

...f...l...u...x\*...  
access to liveable cities

**est**

**bali**

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- **Introduction**
- **visualisation**
- **description of the flux\* mrt system**

\* continuous flow, shift, mutation



# CAR FREE CITIES

CLIMATE CHANGE MITIGATION  
CLEAN AIR NOISE REDUCTION

RECLAIMED PUBLIC  
**SPACE**

MACRO ECONOMIC  
BENEFITS  
LIVABILITY  
WALKABILITY  
FOR ALL

YOU  
ARE  
HERE

SMOOTHEN TRAFFIC  
FLOW THROUGH ITS,  
ERP, ELE, TDM, O & E, 3 IN 1

CAR PRODUCTION  
FOR JOBS AND  
PROFIT

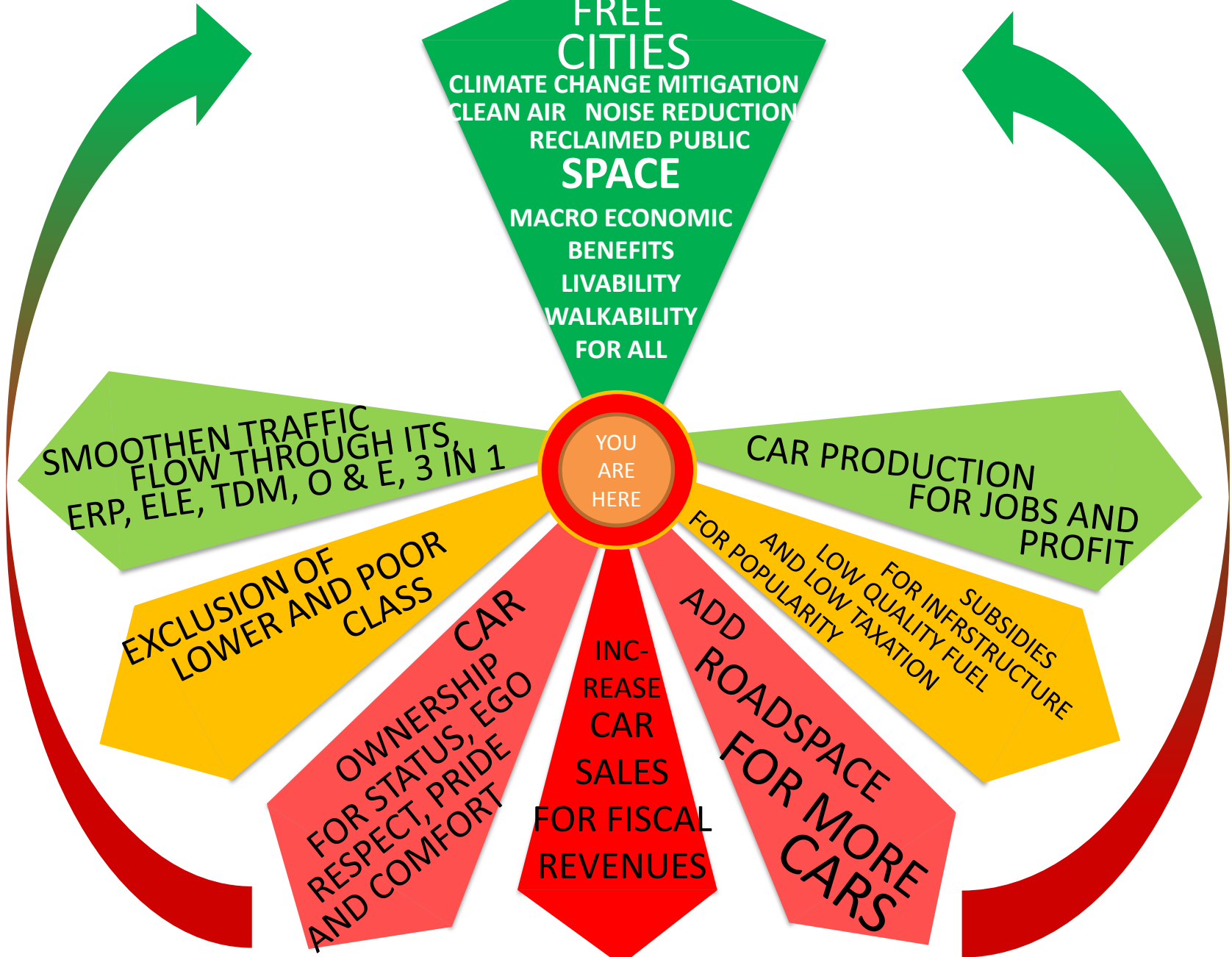
EXCLUSION OF  
LOWER AND POOR  
CLASS

SUBSIDIES  
FOR INFRASTRUCTURE  
AND LOW QUALITY FUEL  
FOR POPULARITY  
AND LOW TAXATION

CAR  
OWNERSHIP  
FOR STATUS, PRIDE  
AND COMFORT

INC-  
REASE  
CAR  
SALES  
FOR FISCAL  
REVENUES

ADD  
ROADSPACE  
FOR MORE  
CARS



# three systems competing in urban public space:

**1 nmt = walking and biking = healthy, livable cities**

lost the plot - needs radical change of mind

**2 public transport = insufficient and neglected**

needs high investments and political will

**3 private vehicles = occupying entire public realm**

winner of the game, responsible for traffic jams, pollution, GHG emissions, loss of productivity

# modal share

PRIVATE



PUBLIC

RURAL

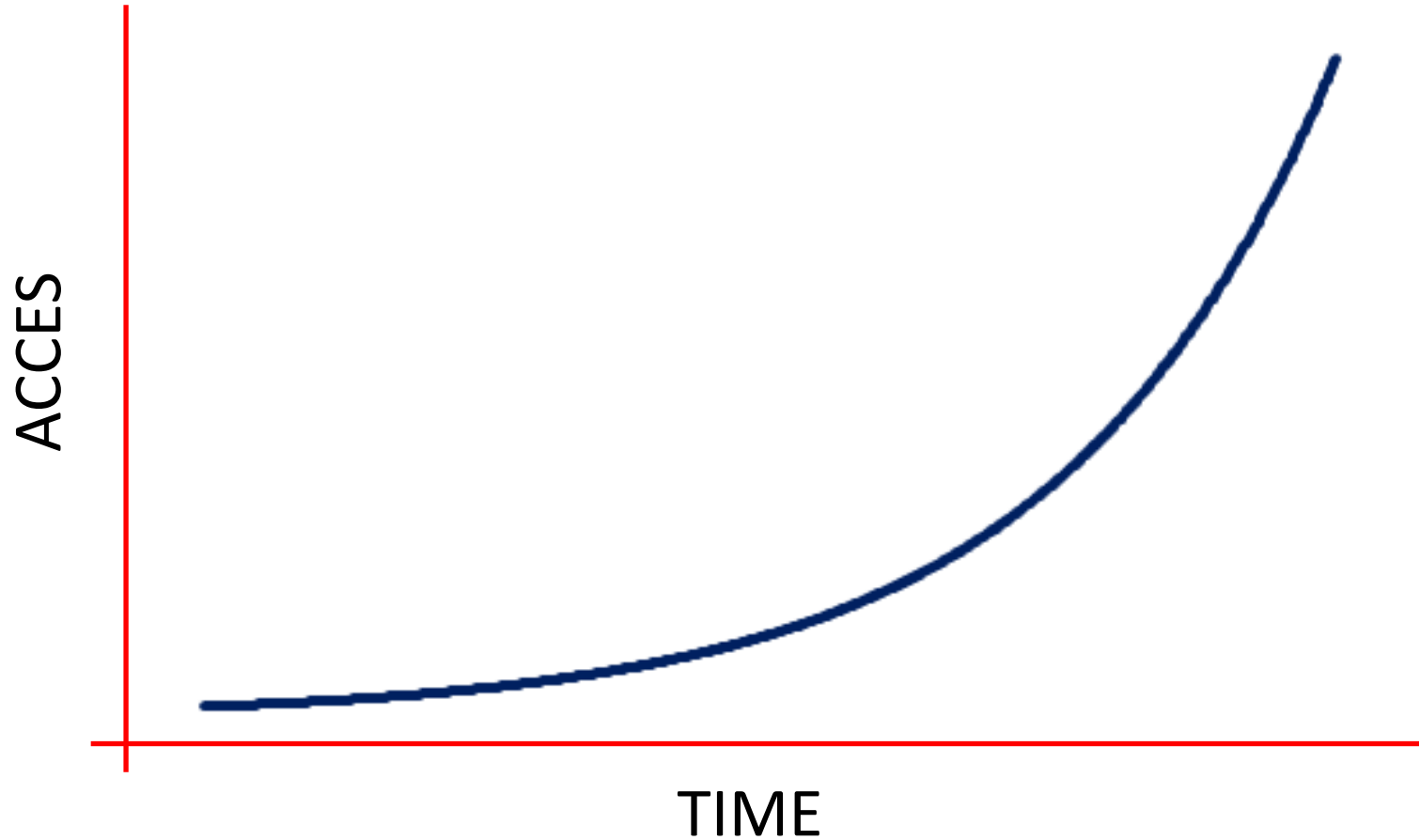
URBAN

# **heavy subsidies for private means of transport:**

- **next to all public space is provided for free to the minority of private vehicle passengers**
  - public space covering often less than 10% of urban space is regarded the highest valued asset of a city but not accessible for the majority, not (yet) able or in need to own a car or motorbike
- **infrastructure** (paved and drained roads, traffic guidance by signals, signs and traffic police) **is provided for free** - except the toll roads are charged, yet at a price less than their economic costs
- **fuel is provided at roughly half the world market's price**



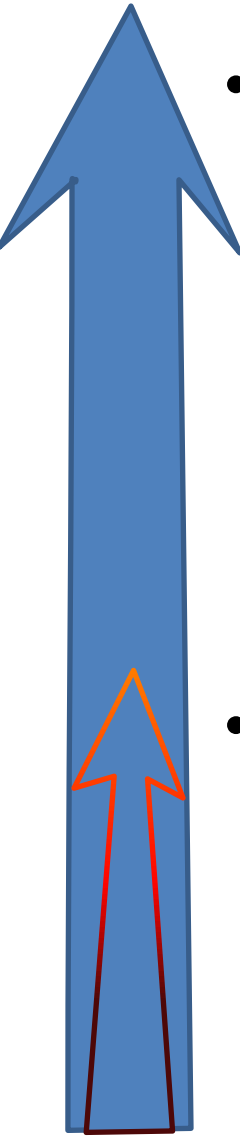
# exponential acceleration of information exchange\*



\* demand for access / need for speed



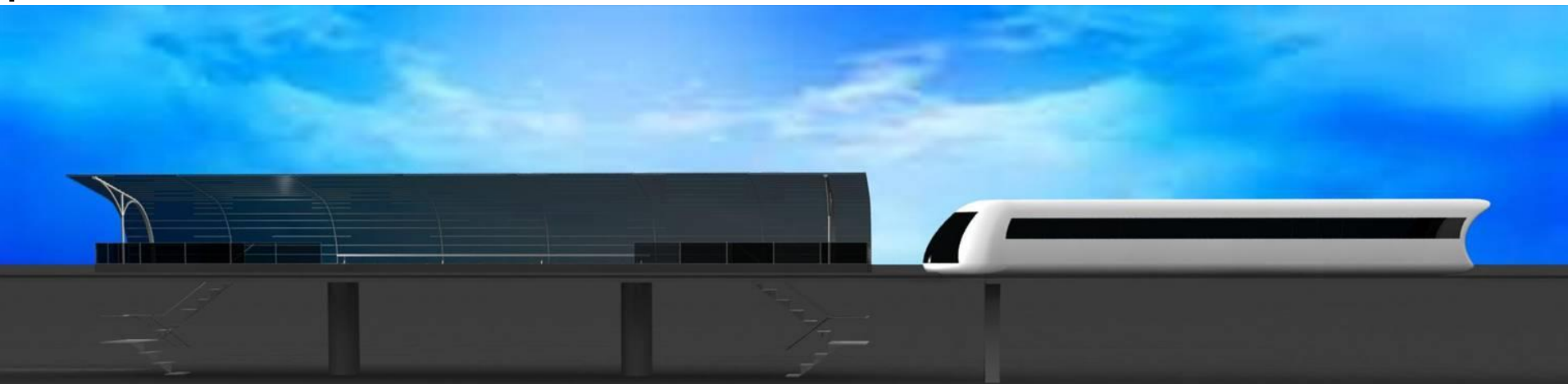
# two tier approach:

- 
- 1. long term vision:
    - » **How do we all want our city to be in 20 years?**
    - » start today the political process,
    - » the financial preps and
    - » the technical implementations
  - 2. short term action:
    - extend, increase and improve today NMT and PT conditions, performance and facilities
    - traffic improvements and TDM measures

# **suggested & realistic vision for the urban future we want:**

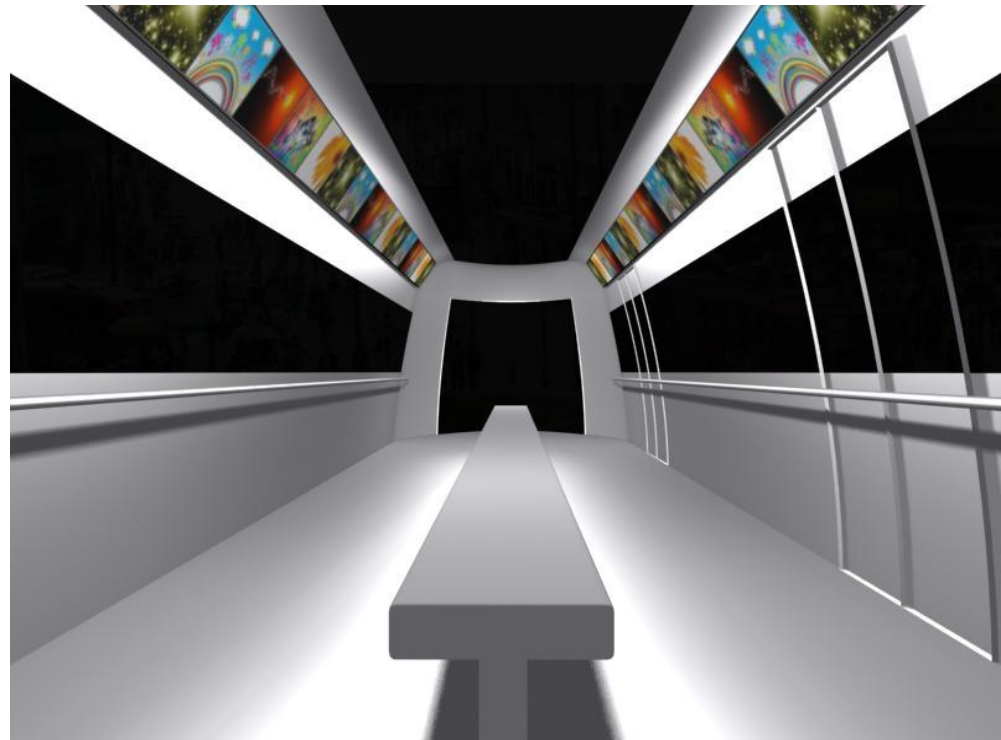
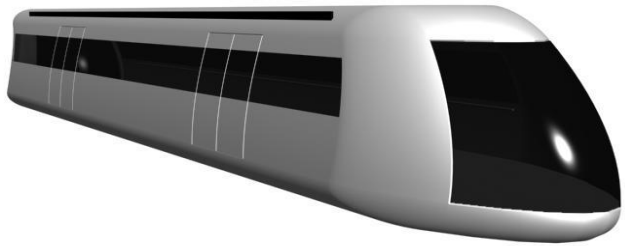
- **Dense, connected and multifunctional built urban structures leaving some 15% of public space for all**
- **The public sphere is free of private fuel driven vehicles**
- **The reclaimed public realm invites to cover some 40% of transit needs by walking and biking, at the same time making cities alive as arts and culture, playing and communicating, meeting and consuming happens in the partly sheltered open space**
- **The huge remaining demand to gain access to every corner of the city is provided by an integrated public transport network, the backbone of which is an innovative urban rail.**

The four wagon train (alternatively a system of 3 railcars could be employed) runs on constant speed of around 70 km/h (45 miles/h) nonstop on a single elevated line, which easily blends into the townscape above public land where no plot needs to be purchased.

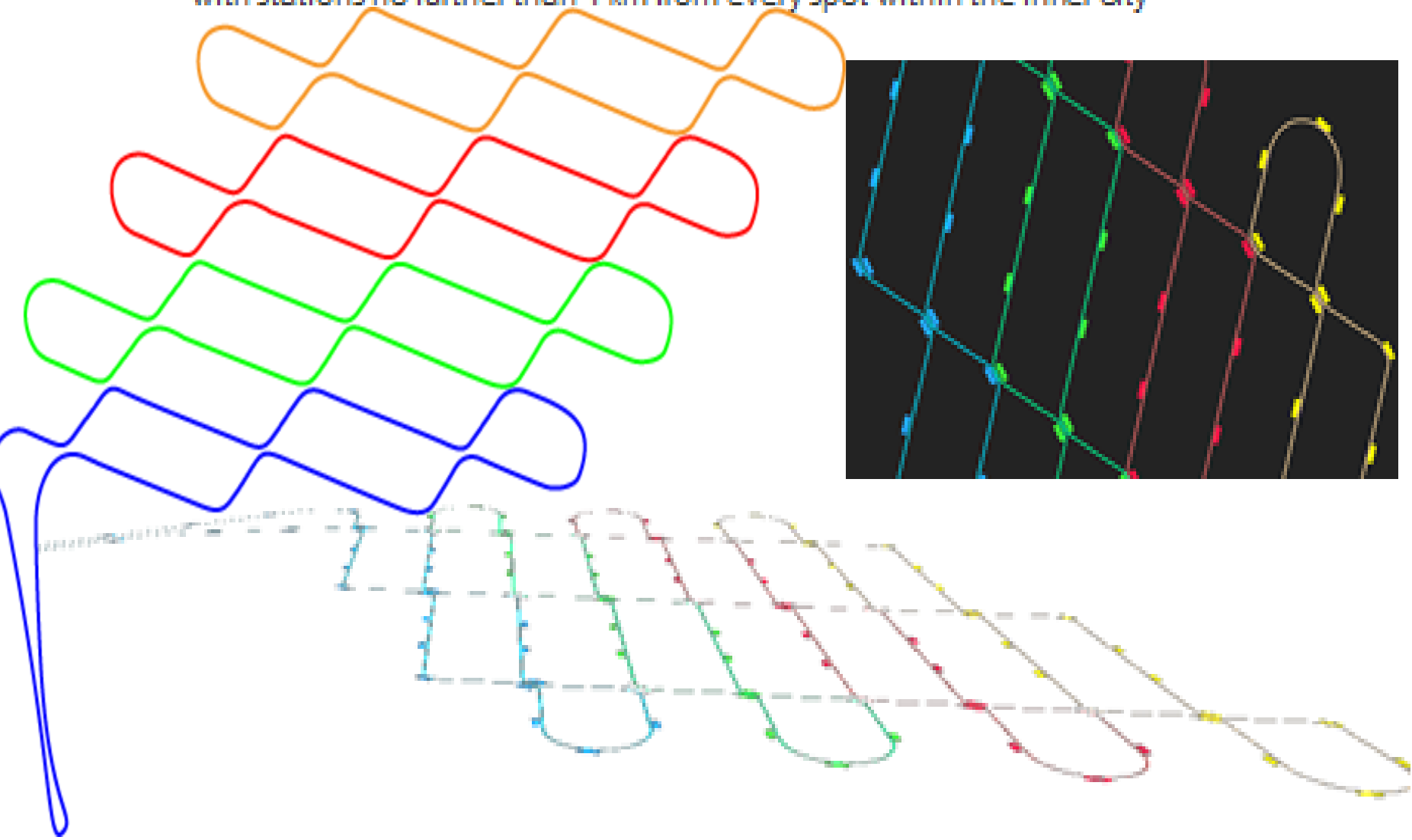


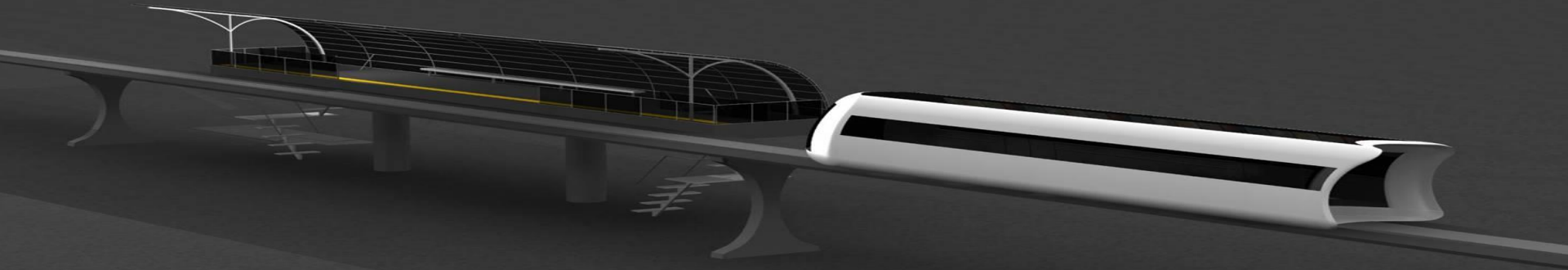
decoupled railcar enters the simple station after the train had passed in constant speed

**all traincars are identical, run driverless on their own, carry up to 100 pax, have a left and right alley for pax movements in either direction, a central division bench for seating, handrails to lean onto and LED screens for information and advertising**

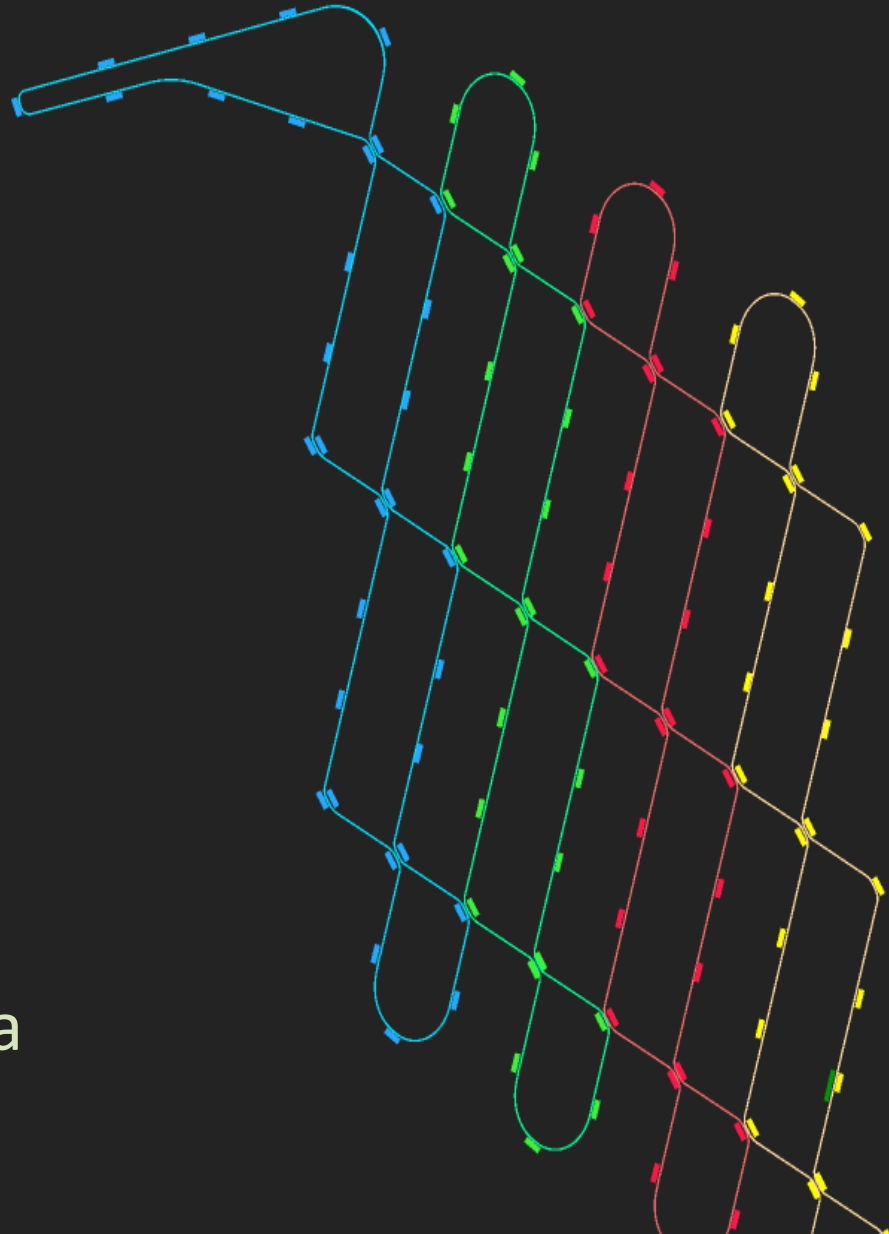


- ▶ The backbone of large and mega cities will be the vast network of MRT trains with stations no further than 1 km from every spot within the inner city

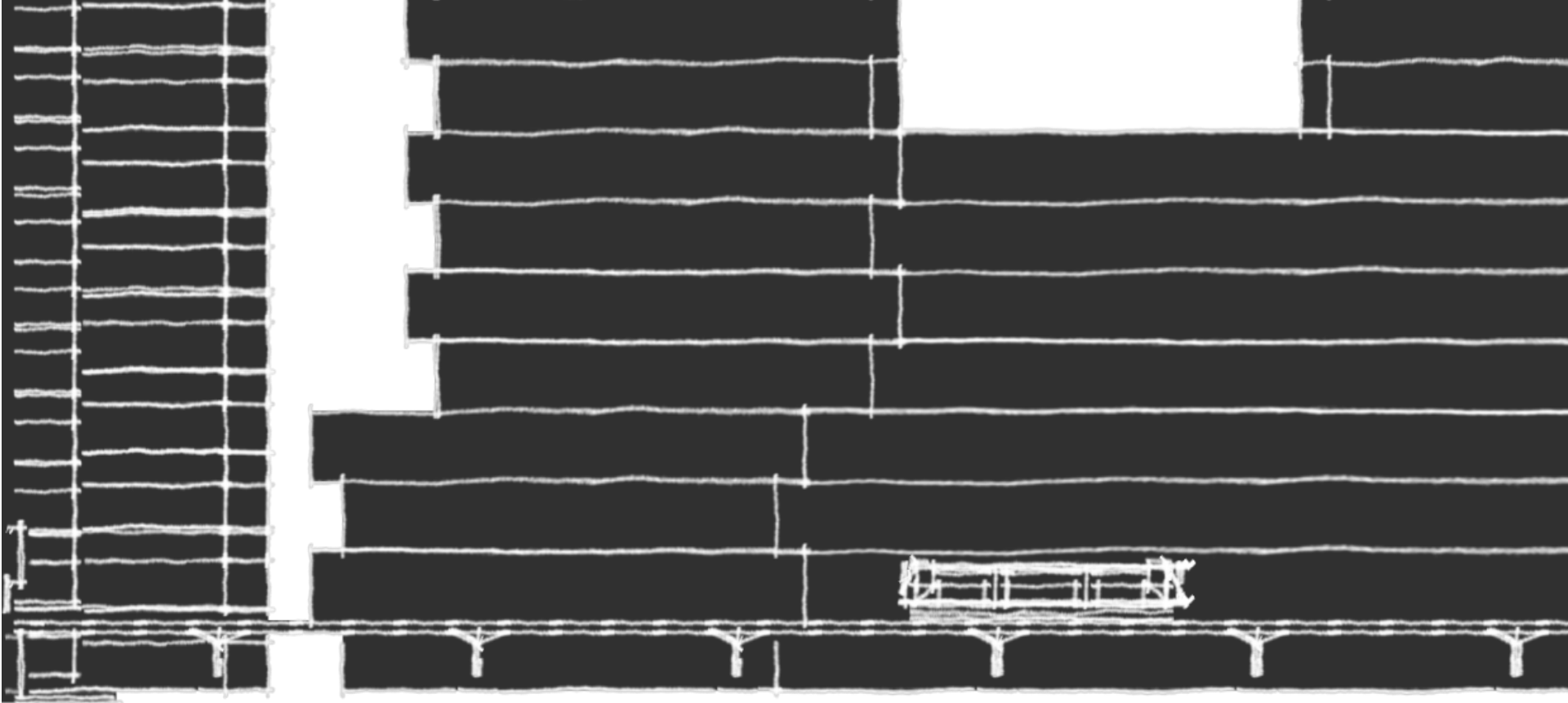




The single stilted lines (sky train type, ~ 5m elevated single rail track) integrate into a typical cityscape, partly along main thoroughfares, but partly as well through narrow corridors of dense neighborhoods, where they might run along or over canals, parks and through modern mega structures, where stations are within or in front of these and connected with same level bridges

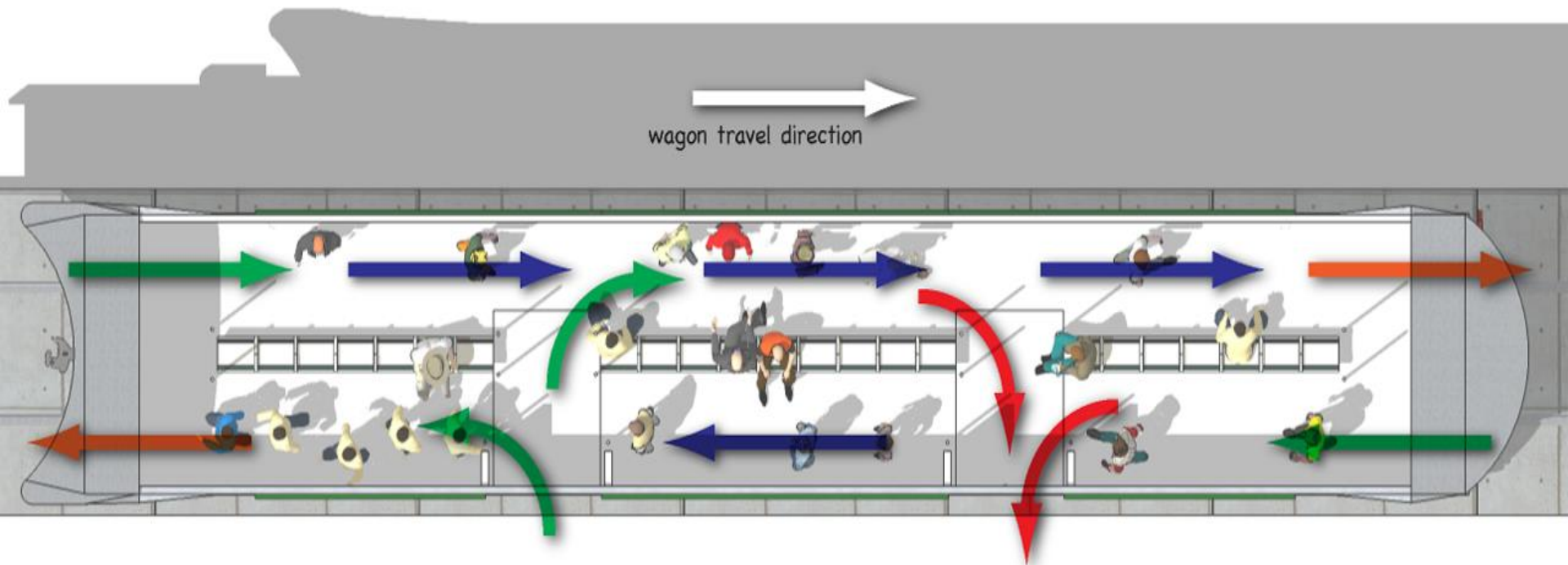


4 loops with  
20 to 25 stops  
in a network of  
240km covering  
a city like Jakarta







The approaching train decouples its last wagon 150 m before the next stop. This single car comes to a halt in that mini-station, while the now three-wagon-train continues its ride in full speed and passes the station without stopping or slowing down.





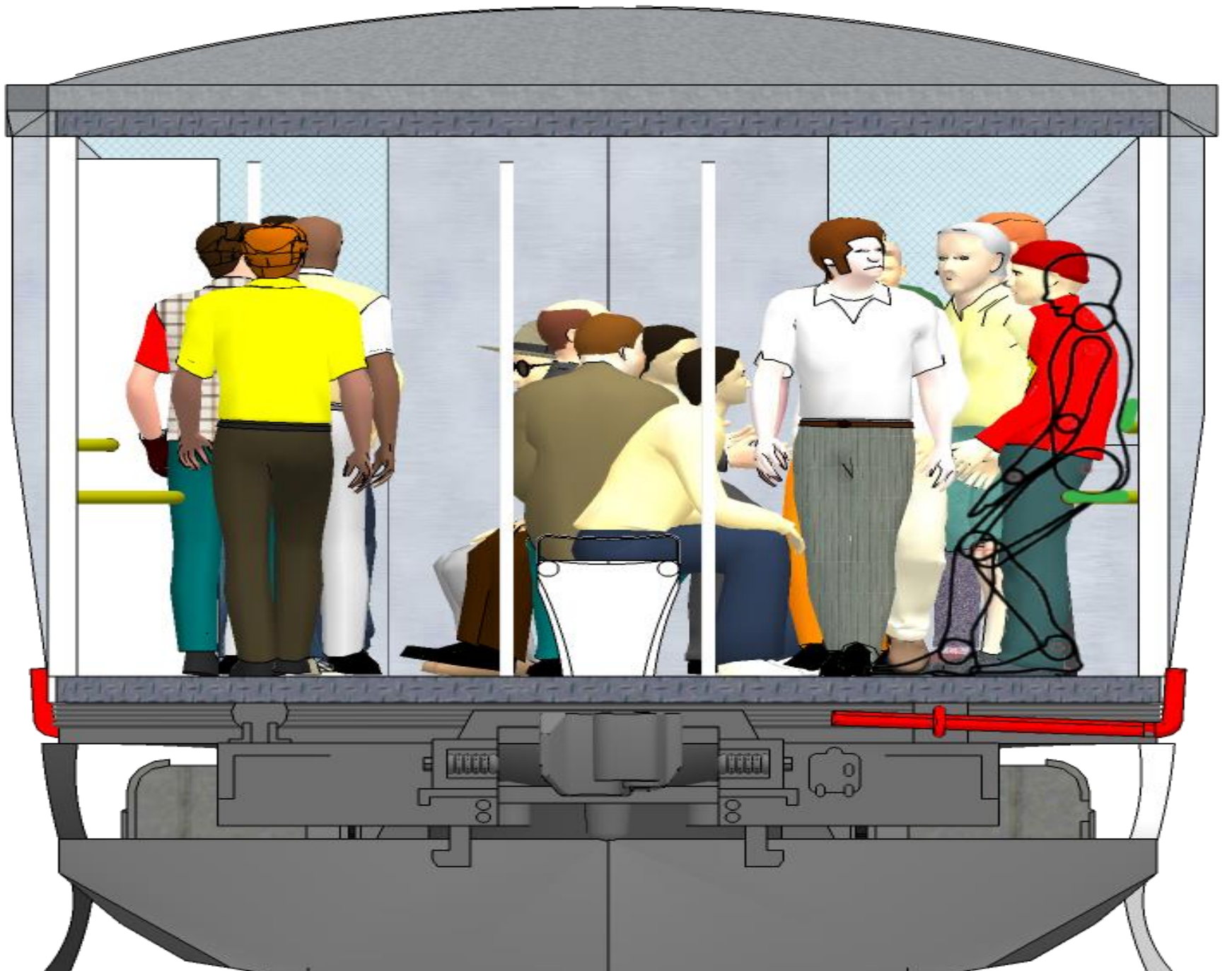
wagon travel direction

-  entering, from the terminal or connected wagons
-  exiting to the terminal
-  movements inside, to find seat or some space
-  changing wagons during travelling

2 alleys on each side of the central seating along the interior walls provide smooth and easy passenger movements

left aisle moving forward,  
right aisle moving backwards



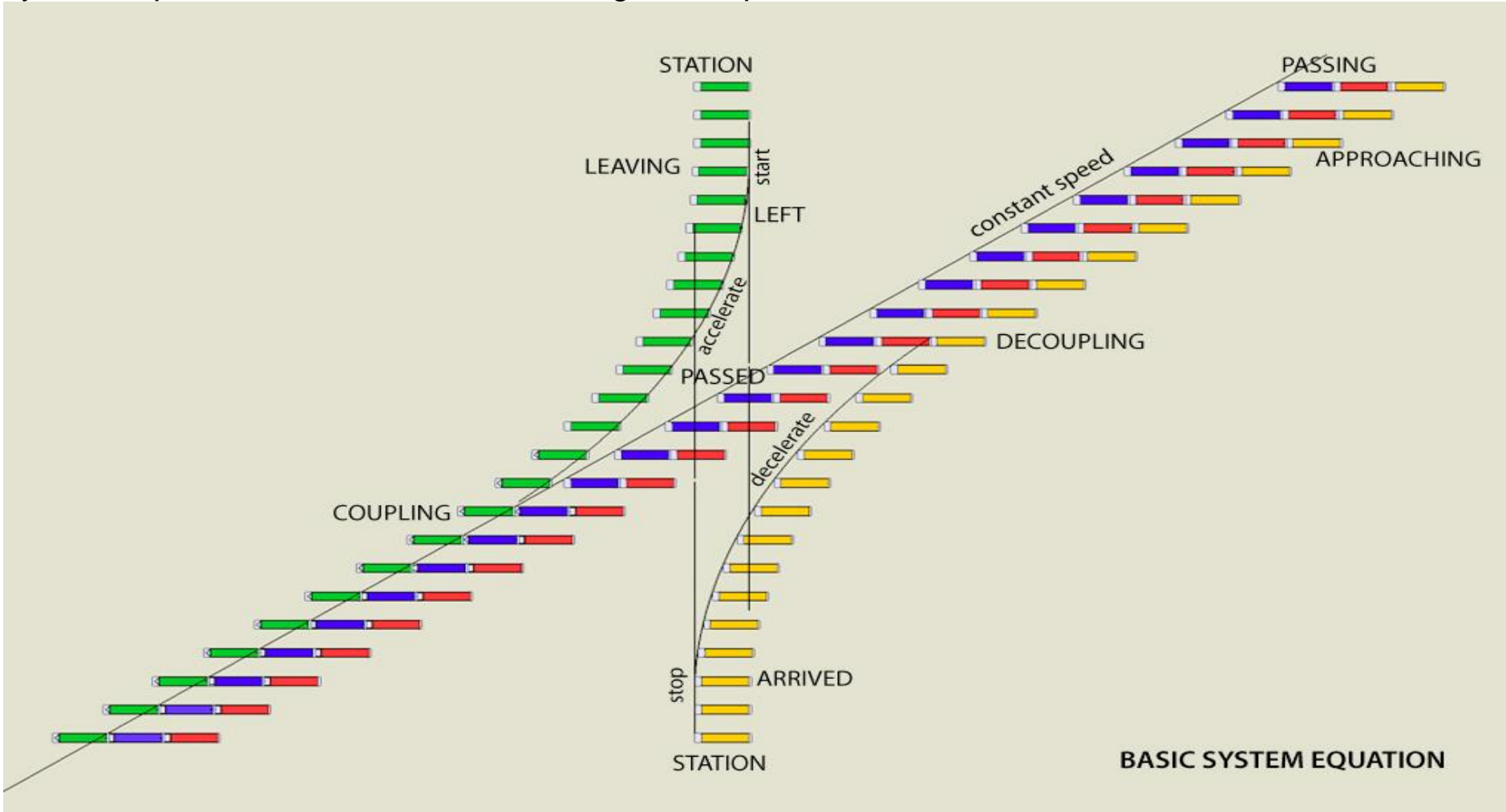


# ...flux....

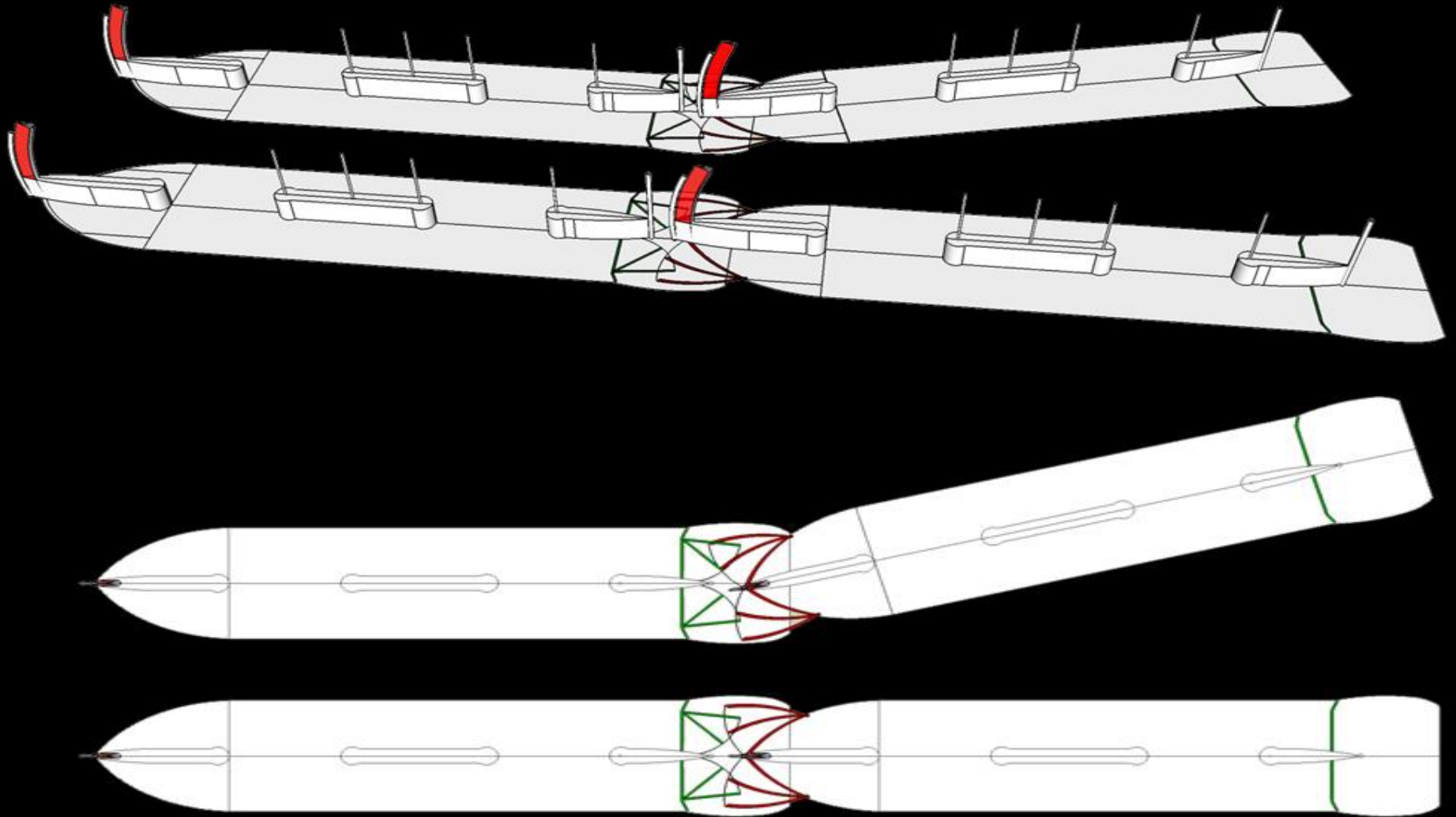
- is the "non-stop-train"
  - which constantly changes its wagon composition (adding front - loosing tail).
- is the system which would cover a whole city with its (e.g. Jakarta 4) loops meeting each other and itself every 3-5 stations with
  - single track
  - one direction
  - only one wagon at each station stopping

the last wagon decouples, decelerates, stops at the terminal, accelerates and joins/couples and continues traveling with the 3 next wagons coming from the rear, then later again the rear one decouples, slows down and stops at the next terminal.

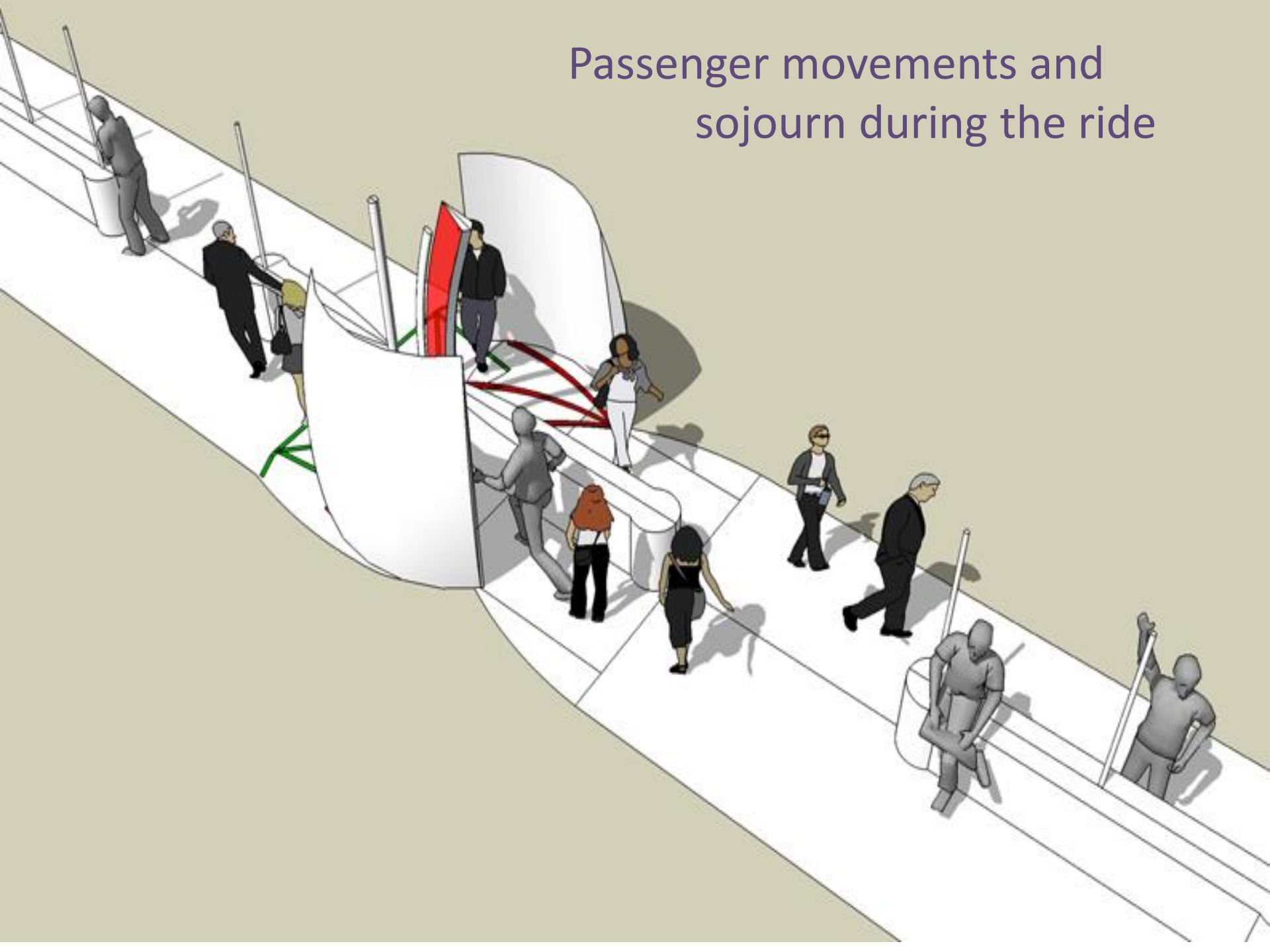
system equation based on a 3 / 2 / 3 wagon composition:



# Coupling studies



# Passenger movements and sojourn during the ride



## If travelling in the commonly deployed 4-car train, the distance of:

1	station	then move	3 cars	back
2	stations	"	2 cars	"
3	stations	"	1 car	"
4	stations	remain in the	same car	
5	"	then move	1 car	to the front
6	"	"	2 cars	"
7	"	"	3 "	"

and so on...



Disabled passengers or those who want to take it even more easy have a fantastic second option by just remaining in the wagon they boarded and stop with it at every fourth station until coming close to the destination, to alight at which there is maximum two wagons to be changed to:

- |   |                      |               |
|---|----------------------|---------------|
| - Stay in original wagon for destinations | 4,8,12,16 etc        | stations away |
| - Move one back for destinations          | 3,7,11,15 etc        | stations away |
| - move one ahead for destinations         | 5,9,13,17 etc        | stations away |
| - move two back for destinations          | 2, 6, 10, 14, 18 etc | stations away |

... still travelling much faster than in any conventional system as only every fourth station causes a two minute delay due to the stop there.

# financial performance

theoretical calculation: **20 hours daily operation**, with steady full occupation of **100 pax/car**, the flux attracts some **6 million passengers a day** (e.g.:Jakarta) -assuming full occupancy and an average ride of 10 km/pax, 125 stations spread over the city and 500 wagons deployed

return of **U\$ 6 million/day** from ticketing alone assuming that every passenger pays the full single journey price of **U\$1** (IDR 10.000) for the average **10 km**

realistic assumption: **50% occupancy**, pax use reduced ticketing schemes, like “job-tickets”, student-cards and long-term-passes:

**U\$ 2 million/day return** expected, annual turnover **U\$ 730 million**

Calculated investment of some **8 billion U\$** for the **240 km** network (JKT) and largely reduced operational costs mainly due to energy savings

# The flux urban rail is made commercially feasible by these measures:

## A. Investment cuts for the installation:

- 1.) single-
- 2.) elevated -
- 3.) extended -  
line Network
- 4.) simplified short (20 m) station platforms
- 5.) prefabricated steel columns and tracks, standardized system for extensive networks in several cities
- 6.) maximized percentage of in-country production
- 7.) all rolling stock is composed of the same electric self-propelled, driver-less 100 pax wagon, which is calculated at less than 2 Mio U\$ / unit

# The flux urban rail is made commercially feasible by these measures:

## B. Gains on TOD (Transit Oriented re-Developments):

- 1.) The investor - public or private – is granted the right to develop the stations over public land with added commercial space:  
residential/offices/entertainment/services/outlets  
in accordance with prevailing or to be established building codes
- 2.) The operator/developer of existing structures is entitled / encouraged to negotiate the integration or connection of stations
- 3.) Station building and maintenance burdened on existing real estate operators

**the flux urban rail is made commercially feasible by these measures:**

**C. minimized operating costs:**

- 1.) huge energy savings by non-stop and constant speed travels of 75% of the rolling stocks
- 2.) braking energy recovery
- 3.) unmanned rolling stocks
- 4.) in-country spare parts and technical know-how
- 5.) simplified 20m non-AC (except if within urban structures), elevated platform stations, many to be maintained by real estate operators on their account (PPP)

# The flux urban rail is made commercially feasible by these measures:

## D. Revenues from ticket sales through highest ridership:

- 1.) speed (nearly doubled)
- 2.) direct access (max 1 km distance to station within inner city)
- 3.) integration (walking accessibility, pedicab, e-taxi, bus feeders drop off and bike park&ride facilities)
- 4.) shortest waiting time (max 30 seconds to board next ride)
- 5.) high turnover (2 minutes headways)
- 6.) comfortable boarding time (90 sec)
- 7.) nonstop ride, constant movement without acceleration and braking during journey
- 8.) information displays and guidance in stations and on train
- 9.) clean and comfortable rolling stocks
- 10.) integrated electronic ticketing
- 11.) branding of the flux system creating pride and identity

## **The flux urban rail is made commercially feasible by these measures:**

### **E. Extra revenues:**

- 1.) advertising in and on (LED skin) attractive rolling stocks and stations  
(potentially up to 5% of total revenues)
- 2.) patent returns and franchising opportunities