





## Cincinnati Funiculars

- Moved Streetcars from the base of hills to the top of the hills.
- Opened up new areas of the city to Tram-based travel that would otherwise have been impossible.
- A great example of how transit technologies can help each other and work together rather than compete.



Transit Techno-Zealotry vs. Multi-Modality

A photograph showing the silhouettes of children inside a cable car. One child with pigtails is reaching up to hold onto the ceiling. Another child's head is visible on the right. The background is a blurred view of a city and other cable cars. A blue banner with white text is overlaid at the bottom.

## CABLE PROPELLED TRANSIT





## Aerial vs. Terrestrial



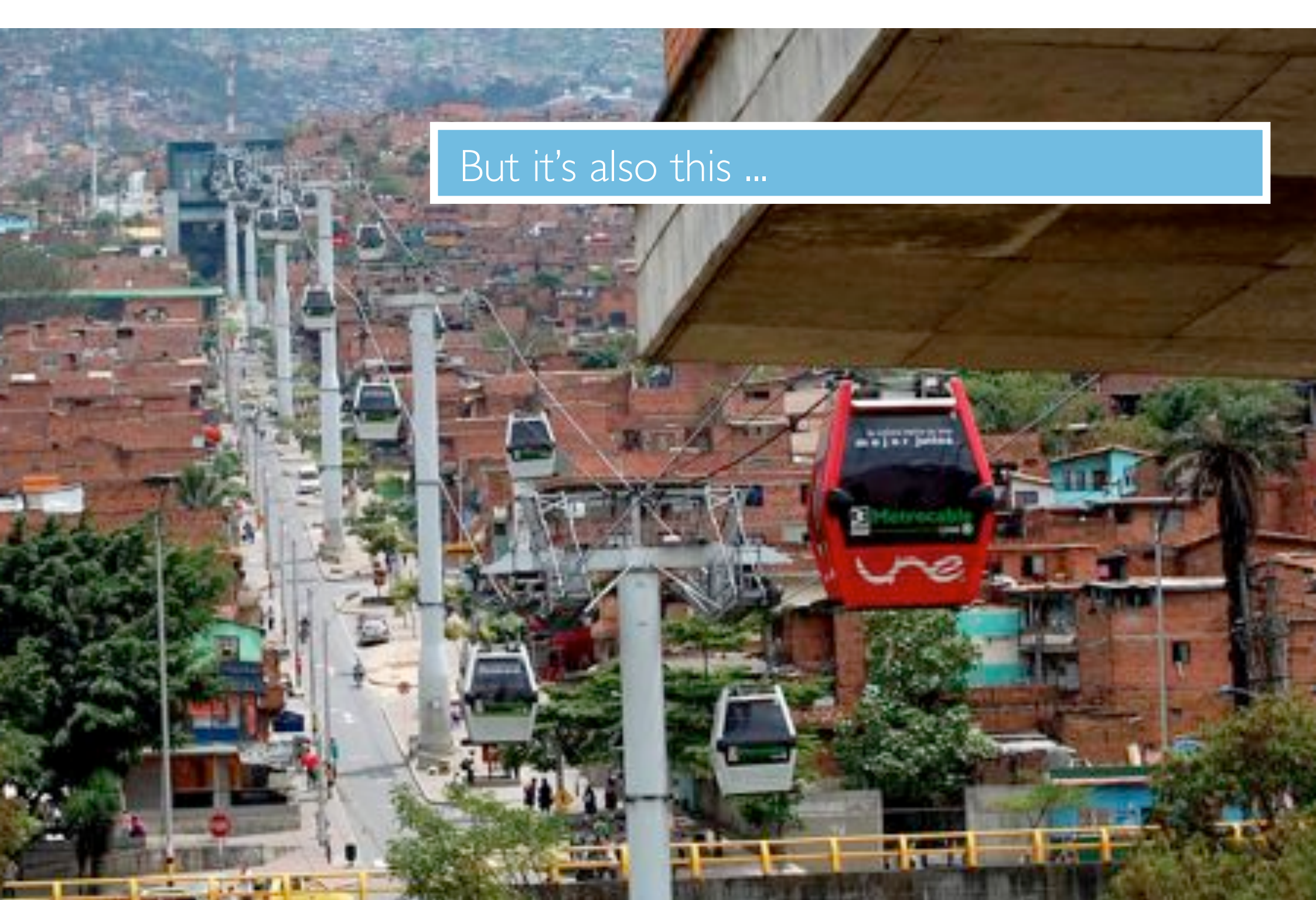
When we talk about CABLE TRANSIT,  
we normally think of this...



[image from flickr user willposh](#)



But it's also this ...





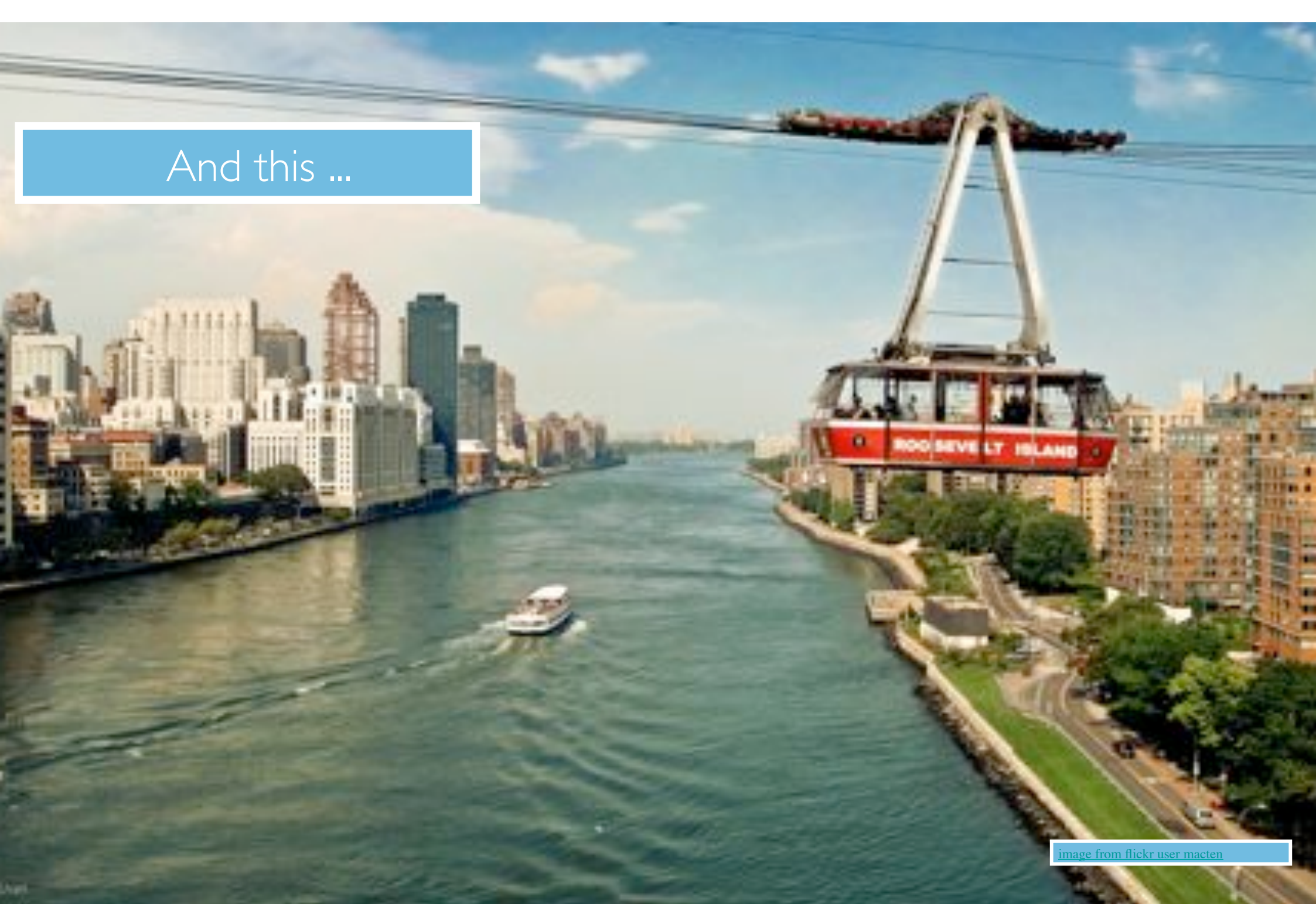
And this ...



[image from flickr user //lucylu](#)

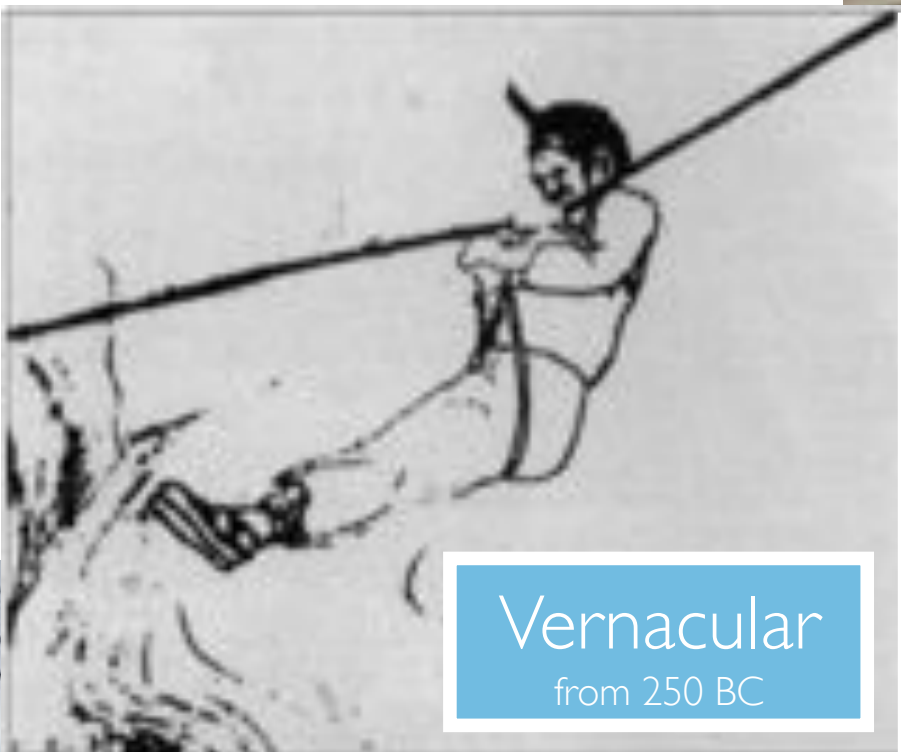


And this ...



[image from flickr user macten](#)





Vernacular  
from 250 BC



Industrial  
from 1834



Recreational  
turn of the 19th century



Urban  
from 1976



## Original Roosevelt Island Tram, 1976

- Originally a temporary installation
- Suffered from lack of full-integration
- Since full-integration in the mid-2000's, it quickly became the favoured mode of travel for Roosevelt Island residents
- Fully overhauled in 2010



[image from flickr user kitch](#)

## Mount Avila Teleférico, late 1990's

- Arguably, the genesis point of all contemporary CPT installations.
- Connected suburbs of Caracas to the Mount Avila resort several km's away.
- Plans to extend the teleférico to the ocean on the other side of the mountain.





- Directly inspired by Mount Avila
- World's first fully-integrated (aerial) Cable Propelled Transit system
- ~ 2 km in length
- 3,000 pphpd
- ~\$25m (US) all in
- 40,000 rides per day

## Medellín Metrocable - Linea K, 2004



- Made possible by the tremendous success of Linea K
- ~ 3 km in length
- 3,000 pphpd
- ~\$50m (US) all in
- Like Linea K, the system is partly responsible for massive social and community development

## Medellín Metrocable - Linea J, 2007/08





- Fully-integrated
- 3,000 pphpd
- \$18m (US) for electro-mechanical
- Additional \$300m (US) for community centre/station infrastructure - a point of confusion
- Two 90 degree turns
- 5 stations
- Plans for another 8 systems

## Caracas Metrocable - San Augustin, 2010





## Medellín Metrocable - Linea L, 2009

- Expansion of Linea K
- 5 km
- ~ \$26m (US) all in
- Only 2 stations
- Meant to service nature preserve.
- Due to the nature of the system, a separate fare is required







## Teleferico do Alemao - Rio, 2011

- Opened mid-2011
- ~ 3.4 km long
- 3 corners / turns
- 6 total stations - largest number ever.
- Borrows heavily from Caracas' social mandate.
- Second line already in planning stages



[image from flickr user Carlos Trinidad Fotojornalista](#)

## Portland Aerial Tram, 2006

- Inspired by RIT
- Stunning, customized architectural design.
- Integrated physically, no integration by fare.
- \$57 m (US) all in
- Ridership double forecasts
- 300 - 400% over budget depending upon estimates



[image from flickr user compuJeramey](#)



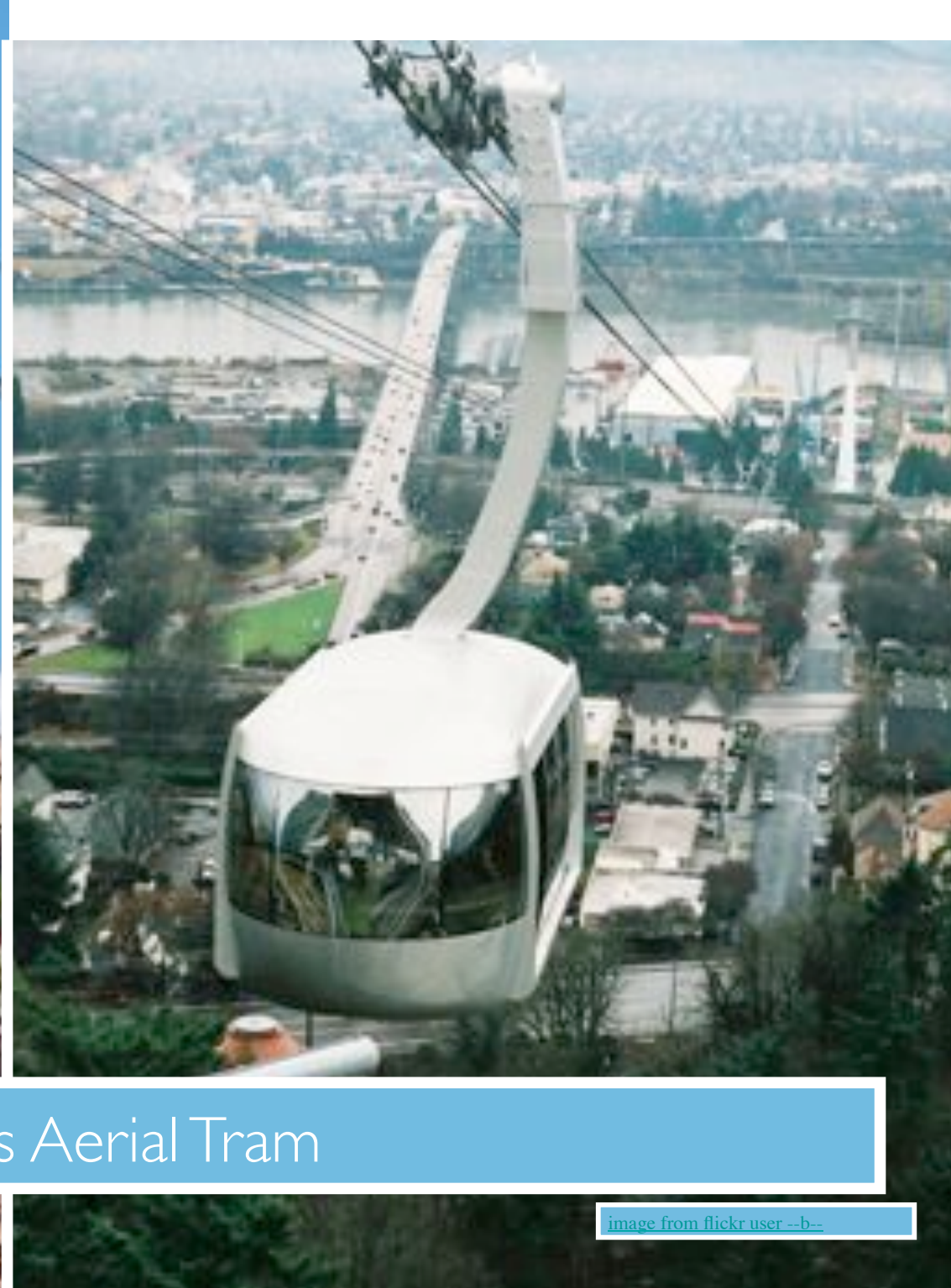


## Portland Aerial Tram, 2006

- Poor route alignment caused “issues” with community
- Also, it was arguably, a poor technology choice







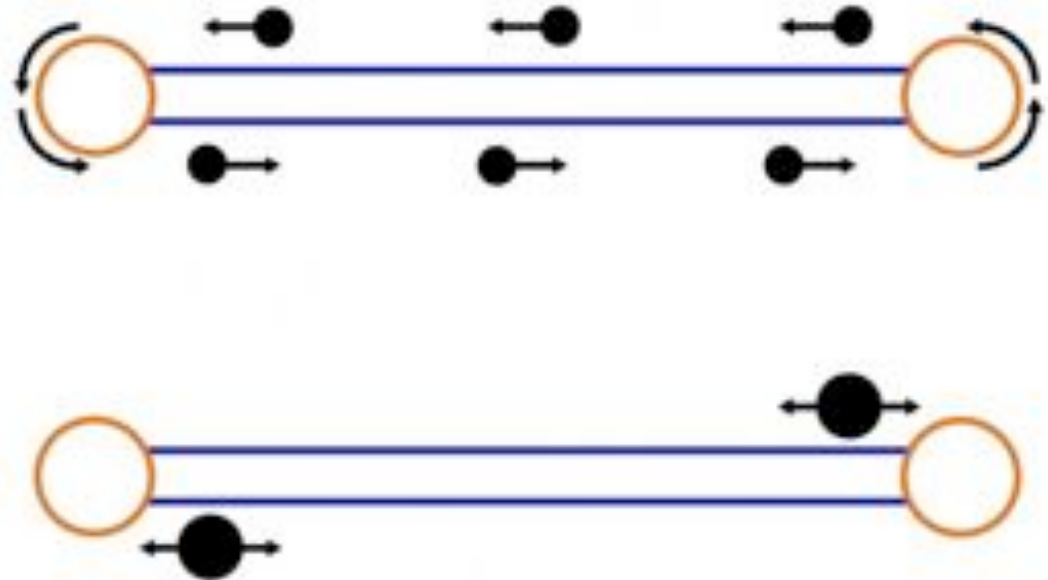
## Gondola vs Aerial Tram

[image from flickr user --b--](#)



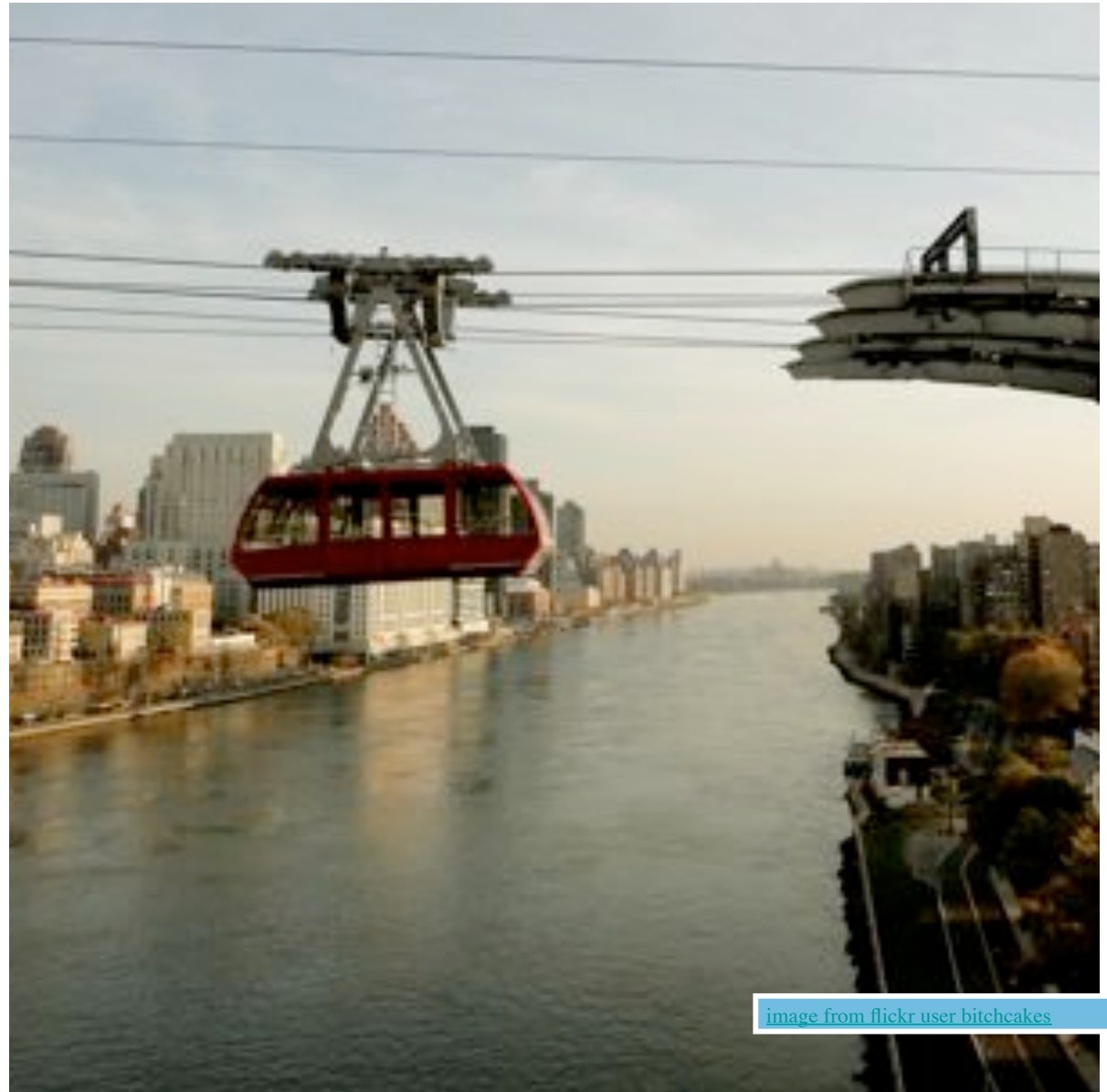
## Gondola vs Aerial Tram

- Continuously circulating versus shuttle-based.
- Arguably, aerial trams have the worst performance-cost package of all aerial CPT systems
- Corners are near impossible, wait times are long, and capacity is low despite having larger vehicles and faster top speeds



## New Roosevelt Island Tram, 2010

- A 'funifor' type system
- Allows for 24 hour, independent operation, easy O&M /evacuation procedures
- A clear step up from the Aerial Tram, but not as useful as a gondola



[image from flickr user bitchcakes](#)



## Other Noteworthy Systems



## Koblenz Rheinseilbahn, 2010

- Latest 3S technology - can carry up to ~ 8,000 pphpd
- A hybrid of Gondolas and Aerial Trams.
- Very slim-profile stations
- New “urban concept” vehicles
- ~ \$25m US
- Can operate in winds above 100 km/hr

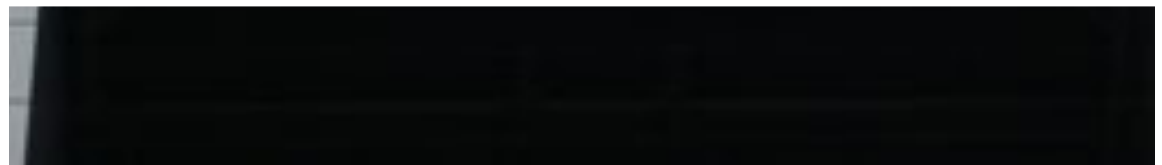




- Rebuild of an old bicable system (bicables generally no longer recommended)
- Unique VIP premium cabins
- Tourist installation
- Unique station configuration on the 15th floor of a skyscraper



Sentosa Island, Singapore - 2010





## Bolzano 3S - 2009

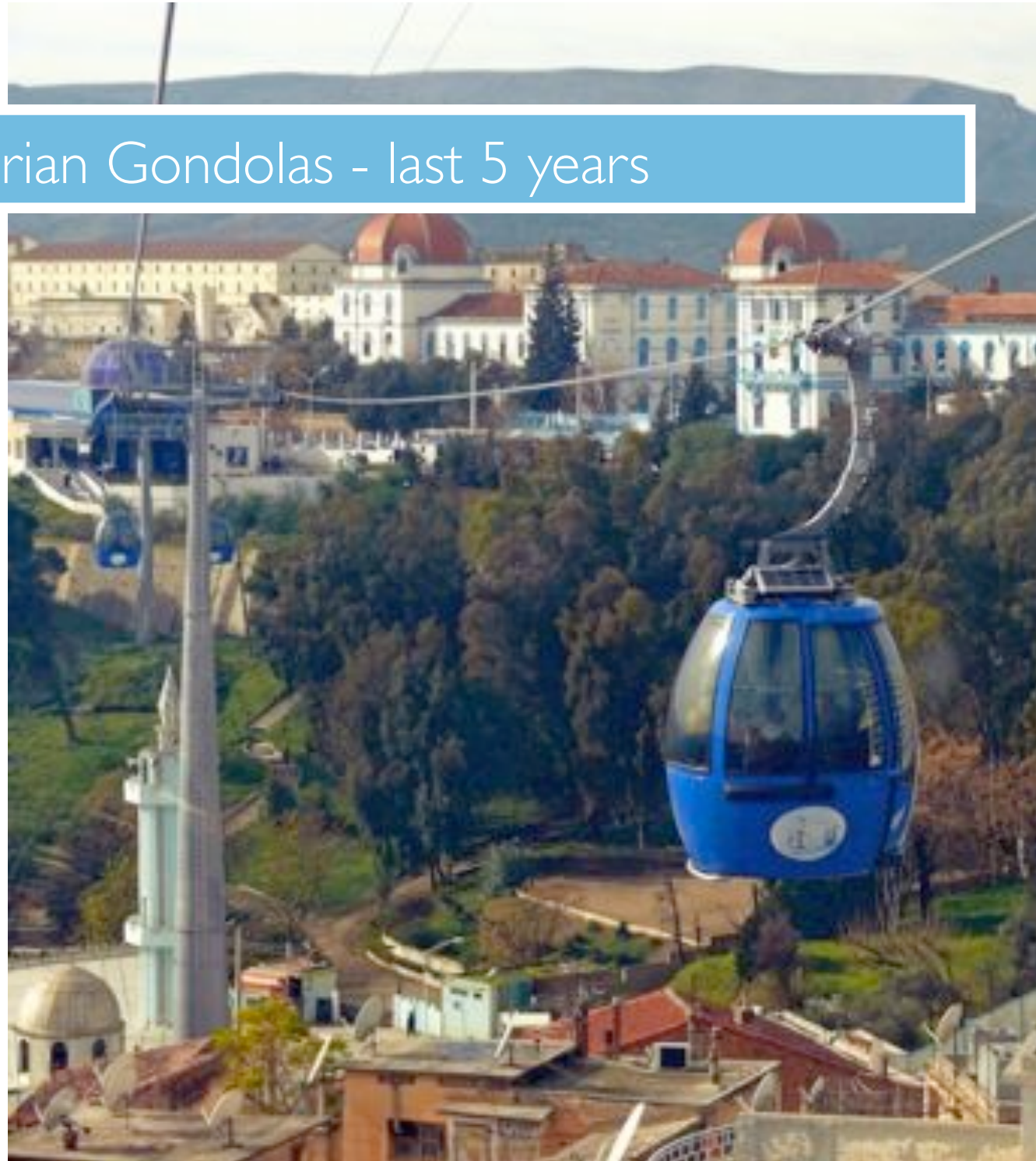
- Notable largely for its incredibly elegant station design.
- Station is perfectly integrated into the surrounding urban fabric
- Very slim-profile
- Almost invisible



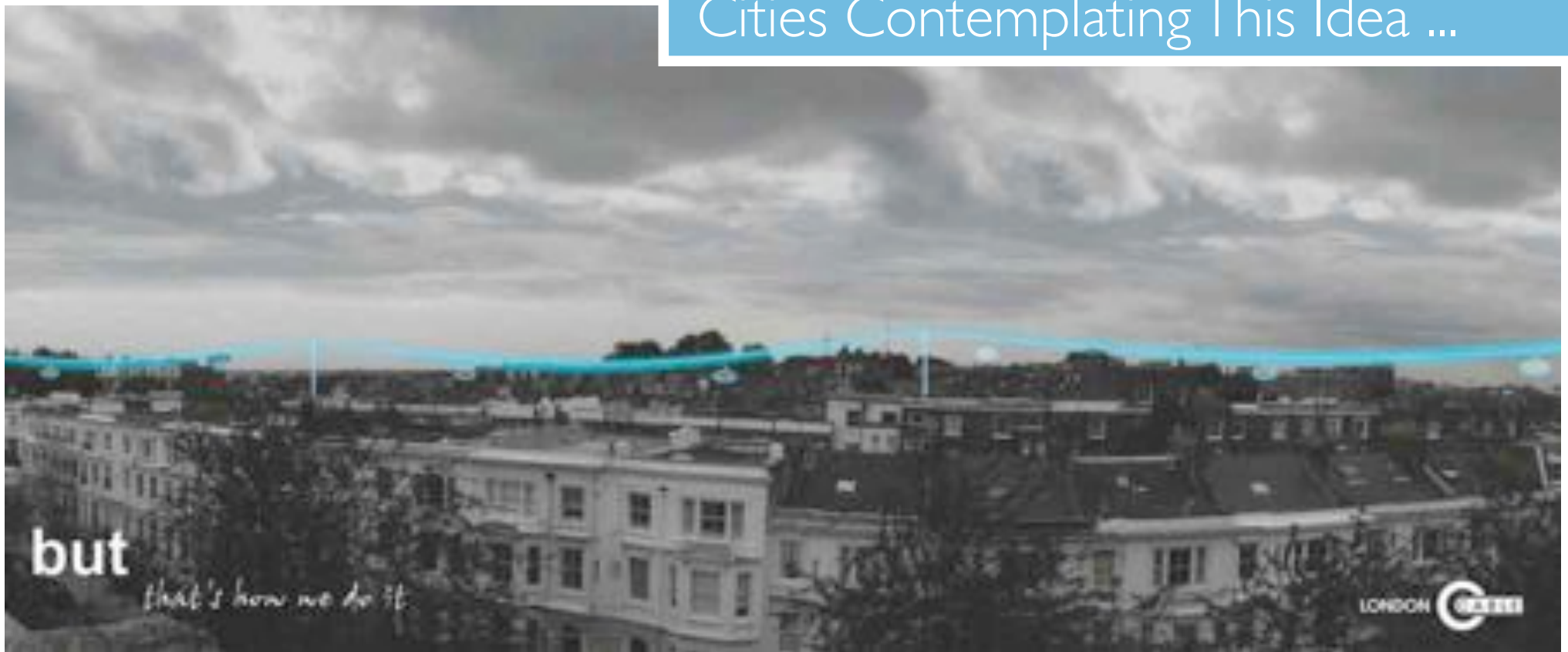


## Algerian Gondolas - last 5 years

- Much mystery
- Estimates range from 3 - 5 systems in operation across the country
- Full-integration
- Excellent blending of the technology with local, vernacular architecture



## Cities Contemplating This Idea ...





## London Thames Cable Car

- Built for the 2012 Olympics
- Cheaper than bridging the Thames
- Controversy surrounding fare & price
- Positioned poorly as transit



## Rio and South America in General

- Rio, Medellin and Caracas already planning and/or building new systems
- A recent study by CUP found over 57 systems in South America are being planned and/or built





## Makkah, Saudi Arabia

- CUP is working with the University of Toronto Cities Centre to help design an “Aerial Rapid Transit” component of Makkah’s new transit plan.
- Spurred largely by the need to move millions of pilgrims during the Hajj



[image from flickr user hamzahydri](#)

## Laval, Quebec

- Initial study by CUP to help inform STL about cable transit.
- Project has gone to feasibility.
- Would be the first fully-integrated system in the world not motivated by topographical challenges.





## Lagos, Nigeria

- CUP conducted initial feasibility study to explore a network of gondolas in the central business district of Lagos.
- Study well-received and the project is now at the AfDB awaiting final funding.



## Vancouver, BC

- Initial feasibility study completed to connect Simon Fraser University to nearby skytrain station
- Unfunded
- Business Case completed. Some opposition.



[image from flickr user jonwick04](#)



...Toronto ?

**TORONTO STAR**

FAMILY HISTORY AND PREVENTION OF AGING • [DOI: 10.1111/j.1365-2214.2009.01099.x](http://dx.doi.org/10.1111/j.1365-2214.2009.01099.x) • MEDICAL EDITORIAL BOARD



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Journal compilation © 2006 Blackwell Publishing Ltd

## IS IT TIME FOR TORONTO TO FINALLY GET CABLE?

Copyright © 2004 John Wiley & Sons, Ltd.

Urban planner says cable cars, at least here, are not the way.

See Institute for Economic Studies (IES) for more information.

## Island airport expansion set for takeoff

Air traffic is going up to 77 per cent by the end of 2001

1. **Author's name:** [Name]

For the Domestic Market segment, sales within the year of acquisition

As the author explains, the author's intention is to provide a comprehensive overview of the current state of the field. The book is written for a general audience and is not intended to be a technical manual. The author's approach is to provide a clear and concise overview of the field, with a focus on the most important concepts and findings. The book is organized into chapters that cover the history of the field, the current state of the field, and the future of the field. The author's writing is clear and accessible, making the book a valuable resource for anyone interested in the field.

Typically, finding the right commercial carrier (depending from the actually required skills) takes 6 months (the fastest, with access to the "black" - people offered by the inside and/banking club, say the law firms, the almost perfect little companies usually for just that service) is expected to reach 10 weeks.

Several authors have been citing this theory's weakness, according to past scientific studies that suggest increased neurogenesis in the past sufficiently demonstrated to cause schizophrenia. It was also noted that the age between it completed a potential increase in neurogenesis is as much as 10 years.

Based upon the information reported, we conclude that our control system formed for use should be revised to include and

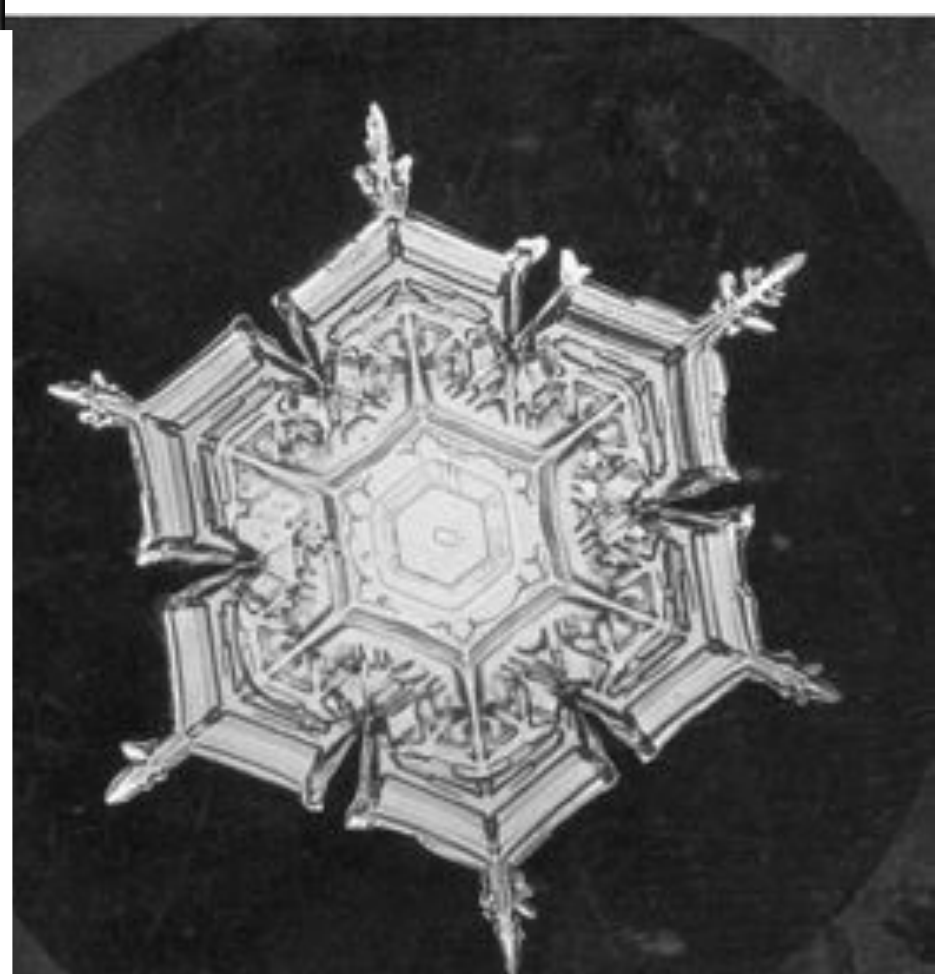
## Others?

- Beyond those mentioned, many other cities are exploring this technology.
- Those cities, however, almost always request confidentiality.
- Beyond the systems already mentioned, CUP estimates there to be at least a dozen other cities in the world exploring this without technology.





New, Recent, and Upcoming Developments



## Air Conditioning

- Still very rare
- Uses super-capacitor technology developed for fuel efficient automobiles





## Speed Improvements

- ~ 22 km/hr for Monocables
- ~ 28 km/hr for 3S
- ~ 36 km/hr for Aerial Trams
- ~ 45 km/hr for terrestrial systems



## Corners

- Originally very rare, cornering is becoming very common





## Low Profile Stations

- Stations are custom-designed to whatever architectural form is necessary.
- Newer “low profile” stations do not impact the urban fabric as aggressively as they do in ski resorts.
- Similar interest in “low profile” towers



## Innovative Urban Station Design

- One of the major questions moving forward with the technology is “how exactly do we help these systems integrate seamlessly into the urban fabric?”



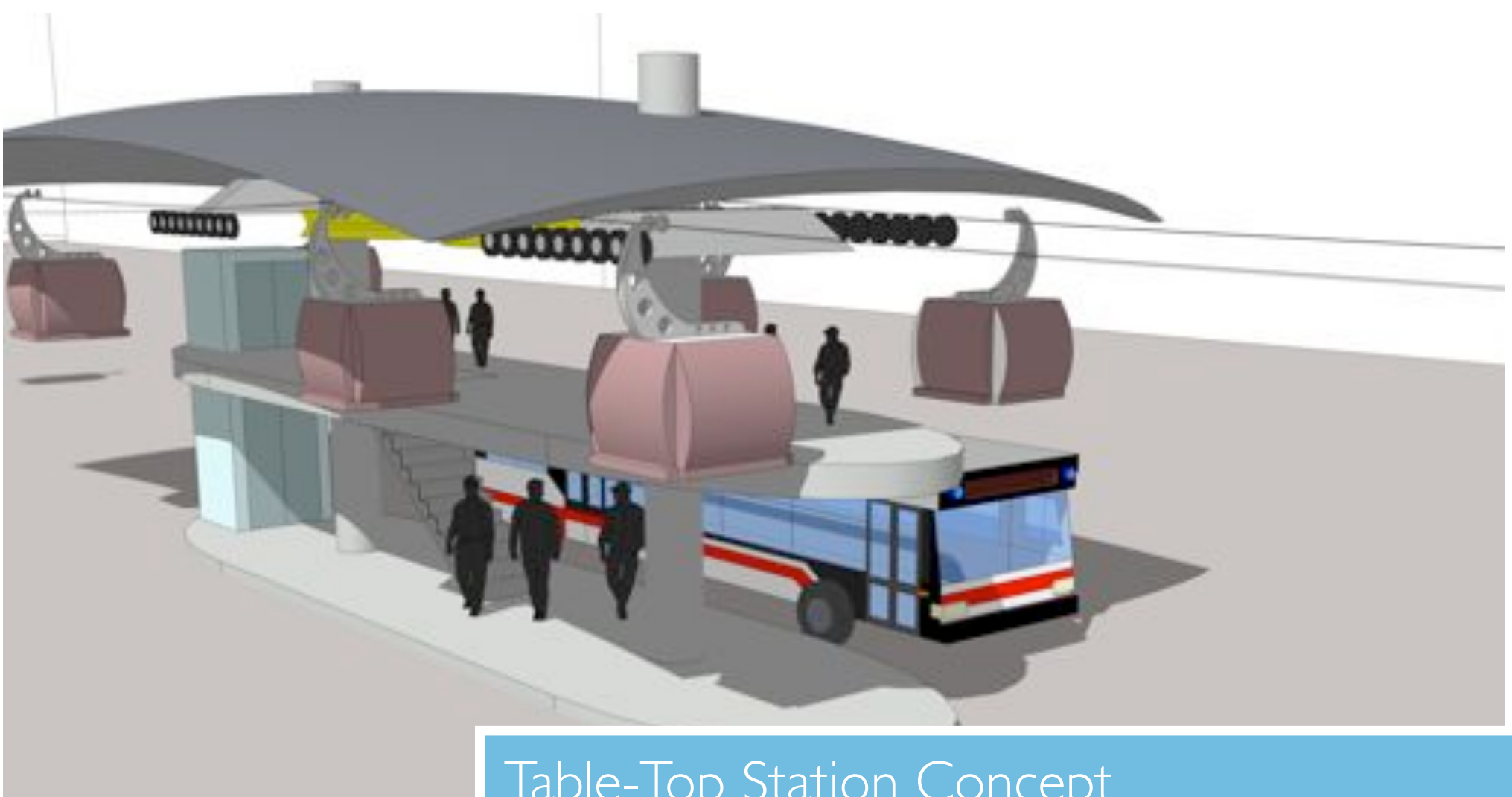


Table-Top Station Concept



## Improved Tower Design

- Towers are incredibly flexible.
- Important to rely upon manufacturer's and engineer's expertise





## Reduced Dwell Times

- Current dwell times can reach 1 minute; terminal times up to 3 minutes - automation renders terminal time irrelevant.
- Engineers report being able to reduce dwell times on 3S systems to as low as 20 seconds.
- This represents a clear conflict between the urban and 'winter' markets



## Stacking

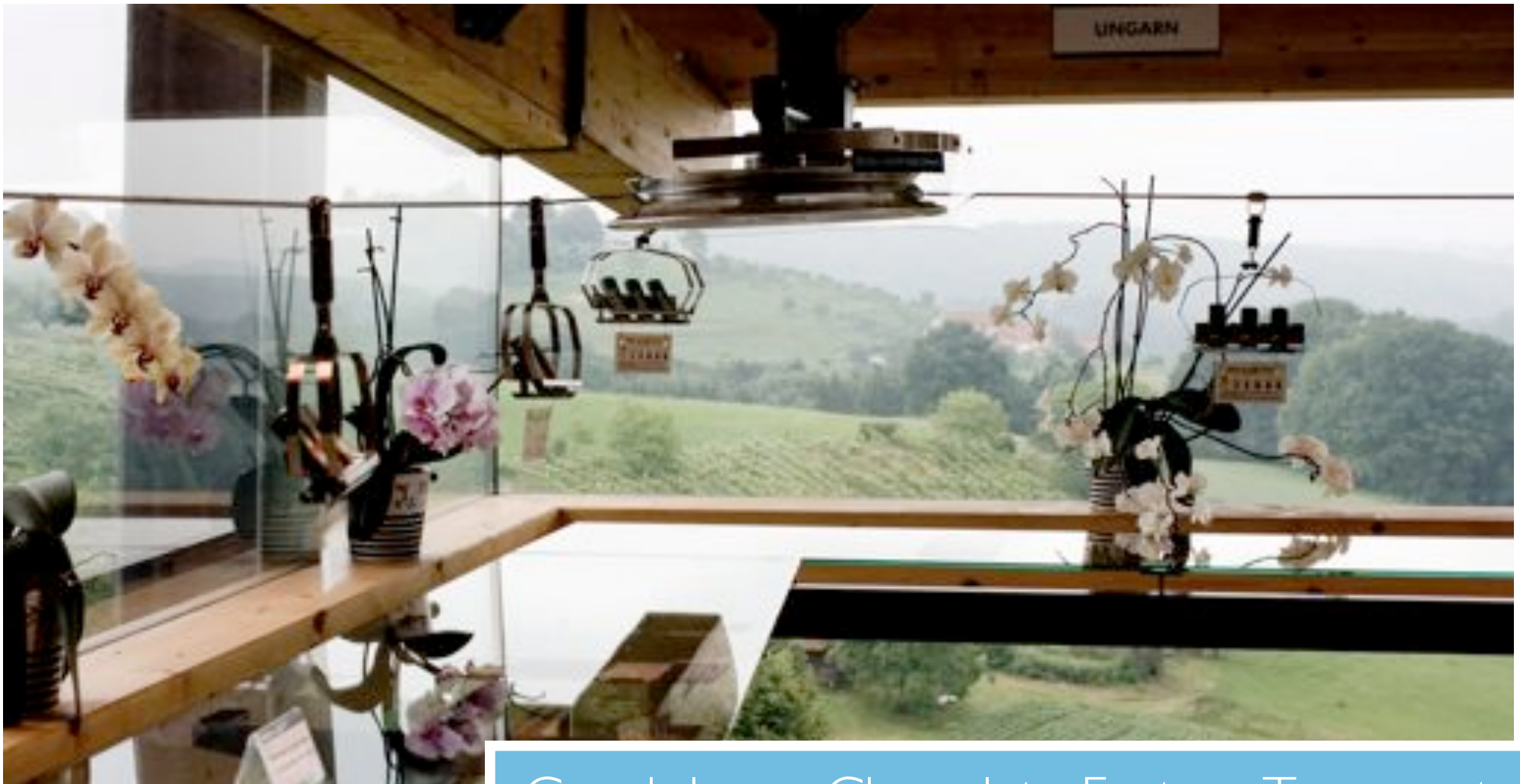
- Technologically feasible and proven.
- Potential for doubling capacity; expanding capacity in future; trunk-and-branching; and express lines





## Gondolas as Transporter of Cars?

- Conceived by Volkswagen as a means to move vehicles between plants.
- Utilizes unique Funitel technology.



## Gondolas as Chocolate Factory Transport

- The Zotter chocolate factory in Germany developed a scale model gondola transport system to distribute their chocolate samples throughout their factory for guests to use.





## Alpine Construction w/o Roads

- Construction teams in Switzerland have pioneered the act of construction atop mountains without need to construct expensive roads to transport equipment or supplies.

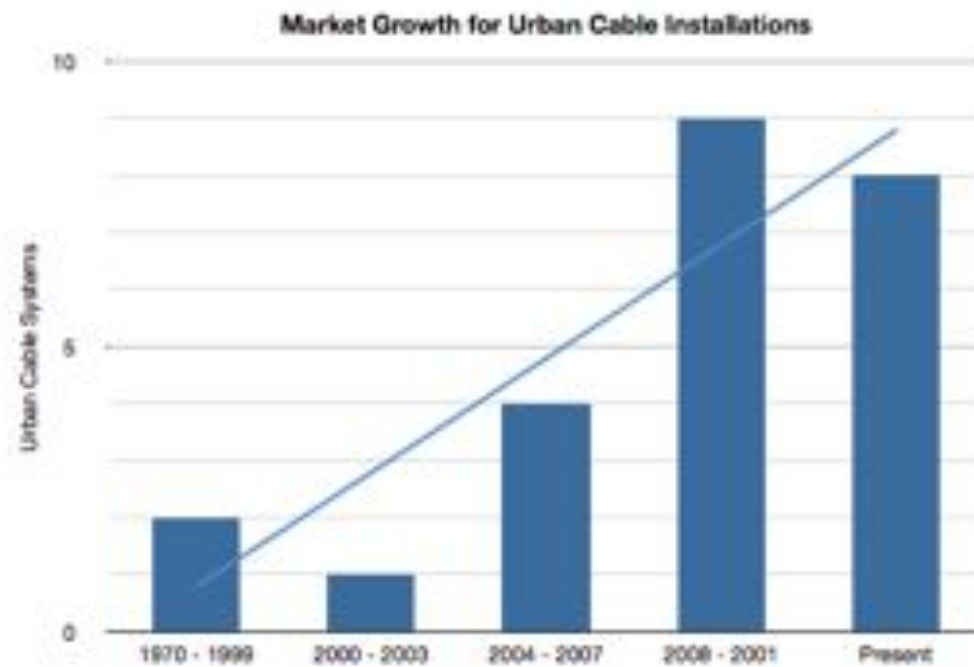


## Sauna Gondolas

- In sauna-obsessed Finland is a gondola that is also a fully-functioning gondola - testament to the idea that cable vehicles can be customized to the individual needs of a client - no matter how bizarre.



## What's Changed?



## What's Changed?

- Studies in the 1990's demonstrate that the transit planning industry was completely misinformed about cable transit systems.



## Gross Misunderstanding

Too expensive

Not fast enough

Difficult to procure


Not safe

Limited Capacity

No ability to corner

No ability to implement  
intermediary stations.

## Gross Misunderstanding



- Too expensive
- Not fast enough
- Difficult to provide
- Not safe
- Limited capacity
- No ability to deliver
- No ability to implement
- Intermediary station

Back in 2006

Even still in 2006, cable transit was barely known or understood. Only one public transit gondola system in the world - Medellin, Colombia.







# THE GONDOLA PROJECT

A CABLE-PROPELLED TRANSIT PRIMER

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11  
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2011

*SUNDAY STATSHOT WITH NICK CHU: URBAN  
TRANSIT SPEEDS*



The Gondola Project

Information Resource

Method to “Spread” The Idea

Research Tool

Monthly Traffic Growth of ~ 15%

Average of 15k Unique Visitors Per Month

Constant media presence



# TORONTO STAR

FRIDAY, NOVEMBER 11, 2011 • 11th Edition • 11th Edition • 11th Edition • 11th Edition



A question that has been asked: Is it time for Toronto to finally get cable? The answer is yes, says the author of a new report.

## IS IT TIME FOR TORONTO TO FINALLY GET CABLE?

By [Name]

Urban planner says cable cars, not just for the rich, are the way to go.

But critics say Toronto, which has been slow to embrace the idea, is not ready.

## Island airport expansion set for takeoff

Air traffic is going up to 77 per cent by the end of 2010.

By [Name]



The Toronto Island airport, which will be the site of expansion, is set to be completed by the end of 2010.


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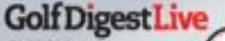
## Gondolas Could Be the Next Great Urban Transportation Device

BY KEITH BARRY 11.20.12 2:13 PM  
[Follow @itskeithbarry](#)

 676  
 182  
 54  
 7




While F1 fans flocked to Austin last weekend for the inaugural USGP, a team of industrial designers were hard at work on plans for a series of aerial gondolas to connect the city. It may sound futuristic, but it isn't as far-fetched as you might imagine.




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## Rio De Janeiro's Urban Gondolas: New Public Transit Line Makes Debut (PHOTOS)



First Posted: 09/01/11 11:12 AM ET | Updated: 11/01/11 06:12 AM ET

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The latest, most innovative form of public transit in Rio de Janeiro has made its high-flying 2011 debut.

As [Wired is reporting](#), a six-station gondola line running above a collection of favelas, or shanty towns, known as the Complexo do Alemão opened in March and carries an estimated 30,000 people a day along a 2.1-mile route over the embattled neighborhood.

As these stunning images attest, the new \$74 million urban gondola line has transformed what used to be a hour-and-a-half trudge into a 16-minute, theme park-style sky ride. The project is just one of the city's [massive construction projects](#) planned in anticipation of the 2014 World Cup and the 2016

Summer Olympics.

Take a look at Rio's spectacular new transit line [here](#):

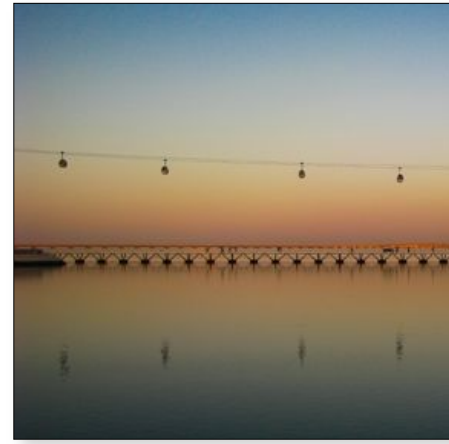




Koblenz  
Caracas  
London  
Rio  
Venlo



New Systems



Singapore  
Lisbon  
NYC  
Algeria  
Medellin



Existing Systems



Calgary  
Lagos  
Makkah  
Montreal  
Hamburg



New Research





La Paz  
Medellin  
Caracas  
Australia  
Vancouver



Coming Systems

## Why Be Afraid?

Over time, new ideas  
become familiar.





Thanks!