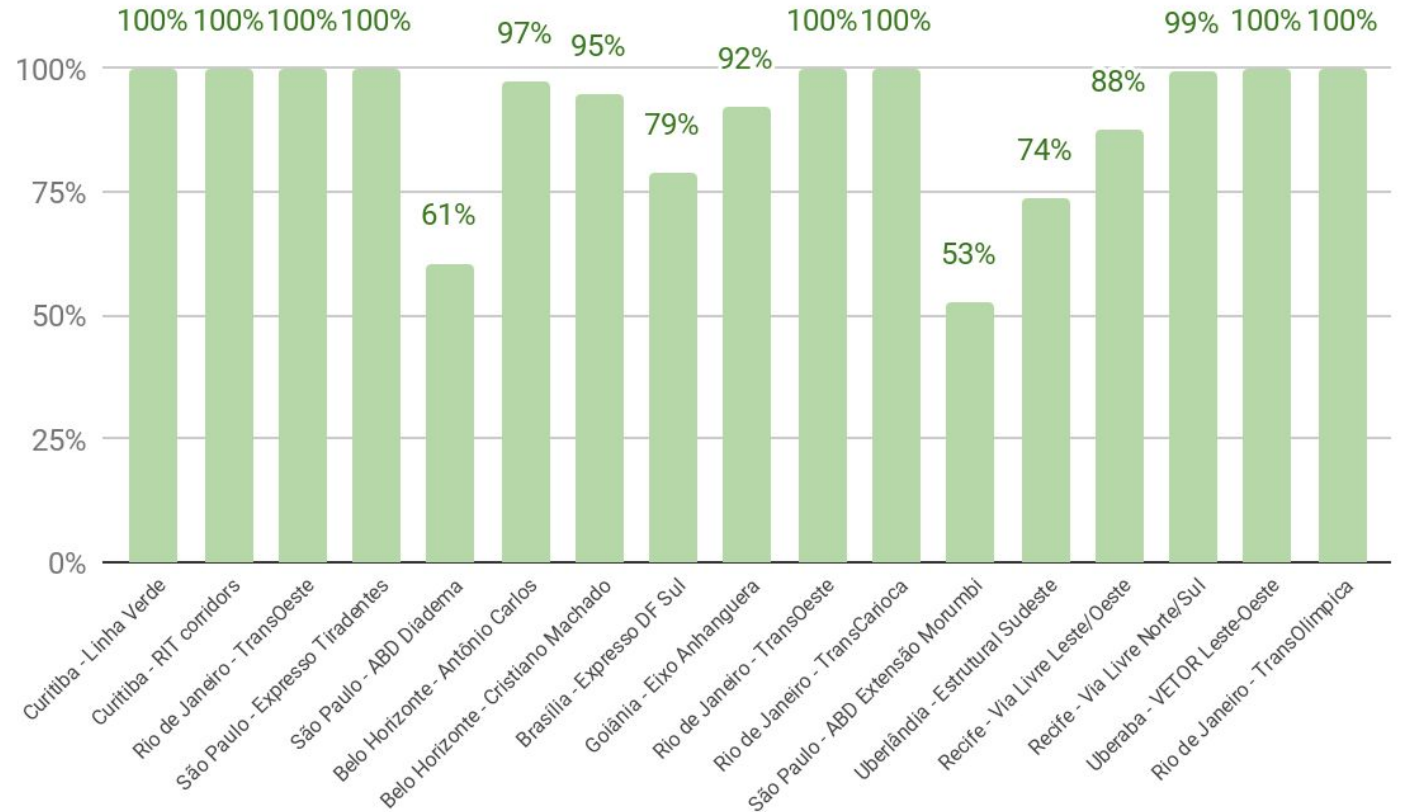
Results - BRT Basics

Items considered essential by the Technical Committee to qualify a corridor as BRT.

- ❑ Dedicated ROW
- ❑ Busway Alignment
- ❑ Off-Board Fare Collection
- ❑ Intersection Treatments
- ❑ Platform-level Boarding

BRT Basics

(% max. points attainable in the category)



Historical corridors in Curitiba counted firstly with fixed guideways median-aligned and two decades later adopted off-board fare collection and level boarding in enclosed stations.



Contemporary corridors such as Rio de Janeiro's continued to adopt the same features.



Rio de Janeiro, BRT TransCarioca
Source: ITDP Brasil
www.itdp.org.br

We can find examples of conventional bus services in median-aligned corridor with visual delineated ROW that do fit the minimum to qualify as a BRT.



São Paulo, ABD Extensão Morumbi
Source: ITDP Brasil

Even though Basics vary among corridors, there is a common threshold:

No Mixed Traffic

(even taxis) throughout the day

Mix traffic is inefficient, inequal and unsustainable.



Rio de Janeiro, Brasil

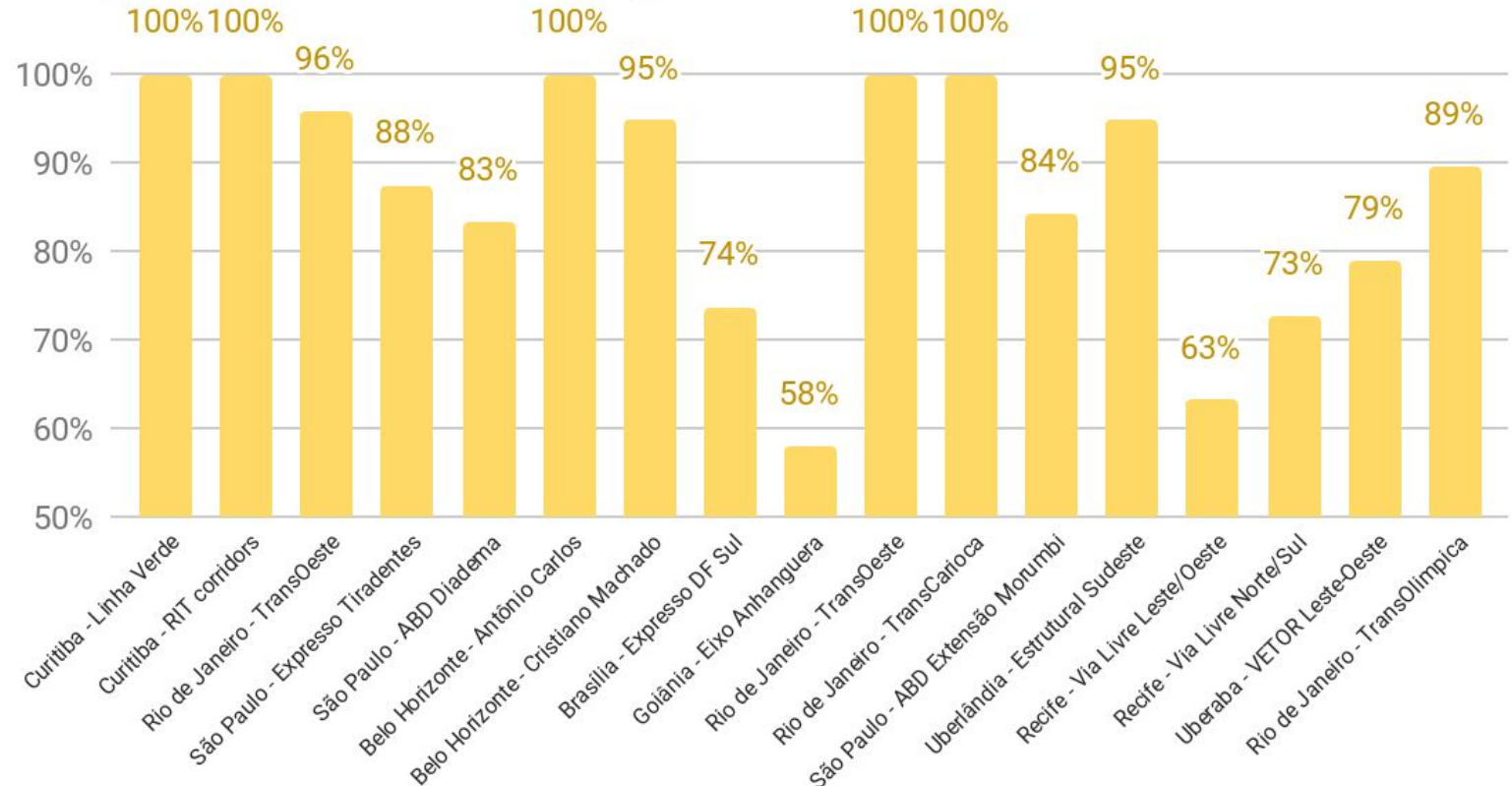
Results - Service Planning

Items that improve the attendance of passengers' travel desires.

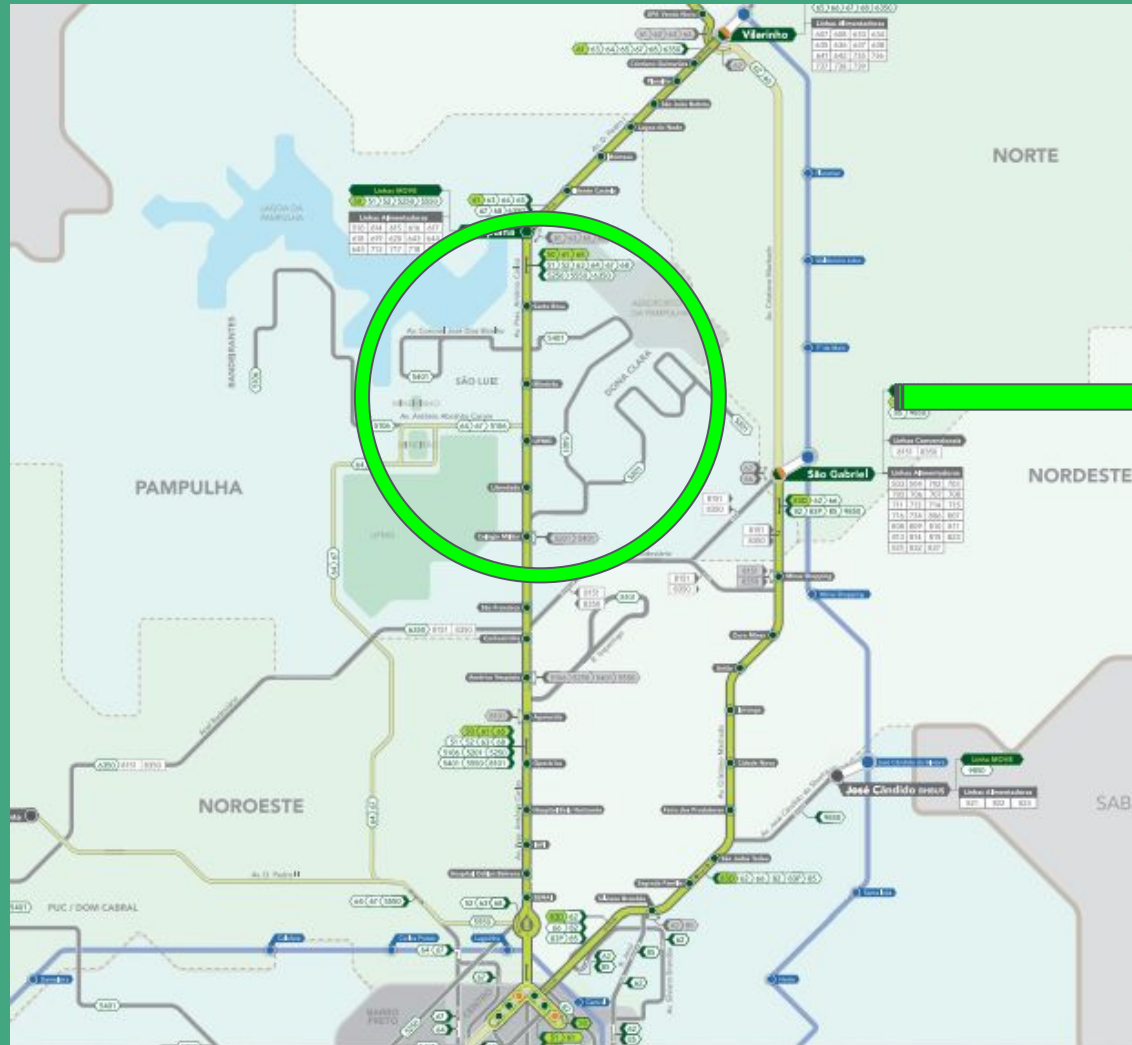
- ❑ Multiple Routes
- ❑ Express, Limited-Stop, and Local Service
- ❑ Control Center
- ❑ Located in Top Ten Corridors
- ❑ Demand Profile
- ❑ Hours of Operations
- ❑ Multi-Corridor Network

Service Planning

(% max. points attainable in the category)



Intricate services that have both trunk end-to-end route and routes that serve part of the corridor.



However, as what happens in other corridors, infrastructure is discontinued just where there is more demand: the entrance to the CBD. This is the case in Belo Horizonte, Recife, Brasília and Fortaleza.



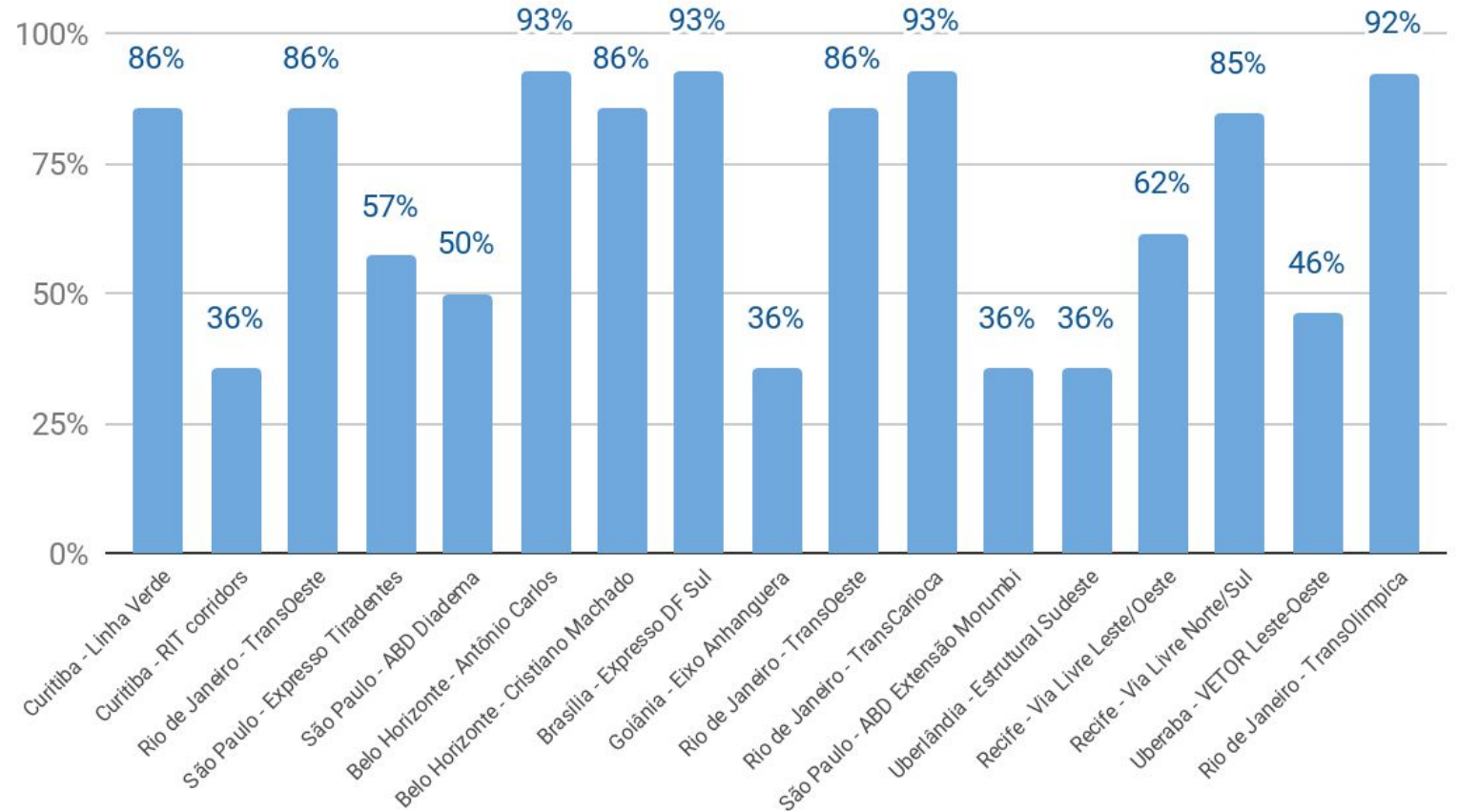
Results - Infrastructure

Items that bring sustainability to the infrastructure and the system in the medium and long term.

- ❑ Passing Lanes at Stations
- ❑ Stations Set Back from Intersections
- ❑ Center Stations
- ❑ Pavement Quality
- ❑ Minimizing Bus Emissions

Infrastructure

(% max. points attainable in the category)

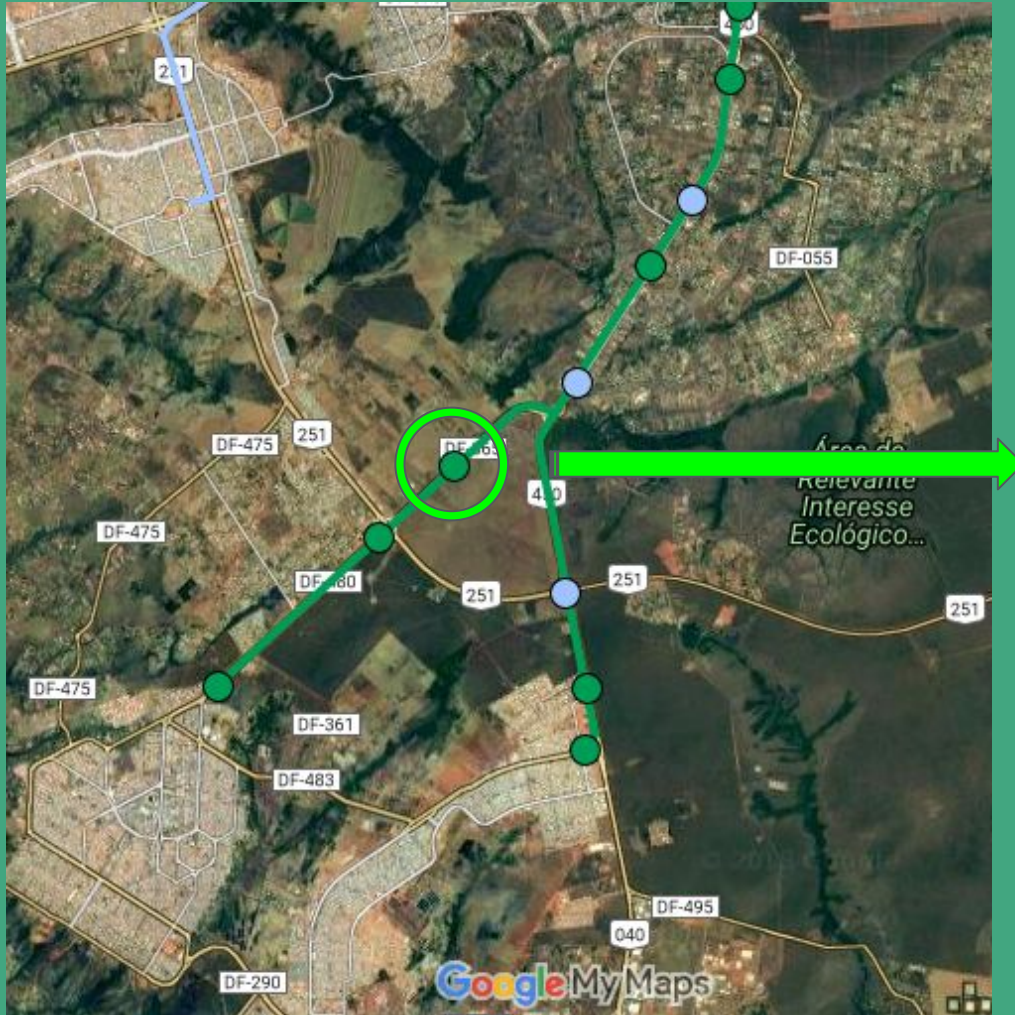


Infrastructure from the corridors implemented in the 70's and 80's and specially the absence of passing lanes has made it hard to cope with increasing ridership. Contemporary corridors shall be more flexible in this aspect.



Belo Horizonte, BRT MOVE Cristiano Machado
Source: ITDP Brasil

Infrastructure needs to understand and be supported by the surrounding environment. Example of a complex station from Brasília's corridor, located in the middle of a low- (to no-) density zone.



Brasília, Expresso DF Sul

Source: Google Maps and ITDP Brasil

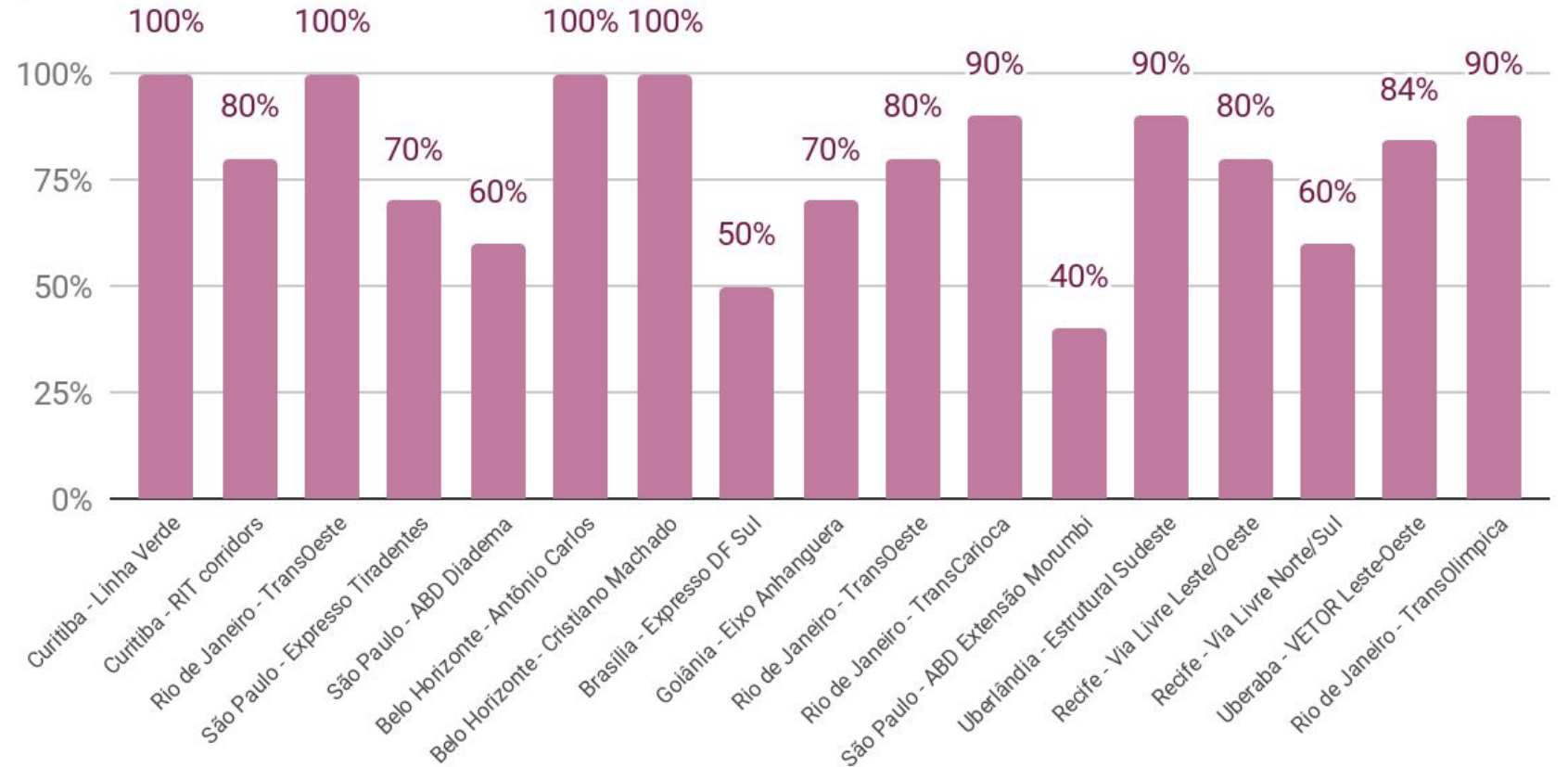
Results - Stations

Items from the BRT corridor station and the interface between buses and the platform used for boarding and alighting.

- Distances Between Stations
- Safe and Comfortable Stations
- Number of Doors on Bus
- Docking Bays and Sub-stops
- Sliding Doors in BRT Stations

Stations

(% max. points attainable in the category)



From conventional shelters...



São Paulo, Extensão Morumbi
Source: ITDP Brasil

... To pre-payment stations that offer adequate shelter, information and improved safety.



Belo Horizonte, MOVE Área Central
Source: Mariana Gil, EMBARQ/WRI Brasil

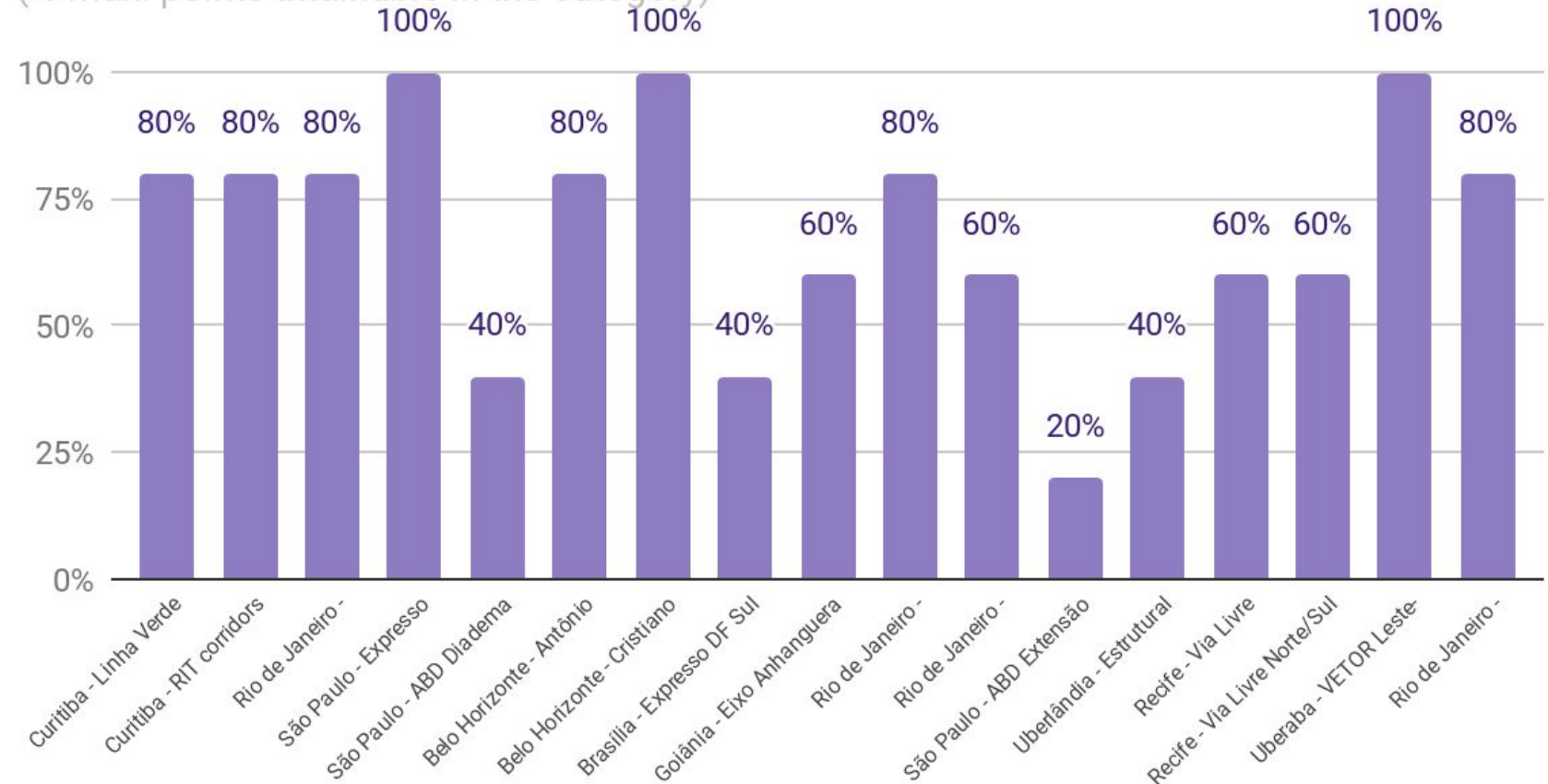
Results - Communications

Items related to the communication to the population of the system branding and the planned service information.

- Branding
- Passenger Information

Communications

(% max. points attainable in the category)



Precise real time information is rare. Uberaba BRT is one of the best examples of on-time ETAs.



Uberaba, Estrutural Sudestes
Source: ITDP Brasil

Even complex systems, like the one in Belo Horizonte, didn't give information a major role when launching the system (since then, the municipal agency has improved communications in the system).



Improvements noted in some systems, including Rio de Janeiro and Belo Horizonte.



BRT MORRO DO OUTEIRO		RIO 16:39	
Destino	Serviço	Próximo	Seguinte
J. Oceanico	EXPRESSO	Aproximando	-
Vila Militar	PARADOR	Aproximando	-
Vila Militar	TRONCAL	5 min	-
Sulacap	EXPRESSO	5 min	9 min
Recreio	EXPRESSO	10 min	21 min
Recreio	PARADOR	30 min	-

7. MAIS DE 9 MILHÕES DE CLIENTES TRANSPORTADOS POR MÊS. REDUÇÃO DE 38% DE CO2.

Imprecise information in the real-time panel. After the evaluation, improvements made the display more intuitive for users

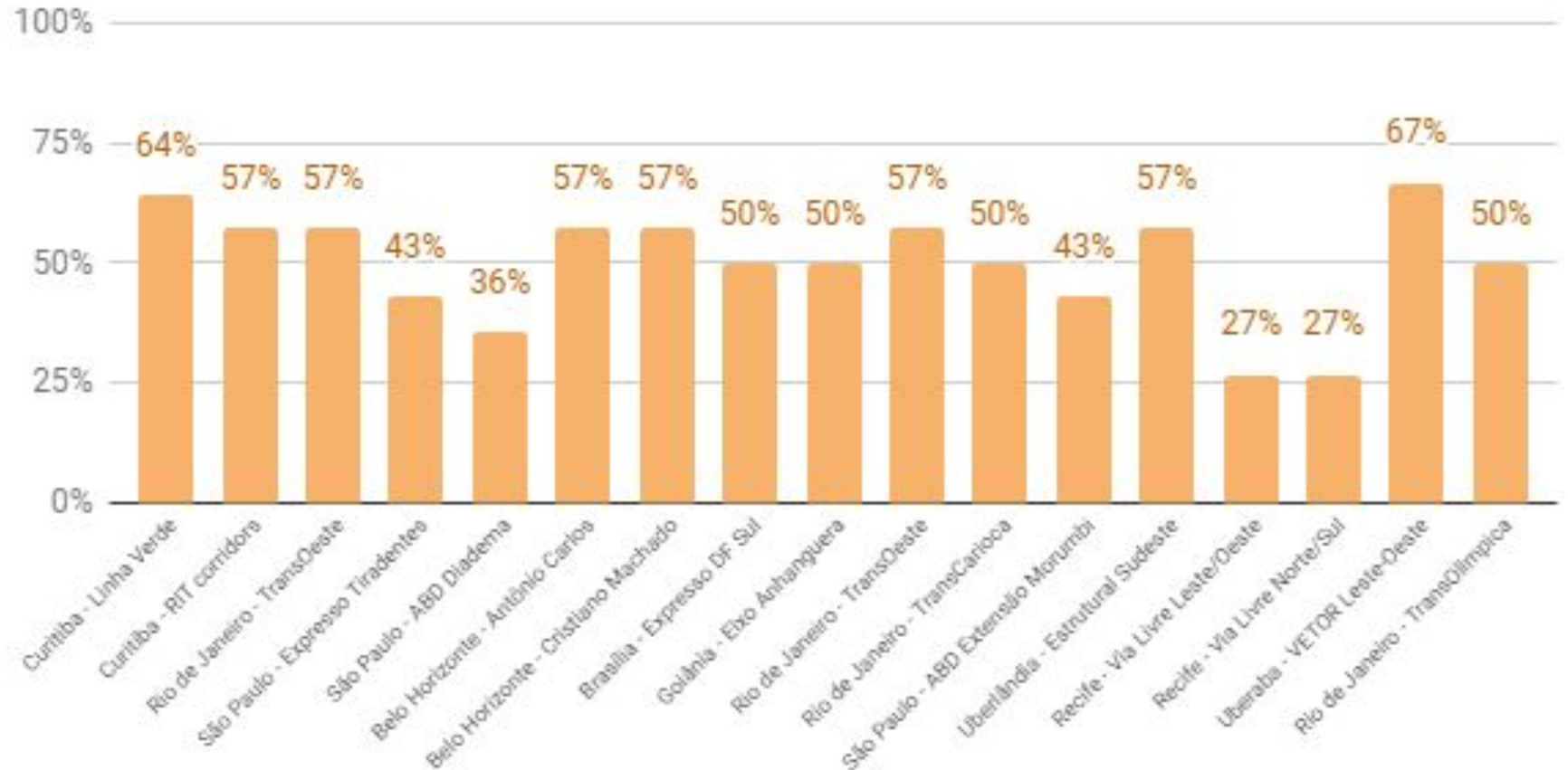
Results - Access and Integration

Items of access by walk or by bicycle, of universal accessibility and of integration with other modes of transport.

- ❑ Universal Access
- ❑ Integration with Other Public Transport
- ❑ Pedestrian Access and Safety
- ❑ Secure Bicycle Parking
- ❑ Bicycle Lanes
- ❑ Bicycle-Sharing Integration

Access and Integration

(% max. points attainable in the category)



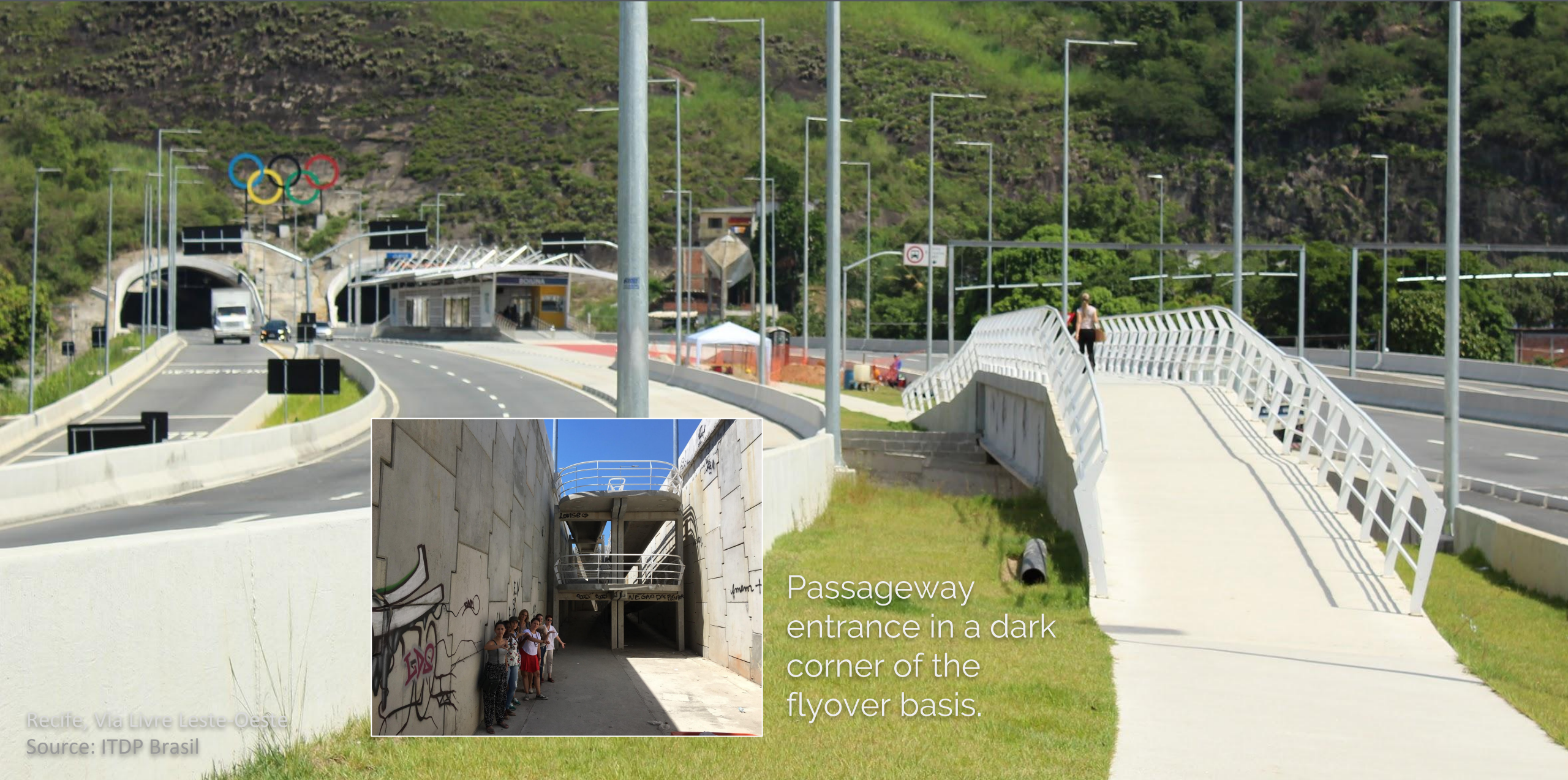
Achilles' heel of Brazilian BRT corridors:
integration with the
surrounding environment.

In many examples, the infrastructure project does not covers the immediate crossings and sidewalks. There is often a lack of cycling infrastructure.



Recife, Via Livre Leste-Oeste
Source: ITDP Brasil

Flyovers will occasionally create long passageways for pedestrians with poor safety and walking conditions..



Passageway entrance in a dark corner of the flyover basis.

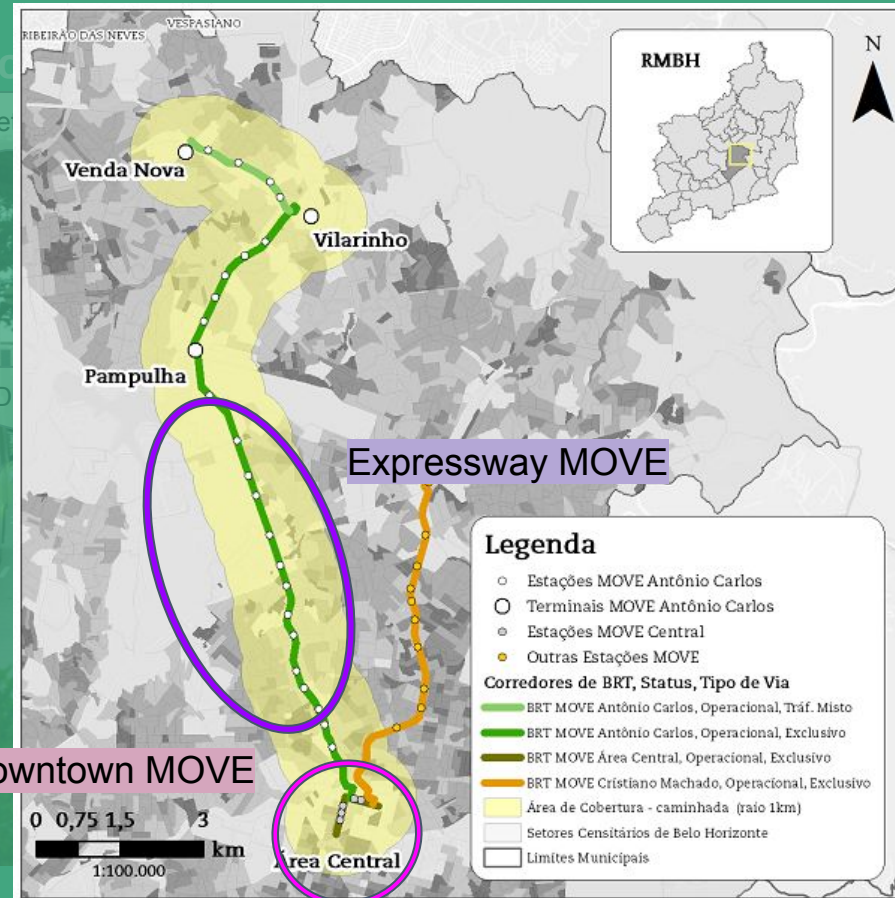
Few corridors adopt conventional cycling parking at the station entrance like TransCarioca BRT in Rio de Janeiro. In most cases, bicycles are spotted attached to rails and poles.



One case stands out... the Belo Horizonte's Downtown MOVE (which has a different project typology than the Expressway corridors).

Same corridor different typology:

Downtown MOVE - "Qualificac



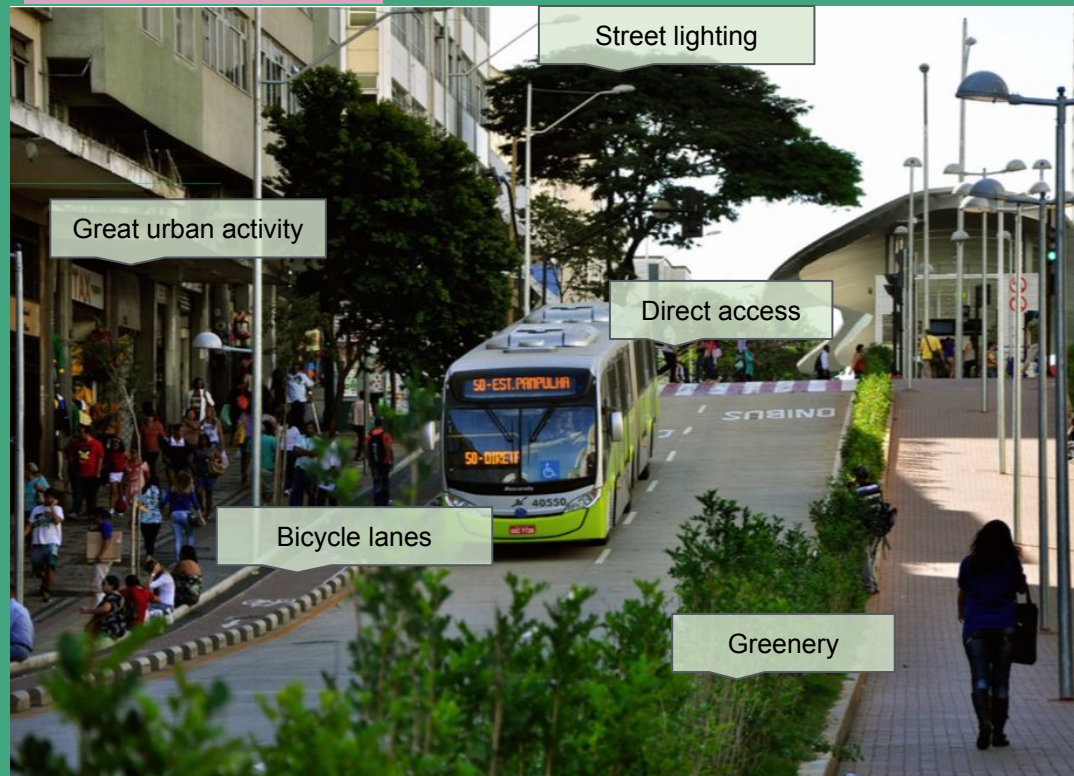
'Express Corridor'



One case stands out... the Belo Horizonte's Downtown MOVE (which has a different project typology than the Expressway corridors).

Same corridor different typology:

Downtown MOVE - "Qualification Corridor"



Expressway MOVE - "Express Corridor"



In the Downtown Area, the project brought major improvements for pedestrian and cycling access and mobility safety while maintaining the original urban landscape..

Before



After



In the Downtown Area, the project brought major improvements for pedestrian and cycling access and mobility safety while maintaining the original urban landscape..

Before

After



Av. Paraná
Belo Horizonte, Minas Gerais
Google, Inc.
Street View - set 2015

Source:
Google Street View

In the Downtown Area, the project brought major improvements for pedestrian and cycling access and mobility safety while maintaining the original urban landscape..

Before



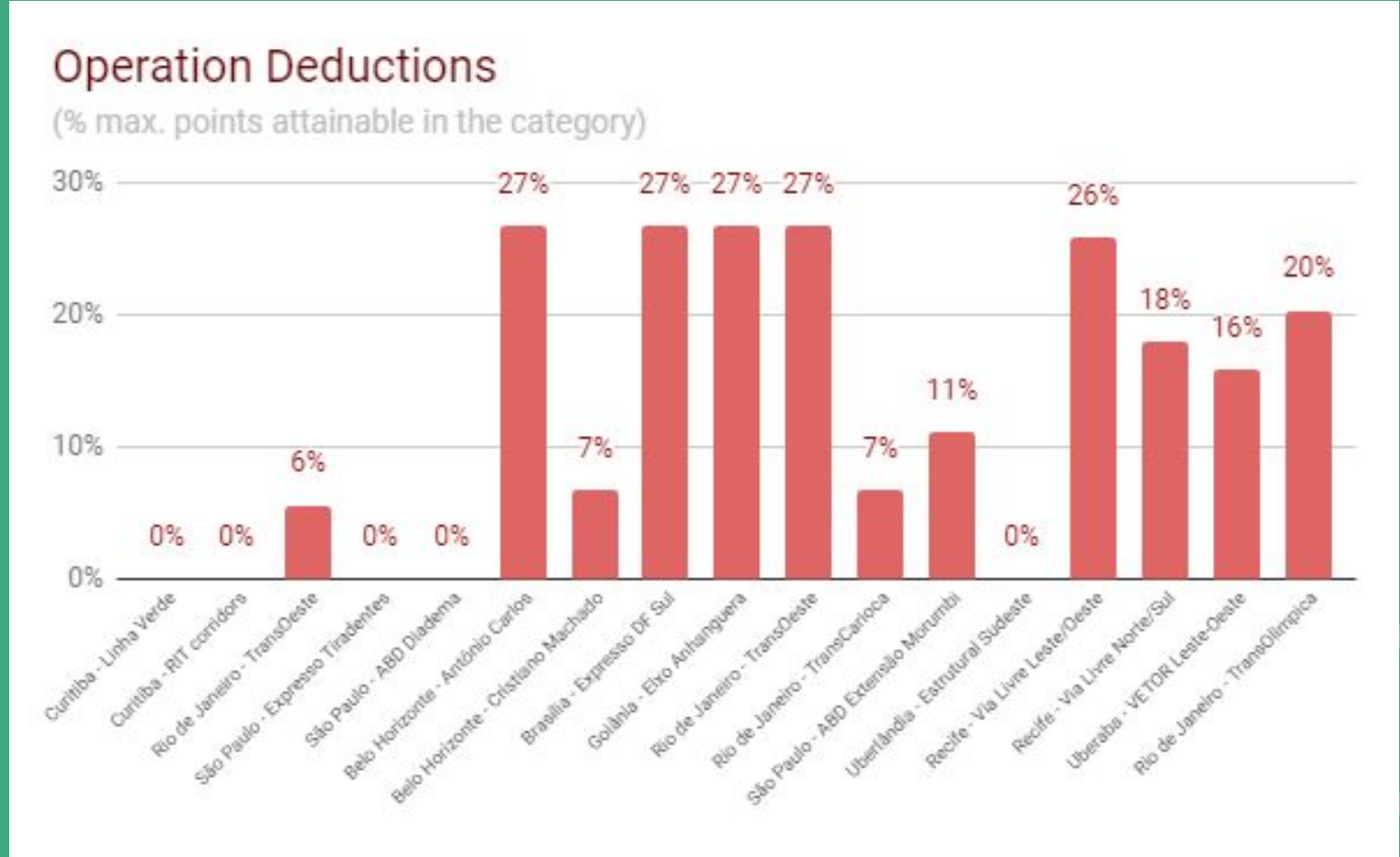
After



Results - Operation Deductions

Items related to the operations, verified from the beginning of the system's operation.

- Commercial Speeds
- PPHPD Below 1,000
- Lack of Enforcement of ROW
- Significant Gap Between Bus Floor and Station Platform
- Overcrowding
- Poorly Maintained Infrastructure
- Low Peak Frequency
- Low Off-Peak Frequency
- Permitting Unsafe Bicycle Use
- Lack of Traffic Safety Data
- Buses Running Parallel to BRT Corridor
- Bus Bunching



These complex infrastructures
have been presenting
serious operational challenges
since their launching...

The 2016 version of the BRT Standard puts a greater emphasis on such aspects.

Overcrowding is happening in the majority of corridors in Brazil...



Rio de Janeiro, BRT TransOeste

Source: [Globo](#)

And so is fare evasion (which can attain between 10-15% of the current ridership)...



Rio de Janeiro, BRT TransOeste

Source: [Globo](#)

... Vandalism.

“BRT Rio spends over 1 million Brazilian reais (250 k USD) per month on the system maintenance and send 15 vehicles to garage every day due to broken doors, seats, etc.” ([system operator](#))



Rio de Janeiro, BRT TransOeste

Source: [Globo](#)

And disregard to the transit exclusive ROW.



Rio de Janeiro, BRT TransOeste

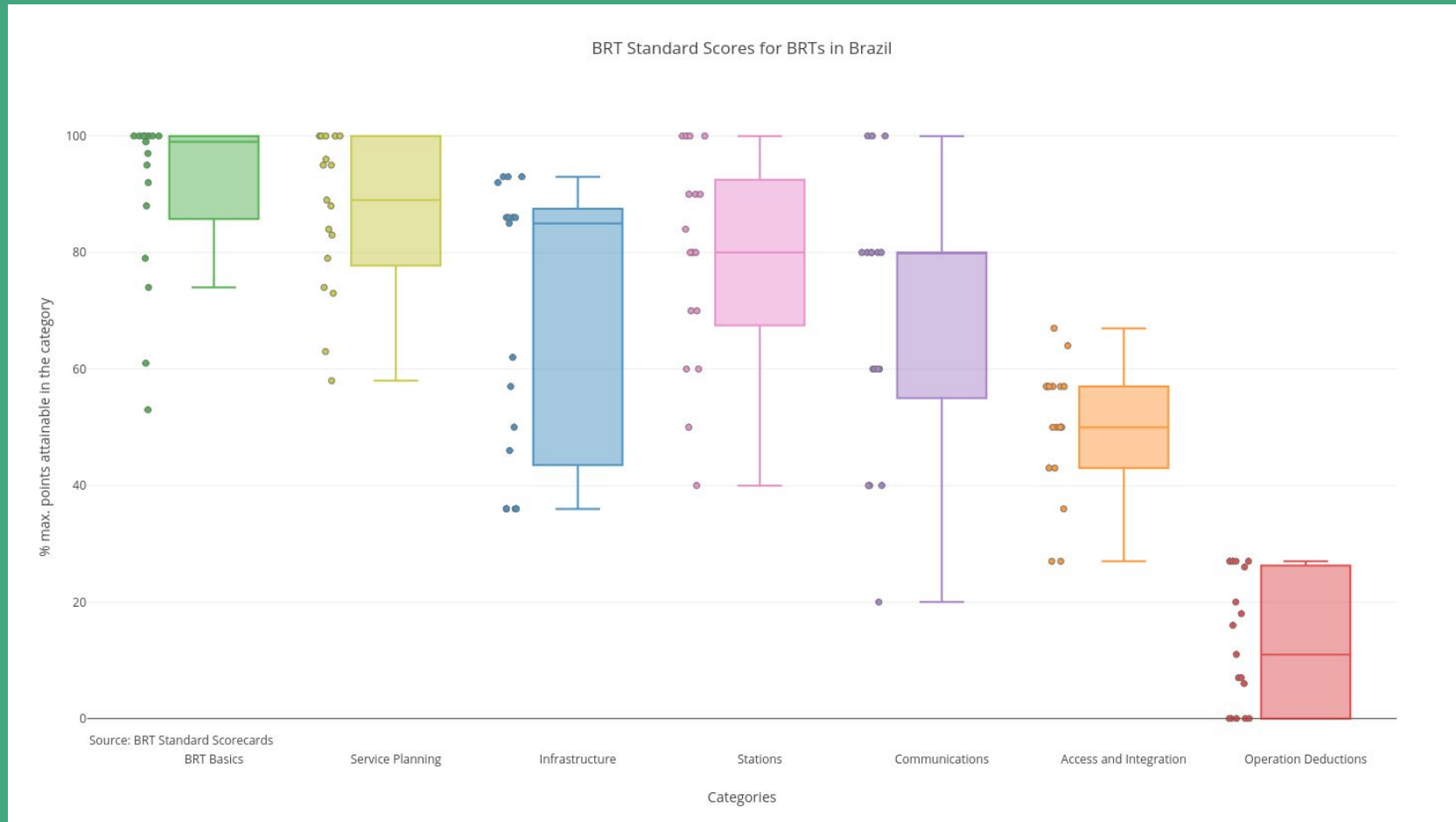
Source: [Globo](#)

Affecting transit riders and labour crew the most...



Brazil BRTs:

- Greater variance in Infrastructure and Communications.
 - Lower results in Access and Integration.
- Operation deductions reveal that corridors are performing badly once launched.

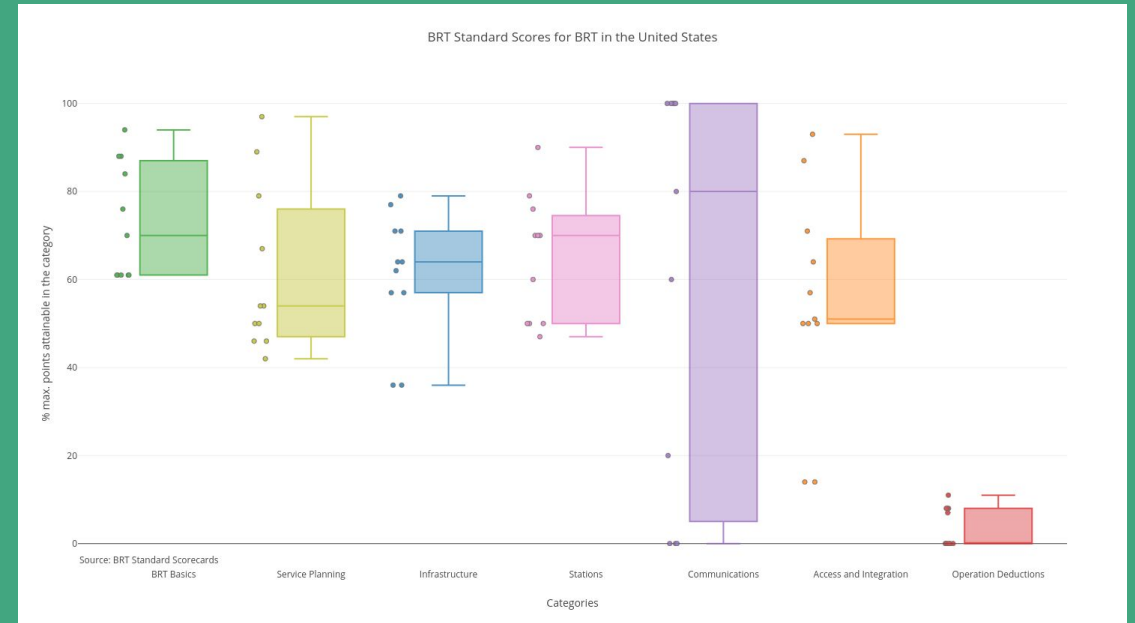


What about the US? 11 corridors assessed

- Simpler Infrastructure (due to lower ridership?).
- More divergence in Branding and Information Communications.
 - Better general Access and Integration.
 - Less Deductions in Operations.



Brazil



US

Results available in: [ITDP - TRB Presentation - BRT Scorecards Analysis worksheet](#)

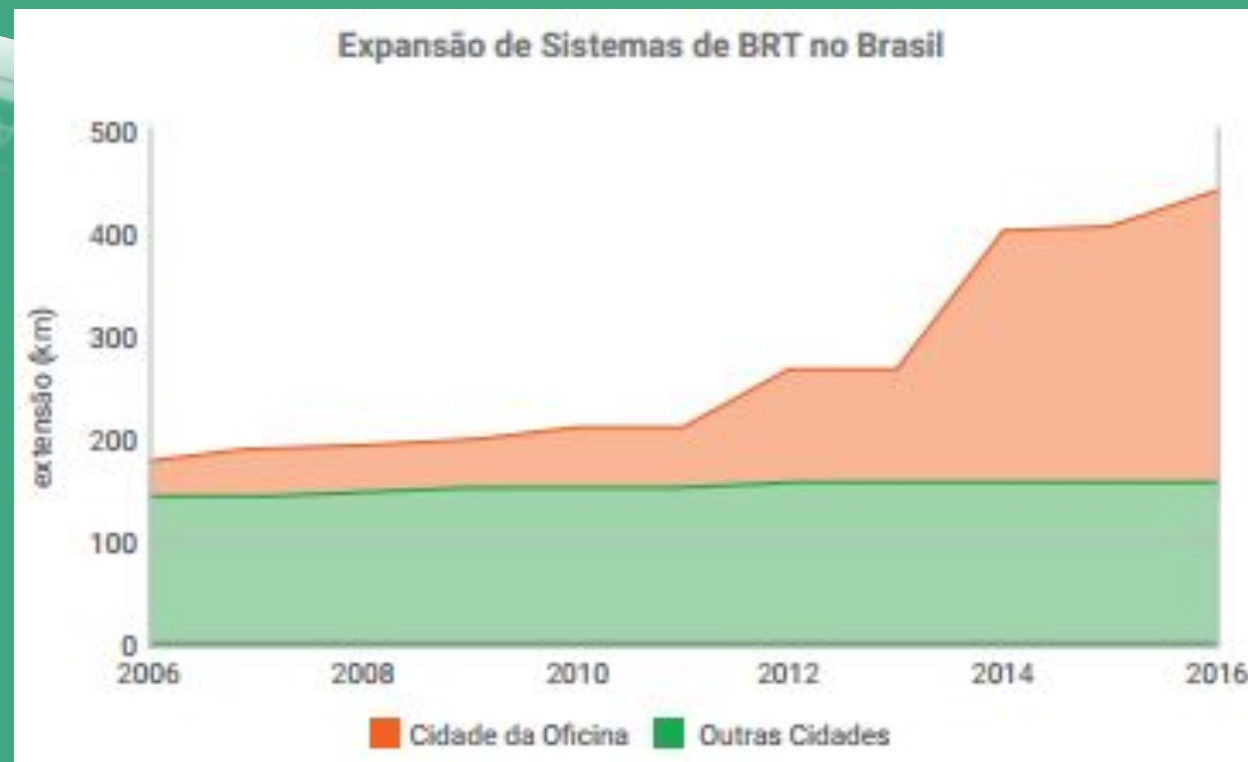
4.

Exchanging Experience
and Finding Trends

Experts from 6 cities where BRTs expanded the most



- Public managers
- Financing agencies
- Private operators
- Civil society institution



Participants at the 1st experience-sharing workshop.



Main common issues and trends



Integration in
management and
governance

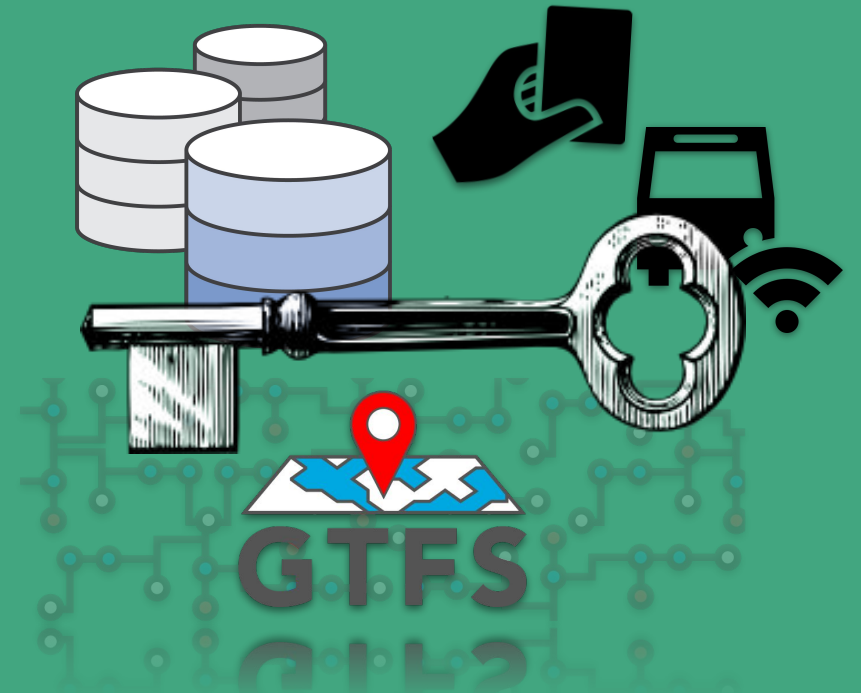
Main common issues and trends



Integration in
management and
governance



Innovation and data
appliance on
management



Main common issues and trends



Integration
management
governance



Users and human
resources engagement



Main common issues and trends



Integration in
management and
governance



Sharing technical
solutions



and human
engagement



Main common issues and trends



Integration in
management and
governance



Innovation and data
appliance on
management



Users and human
resources engagement



Sharing technical
solutions



Policy, contracts and
political continuity

Main common issues and trends



Integration in
management and
governance



Innovation and data
appliance on
management



Users and human
resources engagement



Sharing technical
solutions



Policy, contracts and
political continuity



Operational costs prevision
and guarantee of financial
resources

Main common issues and trends



Integration in
management and
governance



Innovation and data
appliance on
management



Users and human
resources engagement



Sharing technical
solutions



Policy, contracts and
political continuity



Operational costs prevision
and guarantee of financial
resources

Way Forward



Experience-Sharing
Exercises

+

Capacity and
Leadership Building

Obrigado! *Thank you!*



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