The future of transportat systems – Approaches in South America

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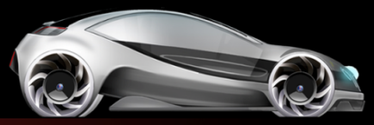
A3PS – Eco Mobility 2018
Vienna - Austria

Background

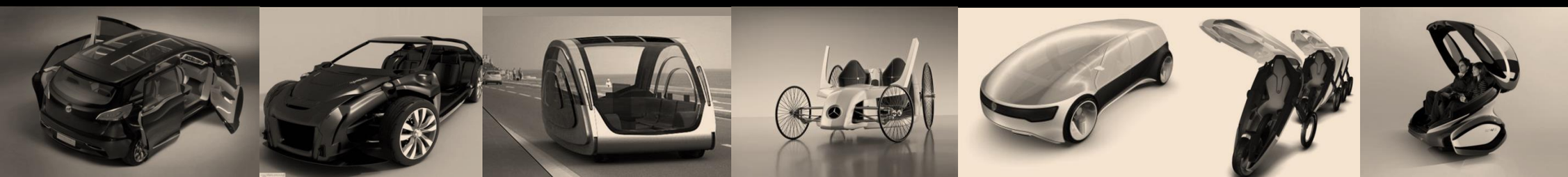


South America X Latin America – Why is important to differentiate?

South America is a geographical definition and Latin America is cultural

In vehicle production three main players:

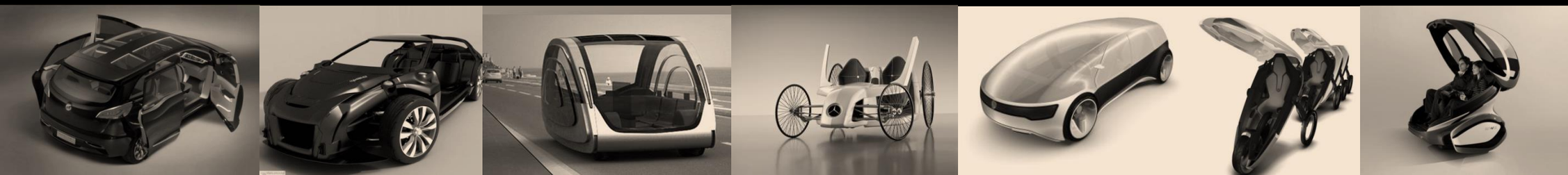
- ***Mexico – Linked to the USA Market***
- ***Brazil – Linked to Argentina to form a regional Market***
- ***Argentina***
  - ***–Both Brazil and Argentina developed a closed market to imported vehicles. Exports are mostly limited to other countries in the region.***
  - ***–For a very long period, product life-cycle was much longer than in other markets***
  - ***–Technological development is to fulfill local demands and are difficult to export (Ethanol fuel)***



Background

Kombi 1957 – 2013

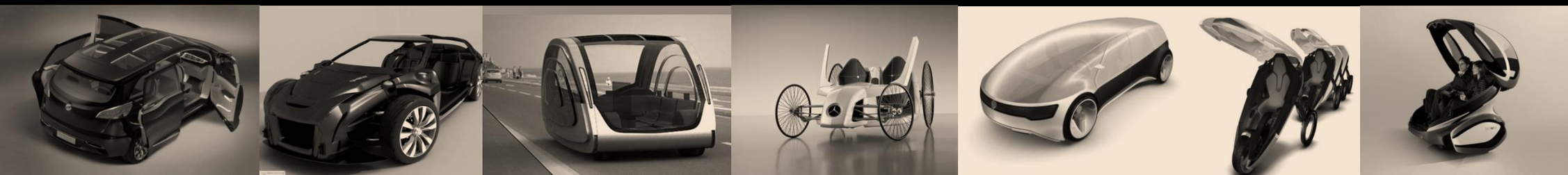
- Liquid cooled engine in 2005 (new emission standards)
- Cost to develop airbags caused the demise
- Said to be biggest profit maker for VW



Background

Energy

- Mexico – Oil
- Brazil – Hydropower, Oil and Gas, Biofuels
  - Nuclear, Wind and Solar are still marginal
- Argentina – Hydropower, Gas and Nuclear
- In the region Venezuela has the largest oil reserves. However, politic and economic problems have made even the oil to be close to collapse.



Background

Economical, political and population data

South American GDP (2017) in USD (billion) - 6541

Brazil – 3219 (aprox. 49% of the region)

Argentina – 911

Colombia – 712

Chile - 452

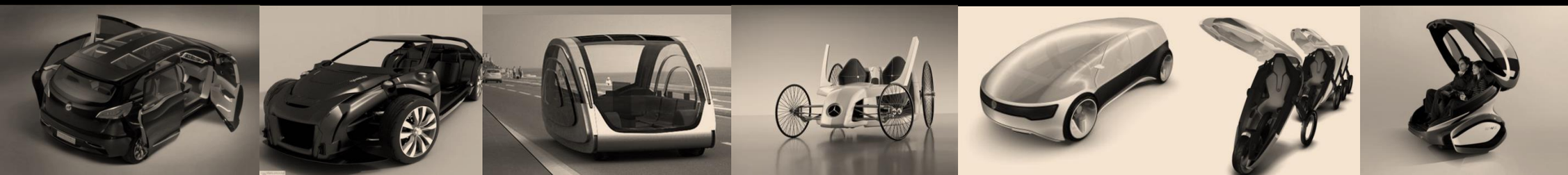
Population 414,7 millions of inhabitants (2018 acc. census and projections)

Brazil – 209,1 (49,4%)

Colombia – 49,8 (11,6%)

Argentina – 44,1 (10,4%)

Peru – 32,7 (7,5%)



Background

	GDP 2018 (USD trillions)	GDP 2017 (USD per capita PPP)	Growth 2017 (total)
Brazil	$3,22	$10.000	0,7%
China	$12,2	$8.830	6,7%
India	$2,60	$7.060	8,2%
Russia	$1,58	$10.743	1,8%

- Rich in natural resources
- Politically unstable
- Economically unstable
- Different levels of development
- Poor road conditions






Background

Land transport with different challenges

City X Country side

People X Goods

Road conditions

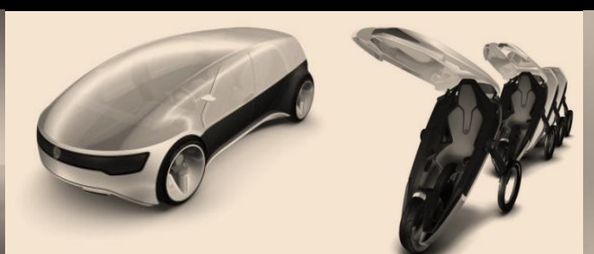
Safety

Energy supply

Polution








Current Situation - Brazil

Recovering from an economic disaster in 2014

Vehicle Sales ***2012: 3.801.859***

2013: 3.797.254 (first decrease in 10 years)

2014: 3.497.805

2015: 2.569.014 (OMG_1!!)

2016: 2.050.327 (OMG_2!!!)

2017: 2.239.403 (relief ?)

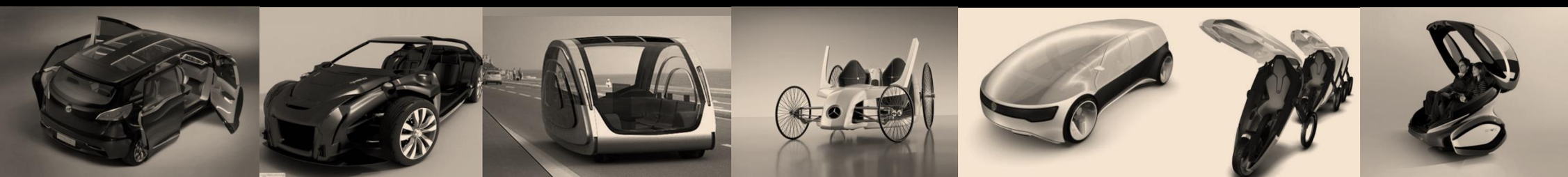
Expectations: A lost decade for the automotive sector. Sales levels of 2012 are to be repeated only by 2020 (optimistic).

Local engineering and development were drastically reduced.

GM has sent 500+ ppl from its local design and engineering to Michigan.

Asian manufacturers and suppliers – Almost no local development

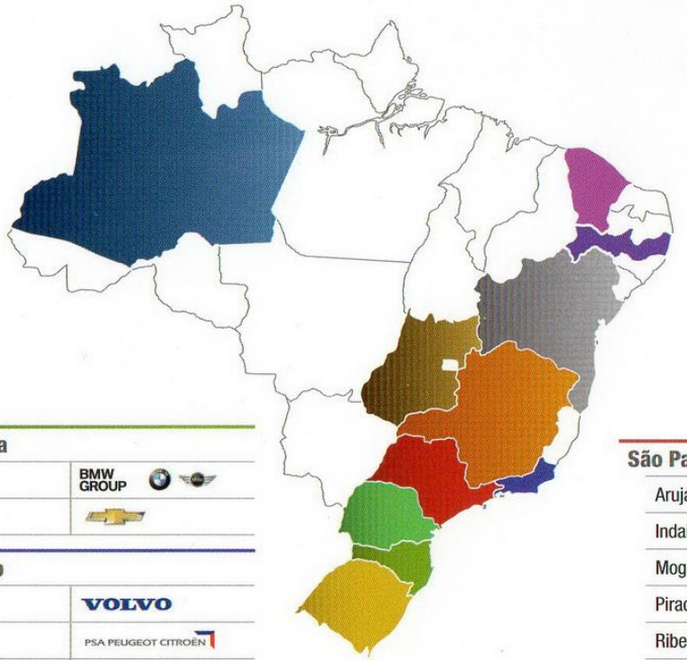
New policy for the sector announced in 2018 (Nov.)



Current Situation - Brazil

60 anos ANFAVEA

Fábricas



Amazonas
Manaus	Mahindra

Goiás
Anápolis	CAOA HYUNDAI SUBARU
Catalão	John Deere, Mitsubishi Motors

Paraná
Campo Largo	FCA, Caterpillar
Curitiba	CNH Industrial, Volvo
Ponta Grossa	DAF
São José dos Pinhais	Audi, Nissan, Renault, Volkswagen

Rio Grande do Sul
Canoas	AGCO, Valtra
Caxias do Sul	Agrale, Iveco
Dois Irmãos	Mahindra
Gravataí	Chevrolet
Horizontina	John Deere
Ibirubá	AGCO, Valtra
Montenegro	John Deere
Santa Rosa	AGCO, Valtra

Santa Catarina
Araquari	BMW Group
Joinville	Chevrolet

Rio de Janeiro
Pederneiras	Volvo
Porto Real	PSA Peugeot Citroën
Resende	Iveco, Nissan

As 31 empresas associadas à ANFAVEA reúnem 65 unidades industriais (veículos, máquinas agrícolas e rodoviárias, motores, componentes, outros produtos). As fábricas estão sediadas em 11 Estados (Rio Grande do Sul, Santa Catarina, Paraná, São Paulo, Rio de Janeiro, Minas Gerais, Goiás, Bahia, Ceará, Amazonas e Pernambuco). A indústria está presente em todas as regiões do País – Sul, Sudeste, Centro-Oeste, Norte e Nordeste – com fábricas sediadas em 40 municípios.

Ceará
Horizonte	Ford

Pernambuco
Goiana	FCA

Bahia
Camaçari	Ford

Minas Gerais
Contagem	CNH Industrial
Betim	FCA
Juiz de Fora	Mercedes-Benz
Sete Lagoas	Iveco

São Paulo
Arujá	Komatsu
Indaiatuba	John Deere, Toyota
Mogi das Cruzes	AGCO, Valtra
Piracicaba	Caterpillar, CNH Industrial, Hyundai
Ribeirão Preto	AGCO
São Bernardo do Campo	Ford, Mercedes-Benz, Scania, Toyota, Volkswagen
São Caetano do Sul	Chevrolet
São Carlos	Volkswagen
São José dos Campos	Chevrolet
Sorocaba	CNH Industrial, Toyota
Sumaré	Honda
Suzano	Komatsu
Taubaté	Ford, Volkswagen

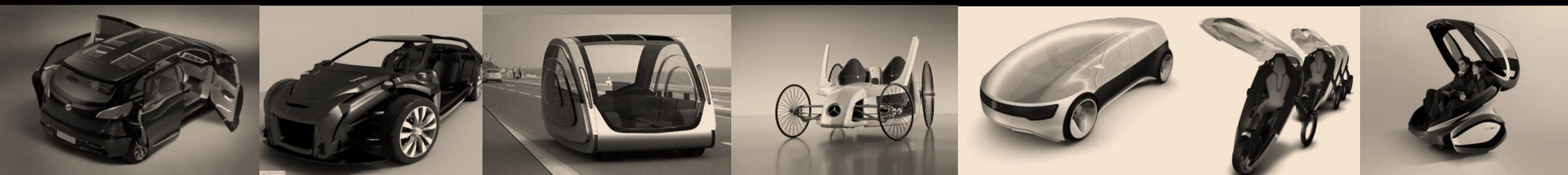






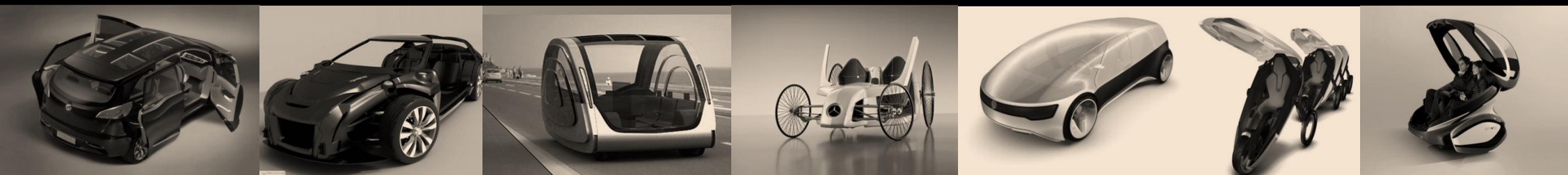
Bio-Fuels

- Ethanol as a replacement to Gasoline
  - Early researc1930’s (UK, France and Brazil)
    - Main oil reserves in the USA + Mexico
    - Discovery of oil fields in Central Asia and Arabia halted research
  - Brazil 1974
    - Country mostly dependent on foreign fuel sources
    - Increase in oil prices led to re-development of ethanol as fuel
      - Sugar cane culture
      - National source of energy
      - Otto-cycle engines only (limited to cars and small pick-ups)



Bio-Fuels

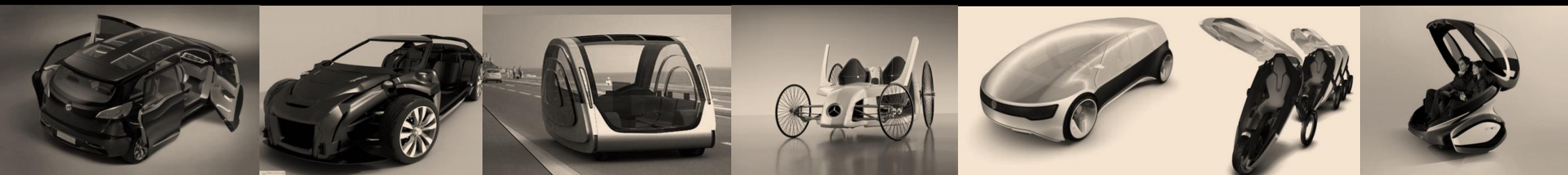
- 1985 Almost 100% of passenger cars were produced with ethanol engines
  - Fully developed nationally
  - Corrosion
  - Cold start
  - Energy disadvantage (about 70% of energy per mass unit compared to gasoline)
  - Higher compression ratio
  - Added to gasoline to replace lead (up to 25% on regular gasoline sold in Brazil)
- Currency crisis and spike on sugar prices made the producers decide to produce sugar
  - Fuel shortage crisis
  - Confidence crisis
  - Ethanol as fuel almost non-existent by 1995



Bio-Fuels

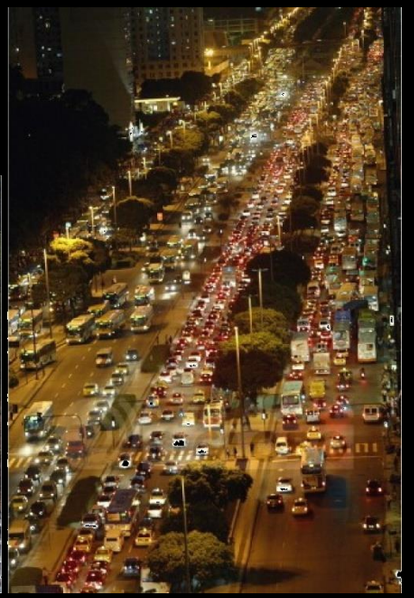
- 2003 “Flex –fuel engine” launched
  - It runs on every mixture of ethanol and gasoline
  - Fuel injection adjust according using the emissions data
  - Users can which fuel they can buy
  - Energy disadvantage (about 70% of energy per mass unit compared to gasoline)

- Societal issues
  - Fuel or food?
  - Land use and deforestation
  - Sustainability

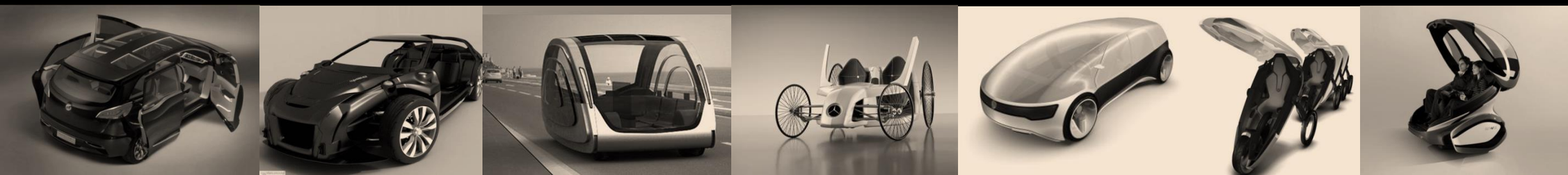


City Transport

People



São Paulo – One of the world's "Mega-cities" (Pop. 12,1 million)
Current fleet (Jul. 2018)
Pax. Cars – 6,1 Million
Buses – 47 thousand
Vans and light trucks – 1,1 Million
Heavy Trucks – 170 thousand
Two-wheelers (with engine) – 1,2 Million

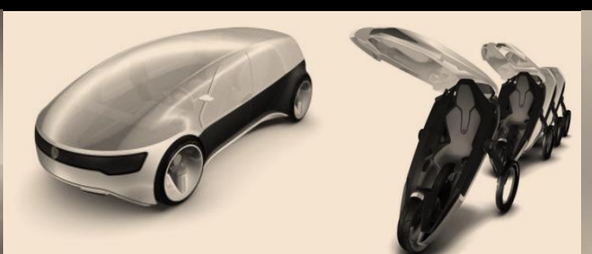


City Transport

“First Mile-Last Mile”



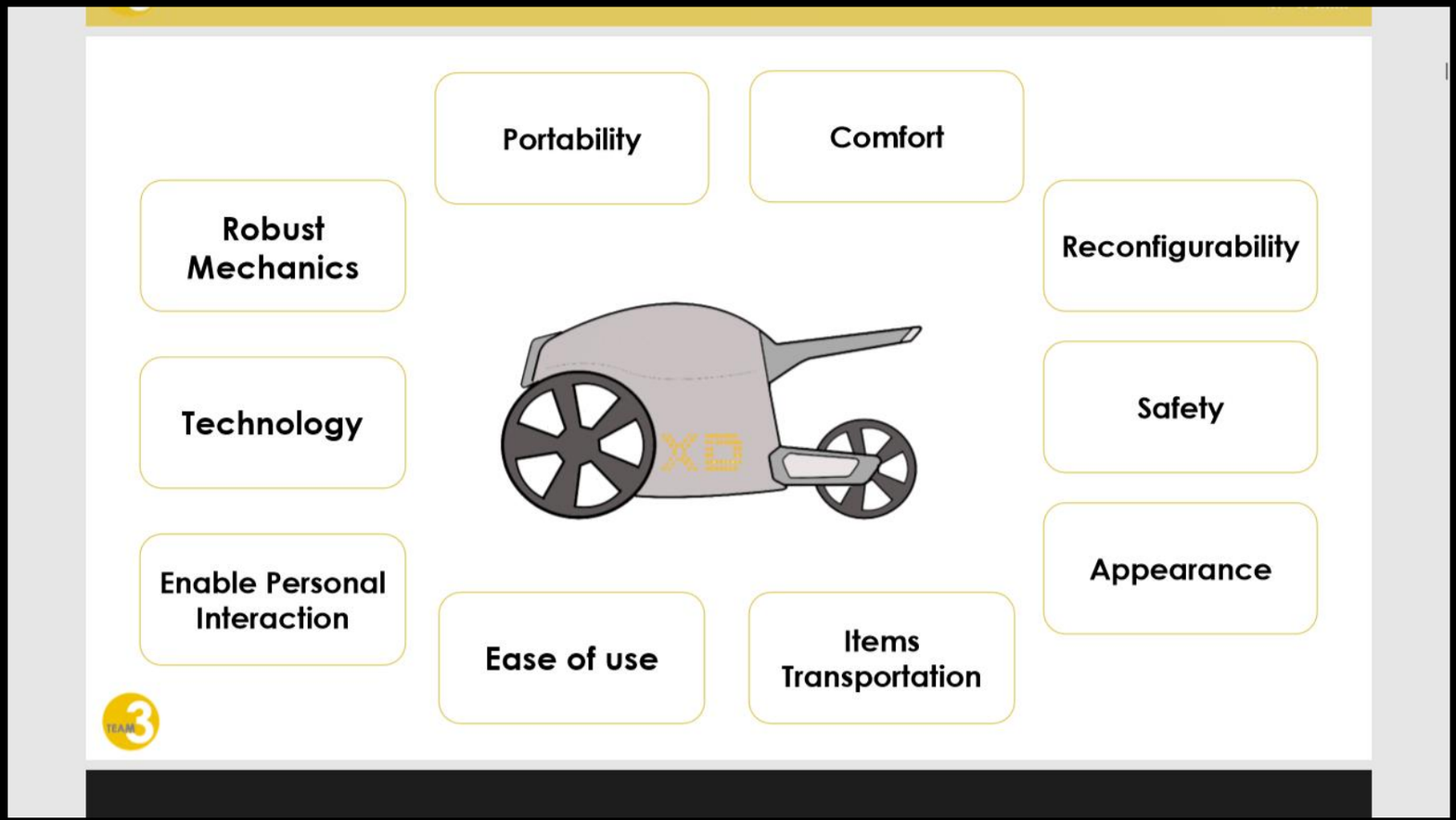


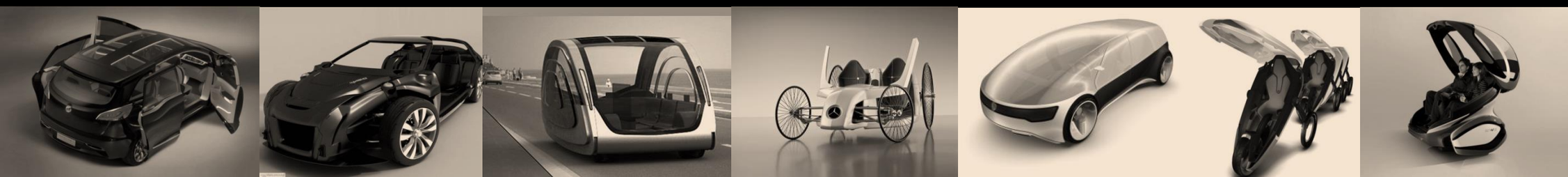



City Transport

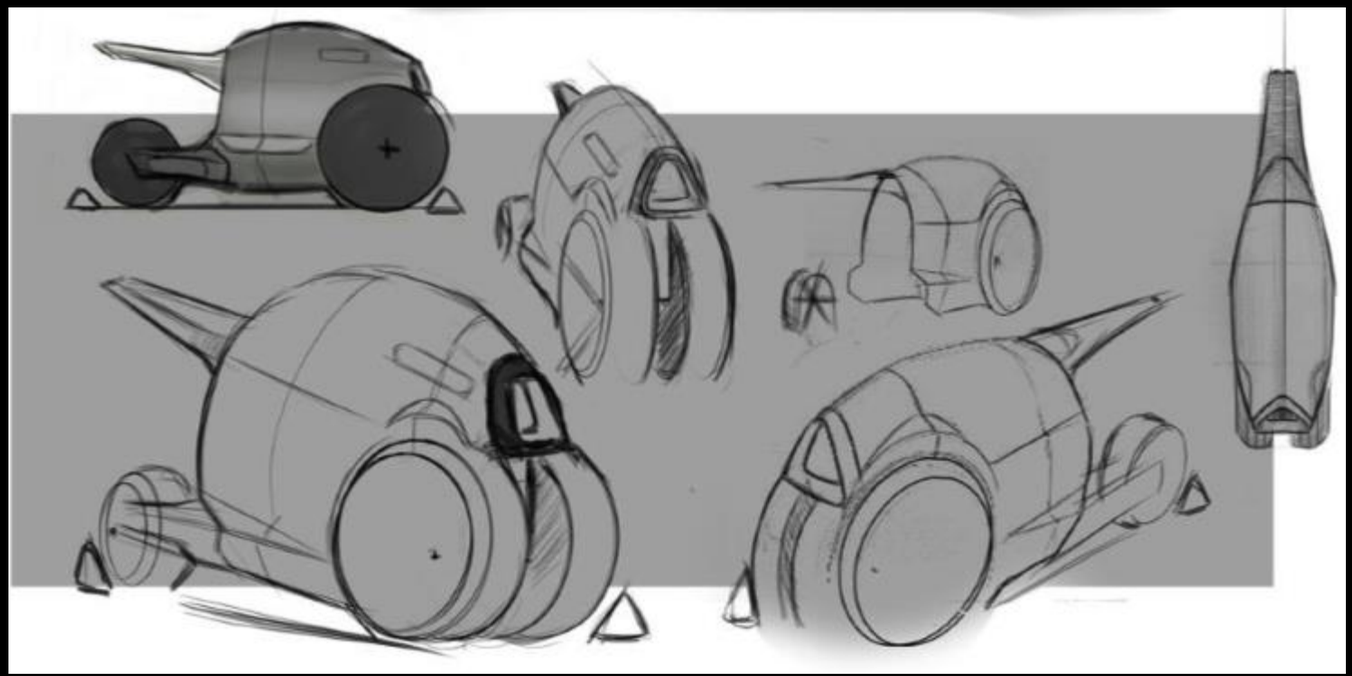
“First Mile-Last Mile”

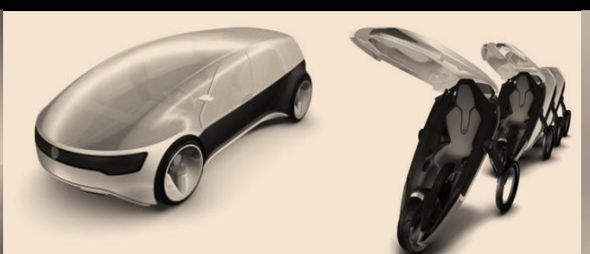
Project XD – Cooperative development Brazil and India



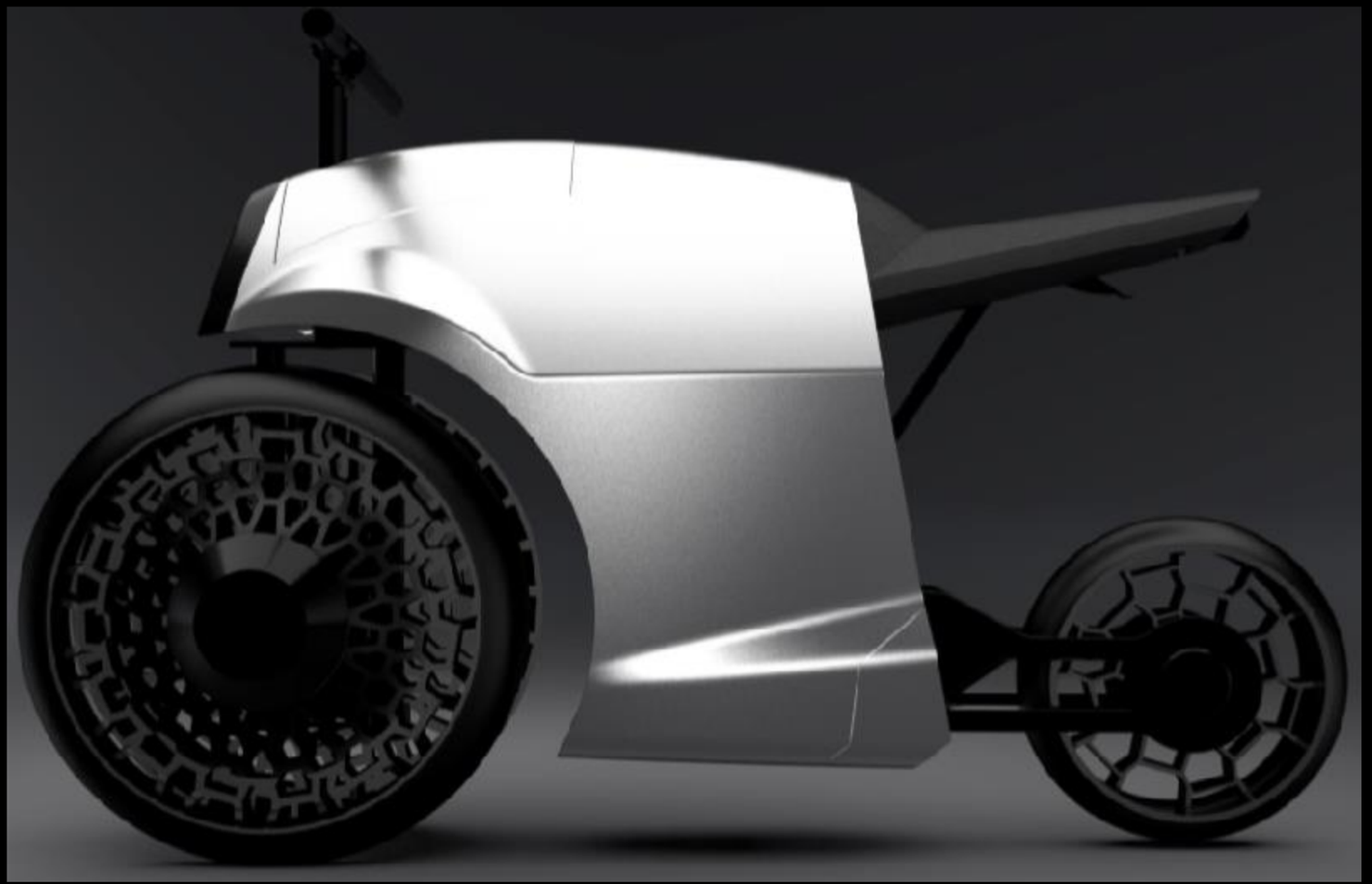


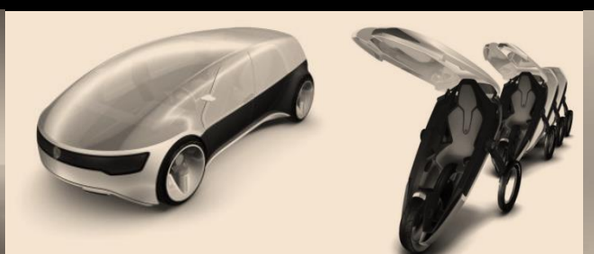
City Transport





City Transport





City Transport

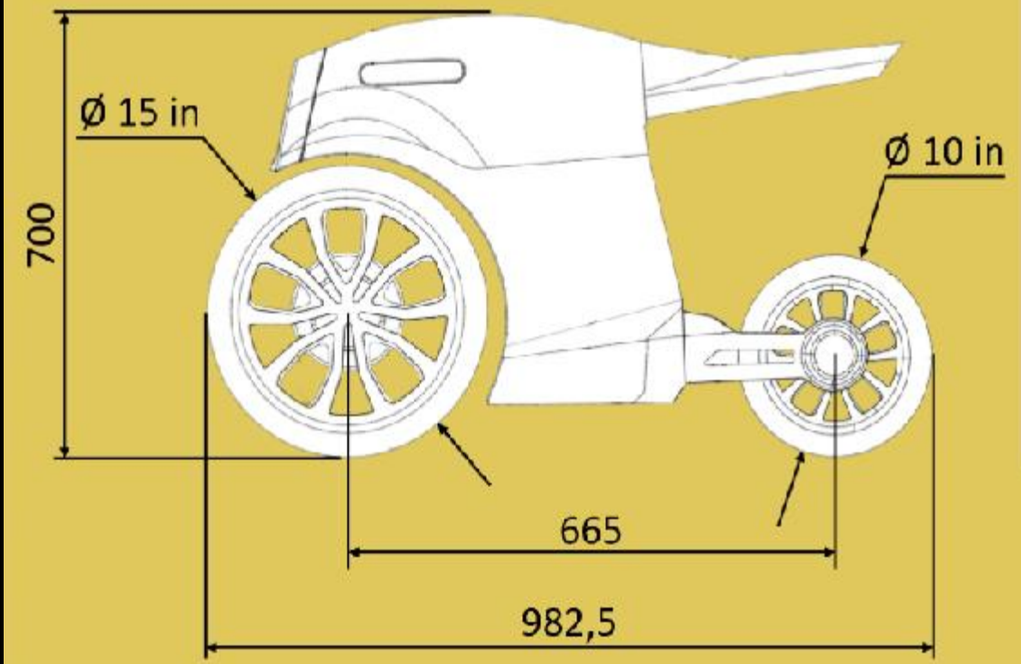
Vehicle main specifications:

- Power: 1,2kW
- Electric
- Torque: 45Nm
- Max. Range: 50km
- Max. Speed: 20km/h






City Transport



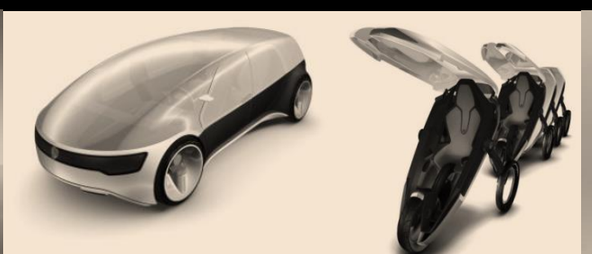
VEHICLE MEASUREMENTS

Width: 250 mm

When folded (L x W x H):
600 x 250 x 590 = 0,088 m³







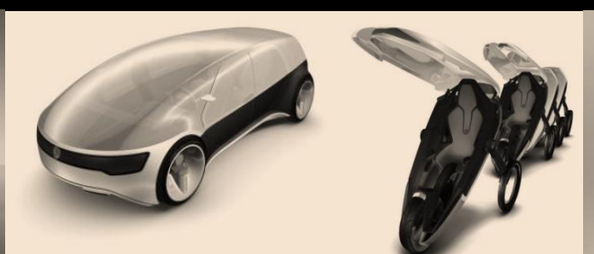

City Transport

Application

- Main tool to access the vehicle
  - Control panel
  - Map
  - Station finder
- Main interface for shared use



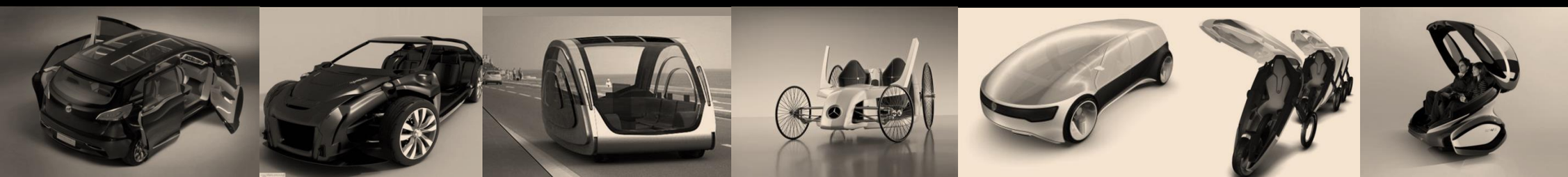





Goods Transport

Long distance transport

- Done by Diesel powered trucks
- Distances of more 3000km in difficult road conditions



Goods Transport - Long distance

Long distance transport

- Investment on railroads is of difficult return
- No possible way to electrify or use alternative power
- Old technology still in use
  - Euro 3 or older (current production in Brazil is Euro 6)
  - No control of emissions (most cities)
  - Subsidized fuel
- New oil reserves present a prospect of continued use of Diesel
- Contradictory policies
  - Brazilian congress proposed a total ban on IC Engines in 2060
- Closed and large enough market to be not affected to world trends in mobility