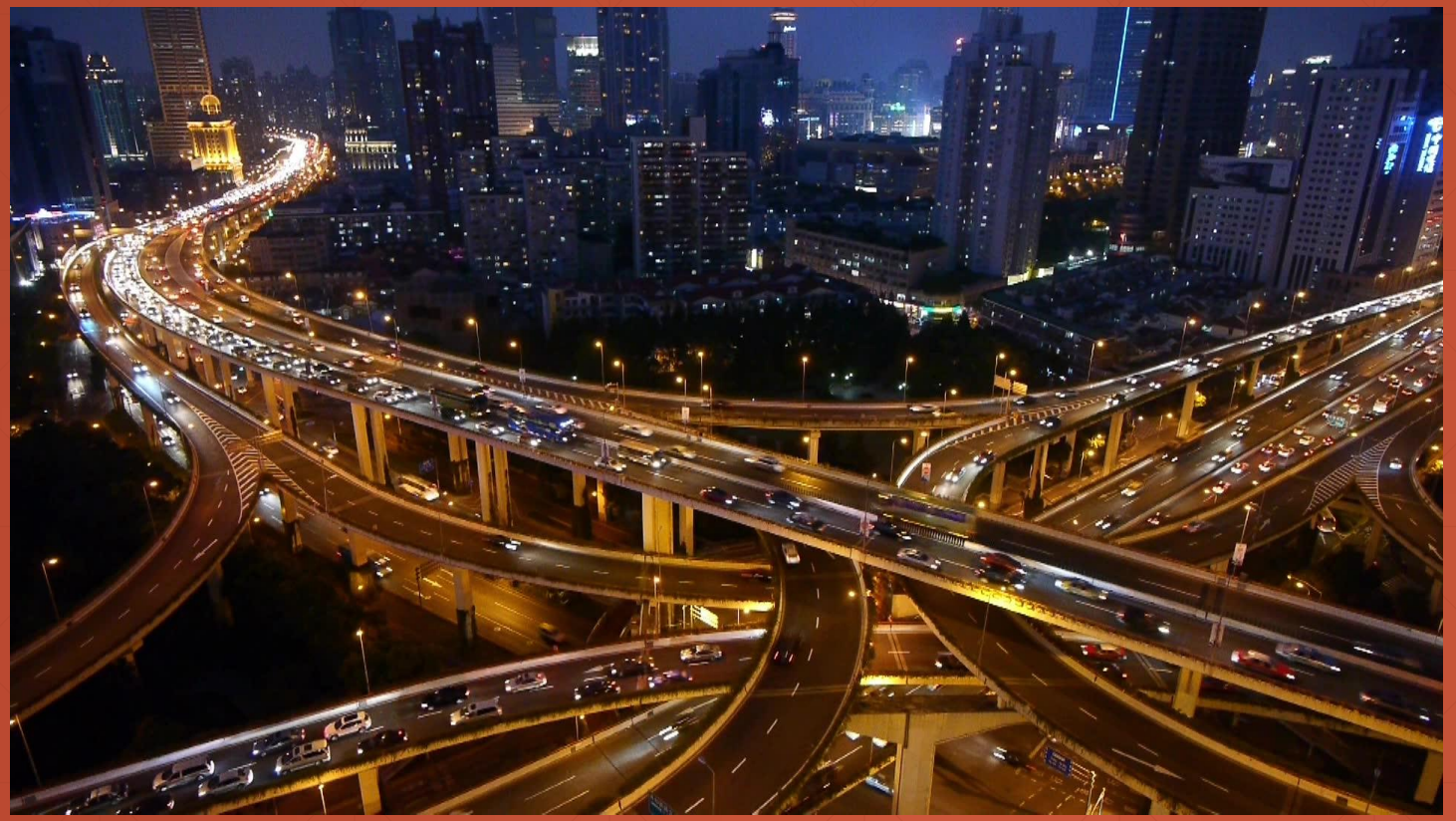


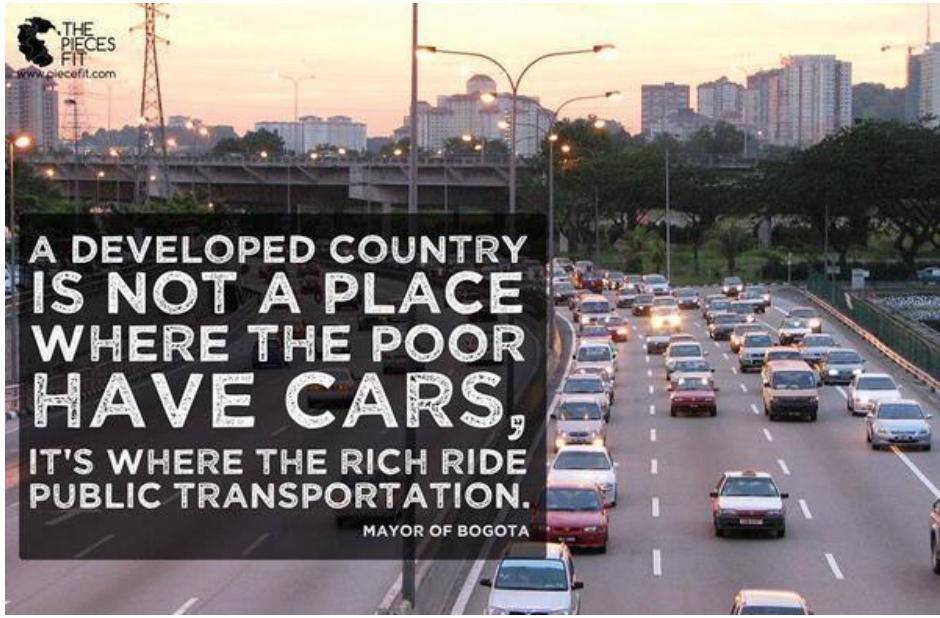
Intelligent Transportation Systems

Rolland Vida, BME TMIT

Intelligent transportation systems

- Smart City
  - A place where people like to live, good quality of life
  - Low pollution, low energy consumption
  - Sustainability
- One of the basic components of a smart city is the intelligent transportation system
  - Too many people in traffic jams – stress, lost working hours
  - Too many people in cars – pollution, energy wastage
    - In Budapest each year + 20-30,000 cars on the roads, more than 3 million cars in total in Hungary
  - **Too many cars**
    - Cars stay parked, empty, for 22 hours per day in average
    - Occupy a parking lot, at home or at work
- **The use of personal cars in not sutainable on the long run**
  - Thanksgiving traffic in Los Angeles

Intelligent transportation systems



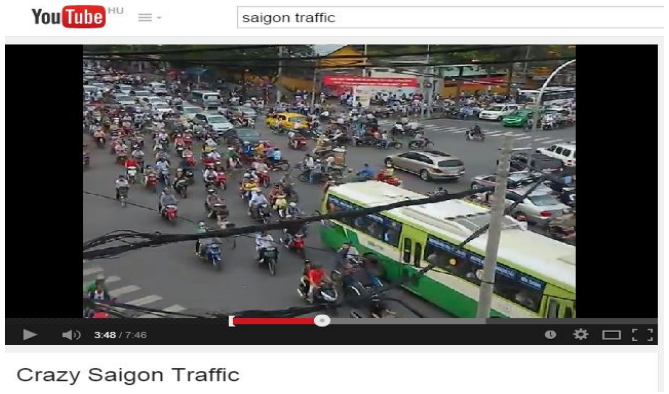
- Efficient public transportation
- Car sharing / Car pooling
- Connected car, C2C or V2V communication
- Intelligent road network, C2I or V2I communication
  - Today mostly static traffic signs, like 100 years ago

- Electric cars
- Self-driving cars

Intelligent public transportation

- Improving the efficiency and quality of public transportation is very important
  - Bad example from the metro in Beijing (2013)
  - https://www.youtube.com/watch?v=xG-meaGqg-M

- If too many people and bad public transportation – **be aware of the motrocycles**
  - **Total chaos in transportation** – see South-East Asia
    - Crossroad in Saigon
    - **http://www.youtube.com/watch?v=gKLWZjBu2iQ**



Advantages of public transportation

- **Much larger capacity**
  - 200 people – on 200 bikes, 1 tram, 3 buses

    or 177 cars

- **Realiability, predicatbility**
  - Real-time monitoring of vehicles (GPS), trajectory planning
  - Track-based solutions – underground, ground level or elevated

BRT (Bus Rapid Transfer)

- Dedicated bus lane, possibly in the middle of the road (easy turning)
- Paying (by card) outside the vehicle, not at the driver – faster boarding
- Green lights at crossroads

BRT (Bus Rapid Transfer)

TransMilenio's passing lanes at stations have increased the capacity of the system threefold.
KARL FJELLSTROM, ITDP

Passing lanes at stations have increased the capacity of the system threefold

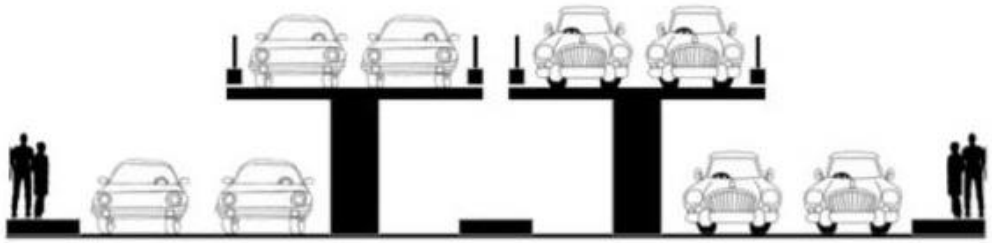
TransMilenio, Bogota, Columbia

Walter Hook, Stephanie Lotshaw, and Annie Weinstock, More Development For Your Transit Dollar: An Analysis of 21 North American Transit Corridors, https://www.itdp.org/wp-content/uploads/2013/11/More-Development-For-Your-Transit-Dollar_ITDP.pdf

BRT (Bus Rapid Transfer)

3-lane carriageway

2 lanes + elevated road



Dedicated lanes for bus rapid transit

Capacity:

3,000 passengers per hour per direction

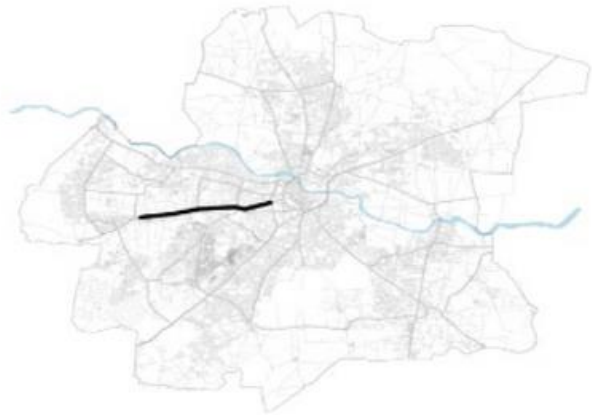
4,700

12,000 +

How much does it cost?

- The BRT is the cheapest solution, but cannot be applied everywhere
  - No space
  - Should not build the city for the cars, but for people
    - Building roads for buses is more acceptable than for cars

Underground metro: **2.5 km**



Elevated metro: **5.0 km**

- **What could you build with 10 billion rupee (~ 156 million USD)?**

Monorail: **6.7 km**

BRT: **67 km**

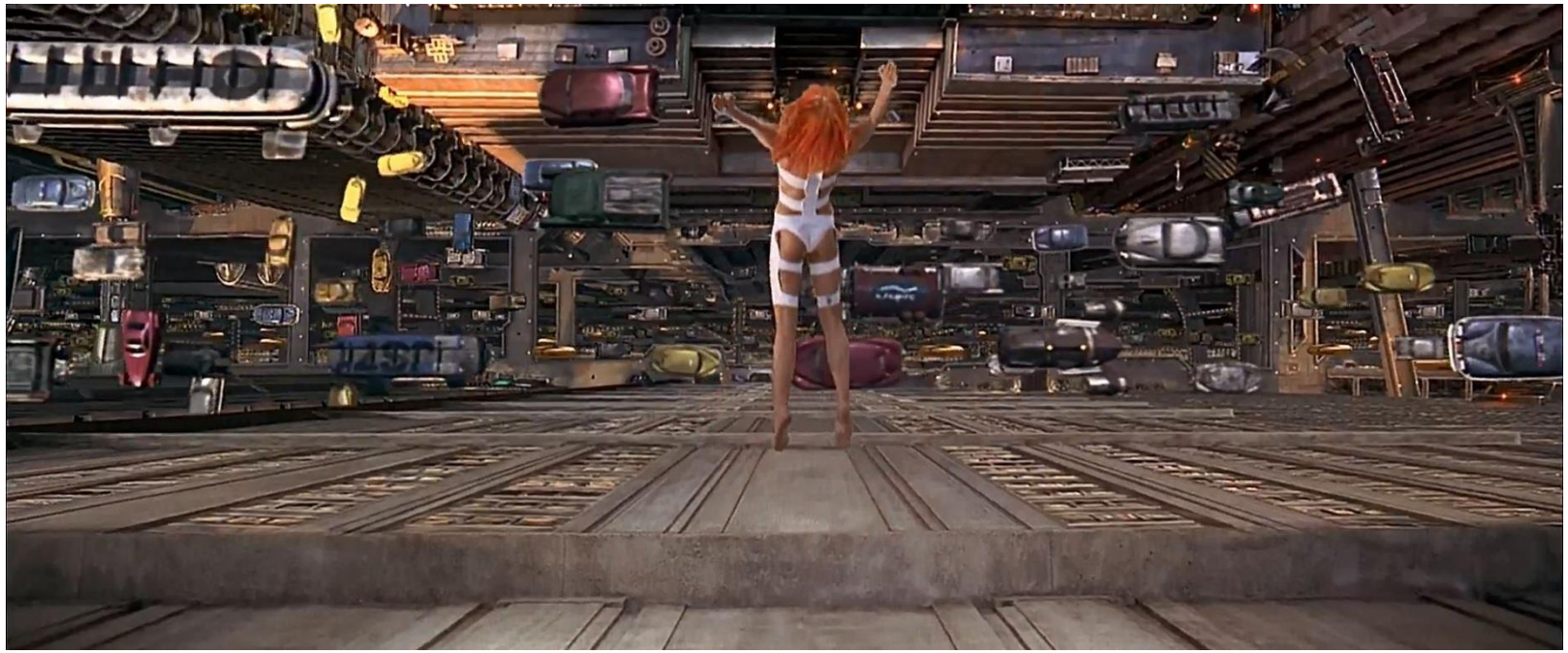
Bringing down some roads

Seoul, South-Korea

Portland, Oregon

Futuristic ideas

- Remember Leeloo’s jump scene, in the Fifth Element?



https://www.youtube.com/watch?v=pK_sGCG-L_c

Futuristic ideas

- Gyroscopic transportation, on multiple heights

https://www.youtube.com/watch?v=1m5vWdeTlno

Futuristic ideas

Elon Musk (46 years)

- **PayPal** – online payment system
  - Bought by eBay in 2002 for $1.5 billion
- **SpaceX** – private space tourism, private satellites
- **Tesla** – electric cars
- **Solar City** – 2nd largest solar power provider in the US
- **Hyperloop** – transportation at 1200 km/h, in reduced-pressure tubes

Futuristic ideas

Elon Musk (46 years)

- **The Boring Company** (2016)
  - System of underground tunnels for rapid transportation
  - Digging started in LA in the summer of 2017

https://www.youtube.com/watch?v=uI3oJqMBpPs