

# Sustainable Transportation – Just a question of mode technology election?

CASPT  
Santiago de Chile  
July - 2012

# Sustainability

- The concept of sustainability is well known but I prefer to simplify it to a simple sentence:  
“Buying without leaving a bill that will be hard to pay later on by future generation”
- This is difficult to see as public funds are seen as nobody's money by politicians and infinite by population specially in developing countries.
- Besides this, corruptions contributes a lot to increase the bill.

# Business as usual

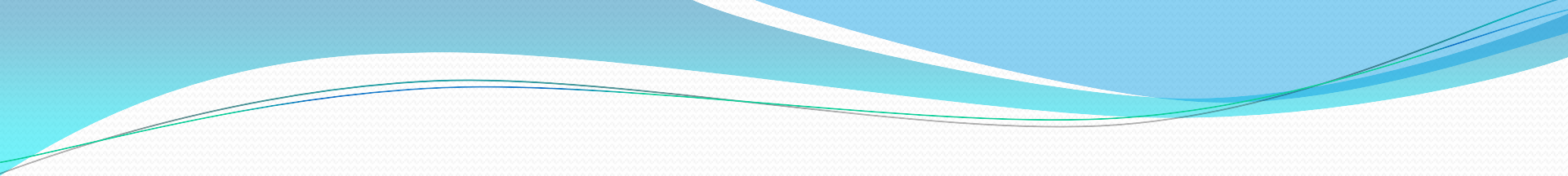
- Decisions are highly influenced if not decided by big corporations.
- Big construction is big business and in many cases, studies are just used as a way to justify some investment decision.
- Big construction are easier because they come with financing from supposedly development banks, pay for political campaigns and many times pay corruption money.

# Characteristics of Large Infrastructure Projects (1)

- Such projects are inherently risky due to long planning horizons and complex interfaces.
  - Technology is often not standard.
  - Decision making and planning is often multi-actor processes with conflicting interests.
  - Often the project scope or ambition level change significantly over time.
  - Statistical evidence shows that such unplanned events are often unaccounted for, leaving budget contingencies inadequate.
  - As a consequence, misinformation about costs, benefits, and risks is the norm.
  - The result is cost overruns and/or benefit shortfalls with a majority of projects.

# Uncertainty, information or what else?

- 9 out of 10 projects have cost overrun.
- • Overrun is found across the 20 nations and 5 continents covered by the study.
- • Overrun is constant for the 70-year period covered by the study, estimates have not improved over time.
- For rail, actual passenger traffic is 51.4 percent lower than estimated traffic on average.
- It must be concluded that if techniques and skills for arriving at accurate cost and traffic forecasts have improved over time, these improvements have not resulted in an increase in the accuracy of forecasts.

- 
- The list of examples of projects with cost overruns and/or benefit shortfalls is seemingly endless (Flyvbjerg, 2005a). Boston's Big Dig, otherwise known as the Central Artery/Tunnel Project, was 275 percent or US\$11 billion over budget in constant dollars when it opened, and further overruns are accruing due to faulty construction.

# Benefit shortfalls

- As for benefit shortfalls, consider Bangkok's US\$2 billion Skytrain, a two-track elevated urban rail system designed to service some of the most densely populated areas from the air. The system is greatly oversized, with station platforms too long for its shortened trains. Many trains and cars sit in the garage, because there is no need for them. Terminals are too large, etc. The reason is that actual traffic turned out to be less than half that forecast (Flyvbjerg, Holm, and Buhl, 2005: 132).

# Seoul – just another case

- Last month, the private operator of Seoul subway line No. 9 shocked citizens with an abrupt notice of its decision to raise fares by 500 won. The company later caved in under strong pressure from the Seoul Metropolitan Government and revoked the announcement. Nonetheless, tension remains between the private operator Seoul Metro Line 9 Corp. and Seoul City over the fee hike
- Yongin entrusted a private investor with the right to operate the light rail transit on condition of investment of 630 billion won. It also guaranteed a level of revenue, which was calculated based on the demand forecast. However, the forecast went awry, and the deficit ballooned to an estimated 3.4 trillion won and prompting a crisis
- In the end, a former Yongin mayor was arrested for irregularities over the project.
- The city managed to reduce the minimum revenue guarantee through renegotiation, and agreed to start the operation of the transit in April 2013. Even if so, the city government is to pay a huge amount in compensation.



# Overspending can have huge impacts

- Some megaprojects are becoming so large in relation to national economies that cost overruns and benefit shortfalls from even a single project may destabilize the finances of a whole country or region. This occurred when the billion-dollar cost overrun on the 2004 Athens Olympics affected the credit rating of Greece.

(Flyvbjerg, Bent, How Optimism Bias and Strategic Misrepresentation  
Undermine Implementation, Concept Report

No 17 Chapter 3, 2007

# Some entity called taxpayer

- An excessive demand forecast, combined with minimum revenue guarantees intended to attract private investment in costly infrastructure projects, has led to the covering of large deficits with taxpayers' money.”
- Deficit is increased with high investment cost over runs.

# Cost effectiveness – does it matter?

- Decision makers want to invest collecting their benefits directly or indirectly. Loans with grace period are very attractive.
- Consultants contribute for this with fake feasibility studies and financial reports.
- At the end, it is the business behind the action that pushes the decision, not the public benefit of the action.

# Creation of Images and dogmas

- People have an image in their minds about progress and symbols
- These images are associated with status, sense of power and social class. They need to be identified with these images. This is somehow determinant on decision making.
- On the technical side, that should be more unbiased, dogmas are created on what is better and many projects are biased by these “dogmas”.

# Deciding by preference?

- It is common today to have preferences. Decisions are not made based on comparisons.
- The mode is elected and studies are made only to justify the decision. Lying is part of the game.

# User is not part of the equation anymore?

- People move by their perception of the available alternatives. This perception varies according to the culture and social organization.
- In many places, poor people do not have the power or social organization to push for better solutions.
- Many times they are convinced that what they are given is the best they can have.
- The saying “passengers are a necessary burden” seems to be each day more true.

# Ethics in consulting

- It is common that consultants are selling something, not proposing the best solution.
- For this purpose, many feasibility studies just mount a scenario to justify what is being sold. This is more common with the rail industry and starts happening with some BRT systems too.
- Many times, this is made by some famous companies that gives credibility with financing organizations. The history behind is hidden from the public.

# What is the choice? Are we really free to choose?

- Choices that are given can be accepted only because people do not really have how to choose.
- Many times they are forced to choose some mode just because other choices are not really choices.
- Many times buses are so terrible that people only have the choice for some rail system, accepting to be packed on the train or to be on their cars even taking more time on the trip.



# Information and perception – Sao Paulo Bike promotion

- São Paulo has been promoting bikes as a mode of transportation in the city for a while.
- The Sunday “ciclovia” joins many people that enjoy riding bicycles. Streets or just lanes are segregated for the cyclists. They feel safe on this day.
- At the same time, on a normal week day, an accident with a bus kills a woman riding a bicycle. All the papers, tv, magazines join to show that riding bicycles is very dangerous. Nobody shows that the problem is road safety, and that this could be provided for bicycles too.
- The information that is kept is: riding bicycle may kill you. It is just for fun on the weekend.

# Just some other cases

- Sao Paulo Metro Line 5: 9 km of rail line with an estimated demand of 350 thousand passengers per day at a cost of almost one billion US\$. The outcome was a demand of less than 40 thousand passengers per day.
- Lima BRT: 24 km of BRT corridor with an estimated demand of 748 thousand passengers per day. Demand is today a bit over than 400 thousand. One third of the buses bought by the operators are parked for more than one year now.
- Rabat tramway: started operations last year. Estimated demand was 250 thousand passenger per day. Presently demand is 70 thousand passengers per day and it is expected the demand will rise to 150 thousand per day with bus integration.

# Transit and BRT

- The idea of using buses as mass transit was first developed in Curitiba, with the vision to develop the City using BRT as the transportation backbone.
- It was then a city with 300 thousand inhabitants

# Bus Corridors of Curitiba

Built between 1974 - 1982



North-south  
corridor (1974)



Vehicle at that  
time – 90  
passengers

# Bus Corridors of Curitiba

1974 - 1982

Conceptual Design





# Bus corridors of Curitiba

## Present network



### Trunk roads

Biarticulated vehicles

Payment outside the bus

Boarding at level

### Express routes

12 m vehicles (padron)

Closed stations

Boarding at level

Operating on mixed traffic

Feeding bus system

Perimetral bus routes

# Bus Corridors of Curitiba

## Trunk routes



Infrastructure

Vehicle





# Curitiba

## Rutas troncales



Terminal

Estaciones





# Curitiba

## Rutas expresas



Opera en tráfico mixto



Estación de parada

## Curitiba – Some operational data

<b>Corredor</b>	<b>Longitud (km)</b>	<b>Demanda pax/day</b>	<b>flujo pico pax/h/dir</b>	<b>Velocidad (km/h)</b>
<b>Sur</b>	<b>10,08</b>	<b>158.231</b>	<b>13.014</b>	<b>18,61</b>
<b>Sureste</b>	<b>10,63</b>	<b>90.663</b>	<b>7.552</b>	<b>18,75</b>
<b>Este</b>	<b>12,04</b>	<b>89.473</b>	<b>7.453</b>	<b>18,82</b>
<b>Norte</b>	<b>9,30</b>	<b>86.412</b>	<b>7.198</b>	<b>18,32</b>
<b>Circular – u</b>	<b>14,09</b>	<b>63.011</b>	<b>5.240</b>	<b>19,90</b>
<b>Oeste</b>	<b>8,25</b>	<b>46.023</b>	<b>3.834</b>	<b>18,72</b>

Source: World Bank, Jorge M. Rebelo – Busway Data in Latin America

# Curitiba – new concept





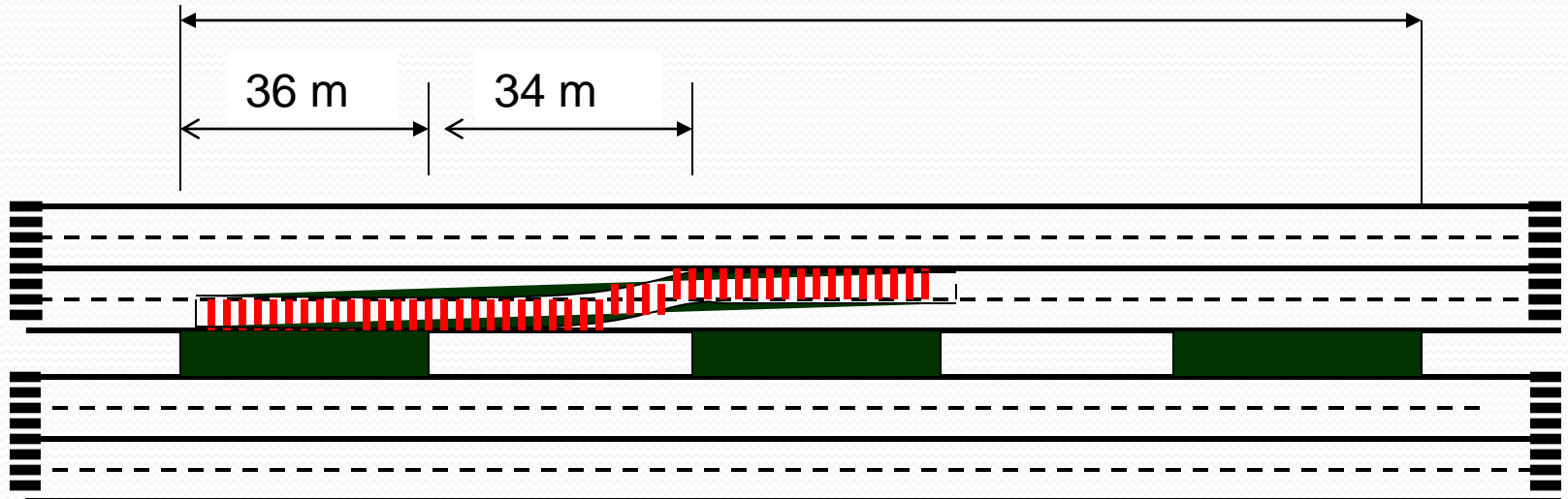
# The next paradigm - Bogota

- Bogotá was a challenge in the sense that no BRT with such capacity was built before.
- The idea that came was to boost the experience of Curitiba with the vast experience with bus operations in Brazil:
  - Improving bus boarding and alighting times (no ramps)
  - Understanding station saturation levels was an issue also faced and solved on the design
  - The combination of all station buses with express services gave the capacity needed.

# Transmilenio



176 m



# Transmilenio

Imagen creada por SURUMBO LTDA. Copyright 2006-2010



Imagen creada por SURUMBO LTDA. Copyright 2006-2010



# Transmilenio today

- Since september 2010 the service is provided by a fleet of 1241 articulated trunk buses and 515 feeder buses
- The network counts with 84 kilometers of trunk segregated lanes and 551 kilometers of feeding services with 83 feeder routes
- *Presently Transmilenio moves 46 thousand passengers/hour/direction, more than 95% of the subway lines in the world.*
- *This is having problems right now because of lack of inversion and deficiencies in operations*

# Transmilenio

- On the last two years, the demand increased from 1,450,000 to 1,700,000 passengers per day without improving stations and terminals or increasing the fleet.
- Last administration was involved in strong corruption on Transmilenio construction and was pushing to build a subway line in Bogota.
- Today, Bogota is facing the challenge to implement a bus integrated system (SITP). The problem of poor quality of the pavements still persist.



# Transmilenio today

- Transmilenio is called by the population as Transmuylleno (overcrowded BRT).
- The last corridor faces strong problems to start operation as construction was delayed.
- A new concession bid was made but the old one was extended for three years more creating a conflict difficult to solve.

# Transmilenio today

- The new administration has a left wing profile with an ex guerrilla as mayor.
- He shows intention to renegotiate the contracts, have part of the system with a public operator and was convinced by the French to build a tramway on Carrera 7 to put his brand on something.
- The bicycle network is left aside.
- Privately, the mayor talks on implementing congestion charging.

# Guangzhou

- **Guangzhou Bus Rapid Transit (Guangzhou BRT or GBRT)** first line was put into operation on 10 February 2010. It handles approximately 1,000,000 passenger trips daily with a peak passenger flow of 26,900 pphpd (second only to Transmilenio BRT system in Bogota). It contains the world's longest BRT stations - around 260m including bridges - with bus volumes of 1 bus every 10 seconds or 350 per hour in a single direction. The BRT system has two new lines and two extensions planned.

# Guangzhou BRT

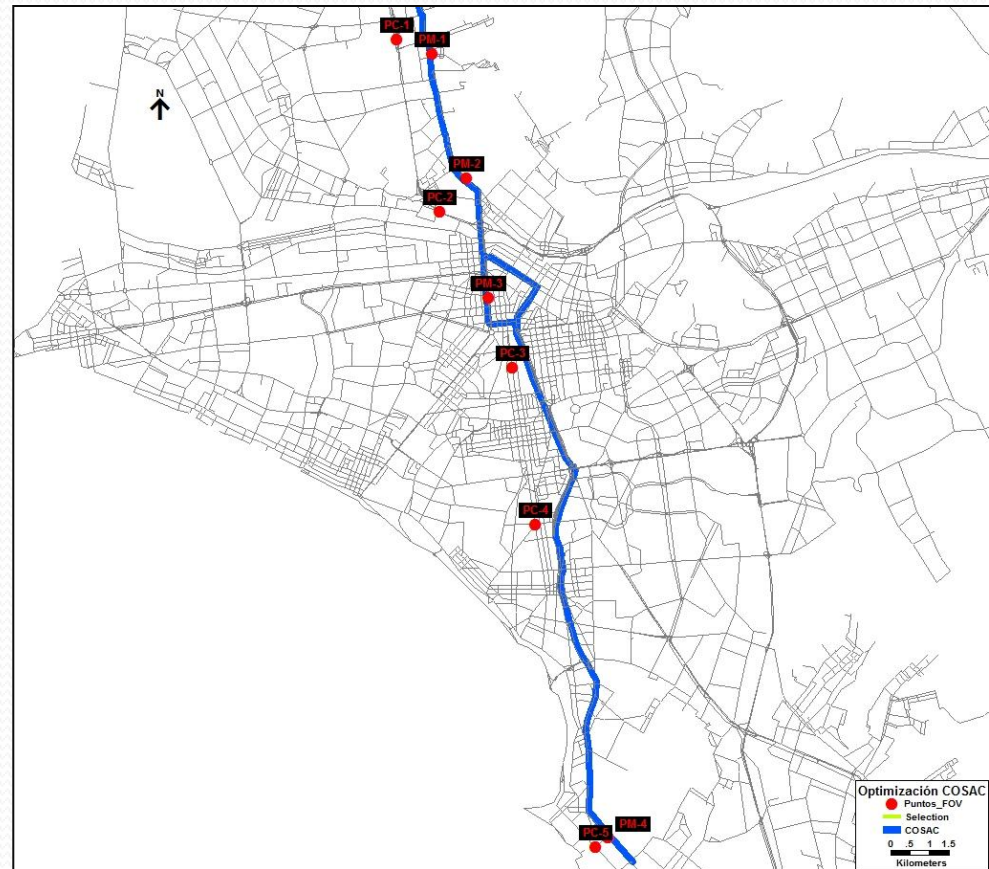
**High quality features**

**Credit must be given to ITDP and to Karl Fjels tron for the effort to push to implement this BRT**



# Metropolitano de Lima

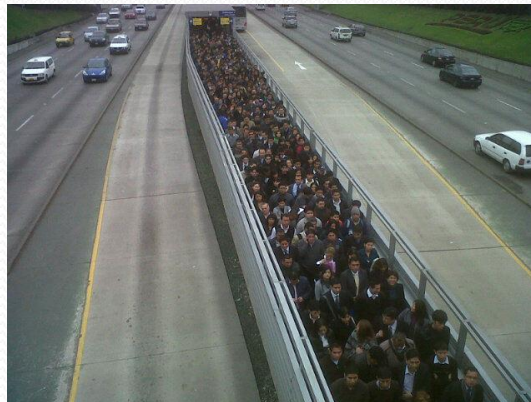
- 26 km with 38 stations trunk feeder system with feeder routes at north and south
- Demand in february was 320 thousand passengers at the trunk lines and 75 thousand passengers at the feeder buses
- Operates with 226 (out of 300) articulated buses and 152 feeder buses





# Lima BRT

- The system has a good demand specially if compared with the light rail that is carrying 110 thousand passengers per day without charging fare.
- Underdesign and operations cause huge queues.



# BRT – ups and downs

- BRT has some ups and downs
- Some systems were well designed and are well operated.
- It has really changed transportation in the cities but as a flexible system, it has “proper translations” from one place to another place.
- Also, as any successful system, many “experts” start selling ideas without knowing exactly what to do.

# BRT -ups

- Last BRT developments show that it is possible to deliver high capacity with reasonable speeds.
- This can be done at low investment and operational cost .
- The system can pay for the investment on buses and operational costs.
- It is flexible and can operate under a trunk-feeder concept ( Transmilenio) or under an “open” concept (Guangzhou).
- It is inclusive for previous bus operators

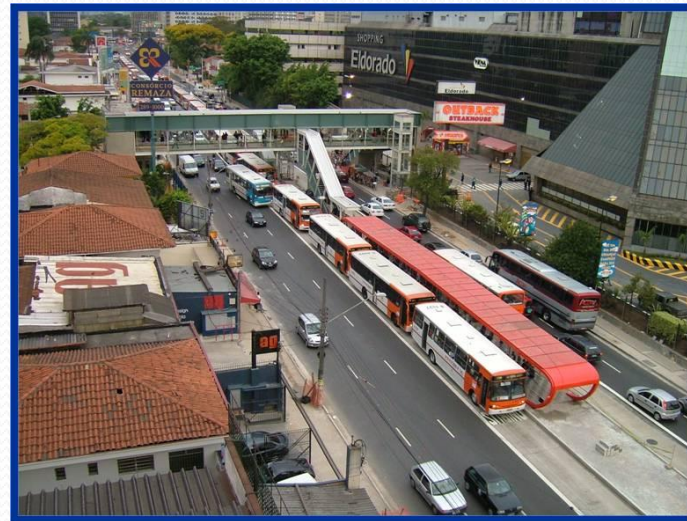


# BRT - downs

- Pay for the past sins
  - Undue compensations to previous operators (México)
  - Pay to scrap old buses (concept introduced by Transmilenio)
- Bad planning and design (Lima)
  - Demand predicted was 748 thousand passengers per day. Present demand is less than 400 thousand. One third of the fleet is not being operated.
- Overcrowding the corridor (Guangzhou)
  - City government decided to increase the number of buses in the corridor oversaturating stops and decreasing speeds
- Sharing bus lane with taxis (Sao Paulo)
  - Speeds went from 19 km/hour to 12 km/hour on Av. Rebouças.

# Sao Paulo

- Design under capacity and taxis on BRT lanes



# The rail system of Sao Paulo

- São Paulo was able to build 61.5 km of subway in 45 years at a cost of more than 10 billion dollars.
- The Greater Sao Paulo suburban rail network, CPTM has 89 stations in six lines, with a total length of 260.8 kilometers (162.1 mi). It is one of the busiest rail networks in the world, carrying over 2 million passengers a day.
- Presently, São Paulo is expanding the existing subway lines 2 and 5 and building 2 lines of LRT.
- In this year, the system already suffered 16 breakdowns due to lack of maintenance, although government denies this. All the available resources are being directed to construction under PPP.

# The rail system of Sao Paulo

- As the bus system was intentionally deteriorated by first allowing taxis to circulate on the segregated lanes and by poor frequencies and regularity of services, rail is the only reliable transportation citizens have.
- The result is overcrowding the rail system and this is announced as a big success.



# The Metro system in Rio de Janeiro

- February 8, 2012:
  - “For the third consecutive day Metro Rio presented problems. This time on peak hour. The Uruguaiana station was so crowded that security personnel oriented passenger not to enter into the station and the company was obliged to return the money for the tickets.” Folha de São Paulo.
  - Yesterday, around 9 PM, the headway between trains rose to 30 minutes also for failures on the air conditioning system. On Monday, a breakdown on signalization of Line 2 closed 11 of the 26 stations.” Folha de São Paulo



# The Metro system in Rio de Janeiro

- Founded in 1979 with five stations operating on one line, it now covers 47 km (29 mi) divided into two lines and 35 stations. It is the second largest metro system in Brazil after the Sao Paulo Metro.
- In December 1997 of that year the system was privatised and the management and operation of the company passed into the hands of the Consortium Opportrans with a concession for 20 years, leaving the responsibility for expansion of the network in the hands of the state government of Rio de Janeiro through company Rio Trilhos.

# The Metro System in Rio de Janeiro

- In late December 2007, Metro Rio renewed the concession for another 20 years to 2038, with the counterparts a number of improvements announced in early 2008 with a plan to expand the subway network and other improvements in the system: the project Metro Century.
- In 2012, in the way to the World Cup and Olympic Games, situation is difficult. One possible explanation is that concessionaries are pressuring for more subsidies.



# BRT in Rio de Janeiro

- As resources are limited, Rio is building a BRT network integrated with metro and normal buses. 4 corridors (Transcarioca, Transcaribe, Transoeste and Transbrasil) with a total of 153 km. The first corridor has an average cost of nearly 30 million US\$/km.



# Demand management and congestion charging

- Main obstacles are:
  - Car users do not want to lose their privilege
  - In many places it is seen as a new tax
  - It cannot be implemented because quality of public transportation is bad
  - Decision makers are car users
- But congestion is increasing to such level that demand management will be accepted

# Some new visions for sustainability

- Smart growth or the new urbanism
  - Small blocks (China)
  - Saving safe space for pedestrians and bicycles
  - Integrating transportation systems
  - A more balanced land use with mixed use. This will reduce the need for transportation capacity

# Sustainability can be related to setbacks?

- Setbacks are natural as economic and political interests change
- All the problems faced can be solved with lower or higher cost, it depends on how it is made.
- It is being recognized with past experiences that it is not possible to charge on one transportation system errors made in the past.
- Subsidy is still a concept that needs to be well understood.

# Conclusion

- Although some situations are not sustainable, I believe we are moving ahead.
- There is much more conscience now than 40 years ago, when I started my career.
- We are facing more the problem of limitations on the resources available
- Corruption is still a problem that will be faced somehow.
- We need somehow make companies that produce fake reports accountable for their “strategic misrepresentation”.





# THANKS

Paulo Sergio Custodio  
Custodio.ps@gmail.com