PARSONS

Planning for Connected and Autonomous Vehicles

Andrew Bevan
Smart Mobility Director

The Evolution of Transportation

Ancient Times
Transport by foot or animal

Industrial Revolution (1825-1900)
Street cars, subways, elevated rail, commuter rail

Private Motor Vehicle Era (1925-Present)
Spread land use activities beyond walking distance to transit stops/stations

Connected and Autonomous transport (Future)
Automated transportation. Mobility on demand. Vertical and horizontal mobility solutions

Each era is distinguished by a different transportation technology and a correspondingly different urban form.

Batte of Ideas

Cities for People of for Cars?

Author and activist Jane Jacobs at a community meeting in Greenwich Village's Washington Square Park in 1963.

Photograph: Fred W McDarrah/Getty Images

An artist's sketch from 1959 of the proposed Lower Manhattan Expressway, a 10-lane highway through SoHo and Little Italy that required the demolition of 416 buildings.

Photograph: AP

Robert Moses stands in front of the Manhattan skyline in 1956.

Photograph: AP

Ref: https://centrodemidias.am.gov.br/dmdocuments/17F7GEO010P1.pdf

Our Future Cities

Improved Public Health

Reduce Roadway Widths

More Green Space

Higher Speed Limits

Increased Lane Capacity

Why Autonomy?

Reduced Passenger Risks

Safer

Reduced Emissions

Increased Capacity

Less congestion

Better Health

Increased Productivity

Data Collection

Improved Mobility for Children, Elderly, Disabled

Mobility on Demand

Where are we today?

UK Autodrive
Milton Keynes & Coventry

2getthere
Autonomous GRT

Waymo
Ride-hailing app Lyft
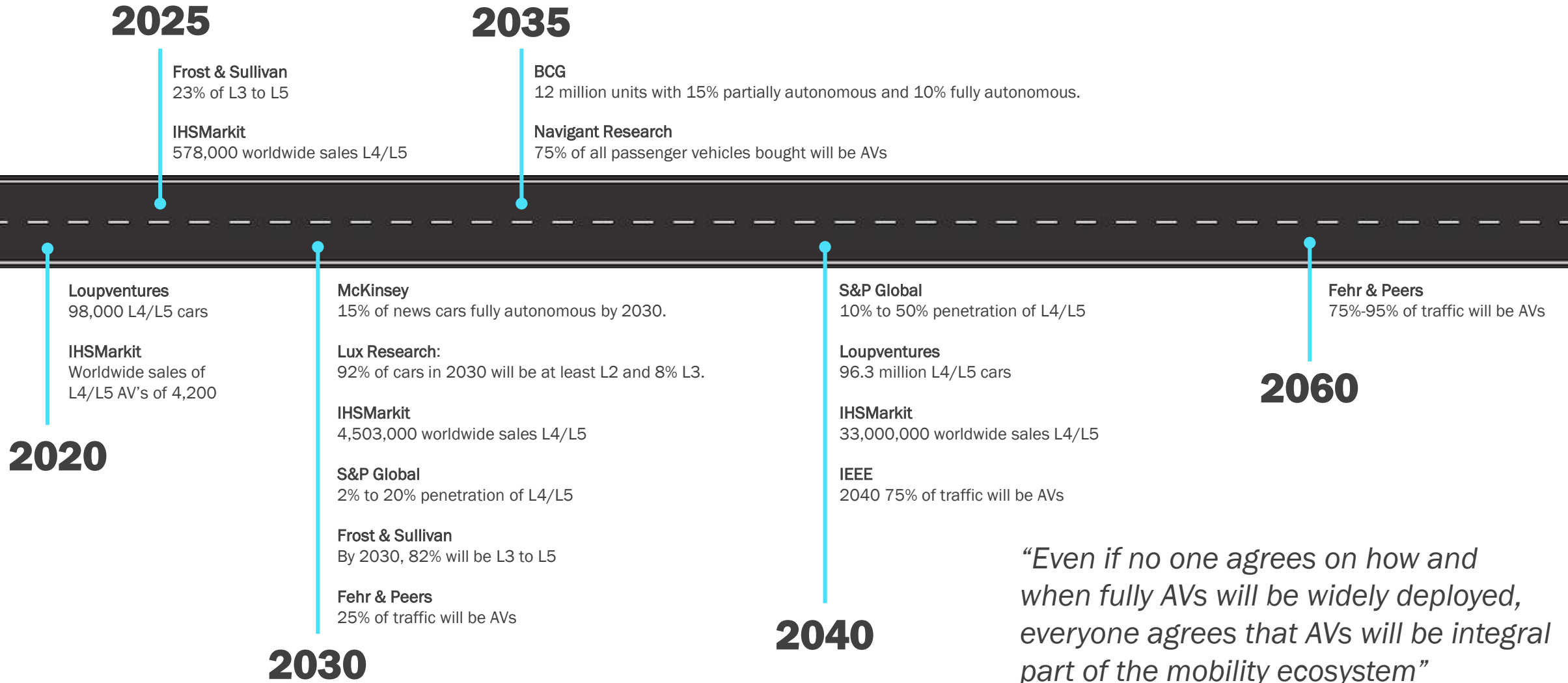8 million miles driven on public roads

CETRAN AV Test Circuit
Singapore

Tesla
Autopilot (level 2-3)

Uber
Self-driving cars
3 million miles driven on public roads

What does the future look like?

2025

Frost & Sullivan
23% of L3 to L5

IHSMarkit
578,000 worldwide sales L4/L5

2035

BCG
12 million units with 15% partially autonomous and 10% fully autonomous.

Navigant Research
75% of all passenger vehicles bought will be AVs

2020

Loupventures
98,000 L4/L5 cars

IHSMarkit
Worldwide sales of
L4/L5 AV's of 4,200

2030

McKinsey
15% of news cars fully autonomous by 2030.

Lux Research:
92% of cars in 2030 will be at least L2 and 8% L3.

IHSMarkit
4,503,000 worldwide sales L4/L5

S&P Global
2% to 20% penetration of L4/L5

Frost & Sullivan
By 2030, 82% will be L3 to L5

Fehr & Peers
25% of traffic will be AVs

2040

S&P Global
10% to 50% penetration of L4/L5

Loupventures
96.3 million L4/L5 cars

IHSMarkit
33,000,000 worldwide sales L4/L5

IEEE
2040 75% of traffic will be AVs

2060

Fehr & Peers
75%-95% of traffic will be AVs

"Even if no one agrees on how and when fully AVs will be widely deployed, everyone agrees that AVs will be integral part of the mobility ecosystem"

Germany

Key Drivers

- Preserve the German automotive industry

- Increase safety and eliminate the incidents caused by human errors
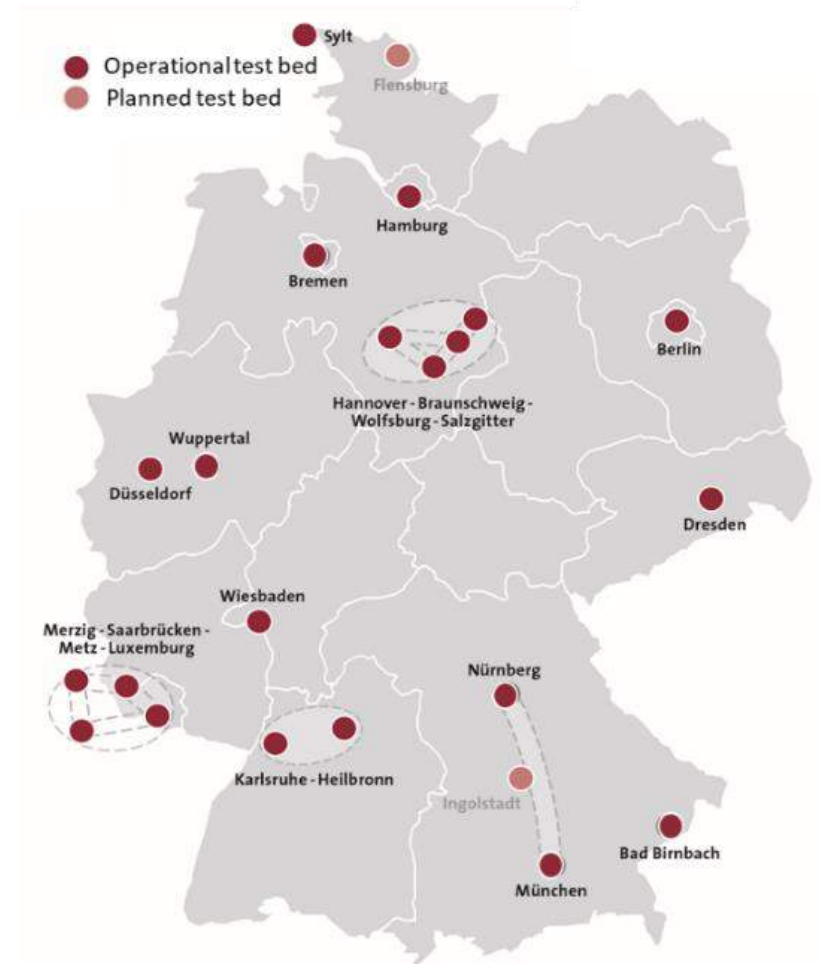
The legal requirements for the use of the first highly automated and fully automated driving functions for regular operation in road transport have been in place since 2017.

AV vision:

- National AV strategy

- National Platform Future of Mobility task force

Locations:

- Digital Motorway Test Bed on the A9 federal motorway in Bavaria

- Test Area Autonomous Driving - Baden-Württemberg

- Diginet-PS Project - Testbed in Berlin

Operational test bed
Planned test bed

Sylt
Flensburg
Hamburg
Bremen
Berlin
Hannover-Braunschweig-Wolfsburg-Salzgitter
Wuppertal
Düsseldorf
Dresden
Wiesbaden
Merzig-Saarbrücken-Metz-Luxemburg
Nürnberg
Karlsruhe-Heilbronn
Ingolstadt
Bad Birnbach
München

AV test beds on public roads in Germany

Singapore

Key Driver: Singapore's 'urban mobility challenge'

- Problems: Lack of space, shortage of labour, increasing demands & dependency on domestic transport
- Solutions: Increase vehicle utilisation, 24hr service/logistics, reduced manpower requirements

AV vision: Fully automated vehicles people mover service

- Self driving buses & taxi's (no human operator)
- Mixed with existing human traffic, complex urban environment, minimal reliance on external infrastructure
- Integrated with MaaS and urban planning

https://fintechnews.sg/33594/insurtech/autonomous-vehicle-singapore/

Locations:

- Sentosa
- One North
- CETRAN

"Developing standards and regulations and replacing traditional vehicles by AV's."
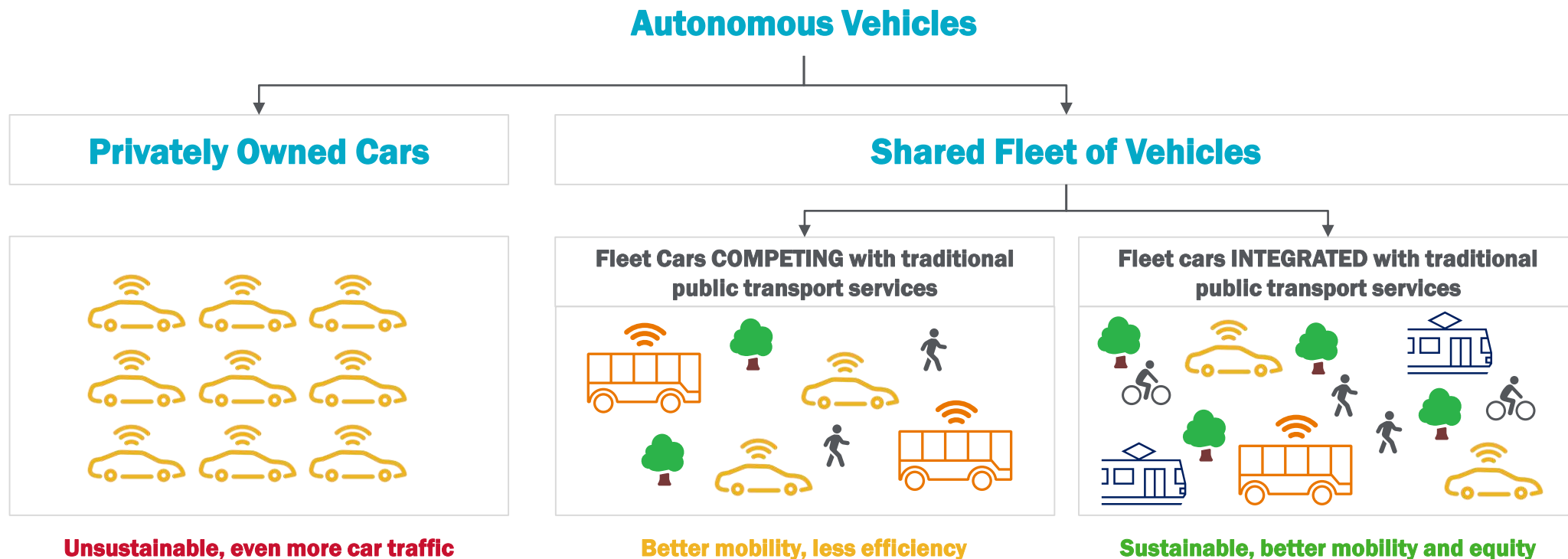
Multi-layered mobility

Developing Mobility eco-system

- Urban mobility

- Sustainable mobility

- Socio-economic influencers

- MaaS

- New modes of transportation

- New influencers

UITP Vision on Connected and Autonomous Vehicles

Autonomous vehicles will only help to meet public policy goals if they come as shared fleets integrated with public transport

Autonomous Vehicles

Privately Owned Cars

Shared Fleet of Vehicles

Fleet Cars COMPETING with traditional public transport services

Fleet cars INTEGRATED with traditional public transport services

Unsustainable, even more car traffic

Better mobility, less efficiency

Sustainable, better mobility and equity

Planning Applied to AVs

(+) **Transport Systems with AVs are no different than regular transport systems**

(+) **Additional Considerations:**

- Equipment for infra, comms & signage
- The fact that AVs are likely to be integrated with public transport

(+) **What changes from traditional transport planning:**

- More criteria to take into account (tech maturity, consumer acceptance, policies, etc.) but the approach stays the same

(+) **Important to conduct an analysis on where to deploy AVs, to bring to light to unknown issues and to dimension the offer to the actual demand**

(−) **Offer inadequate service**

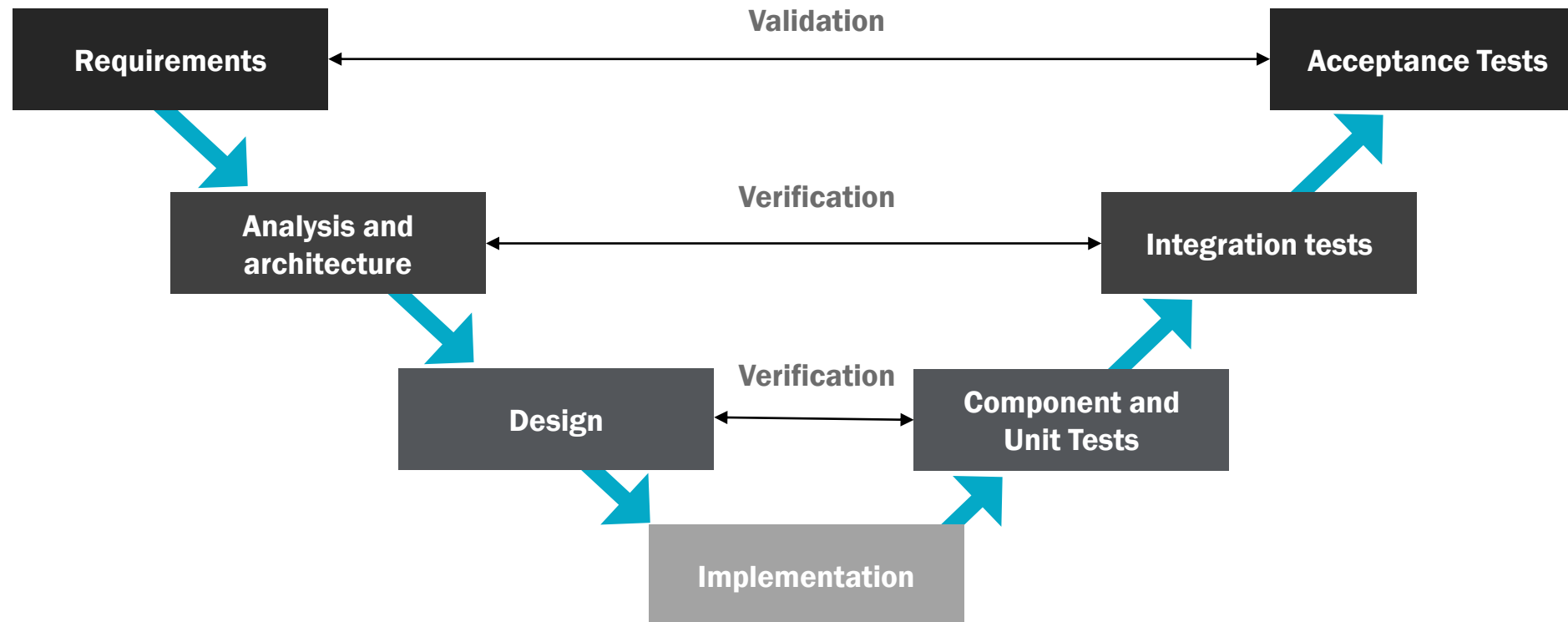(−) **Transport systems improperly dimensioned (under or over used)**

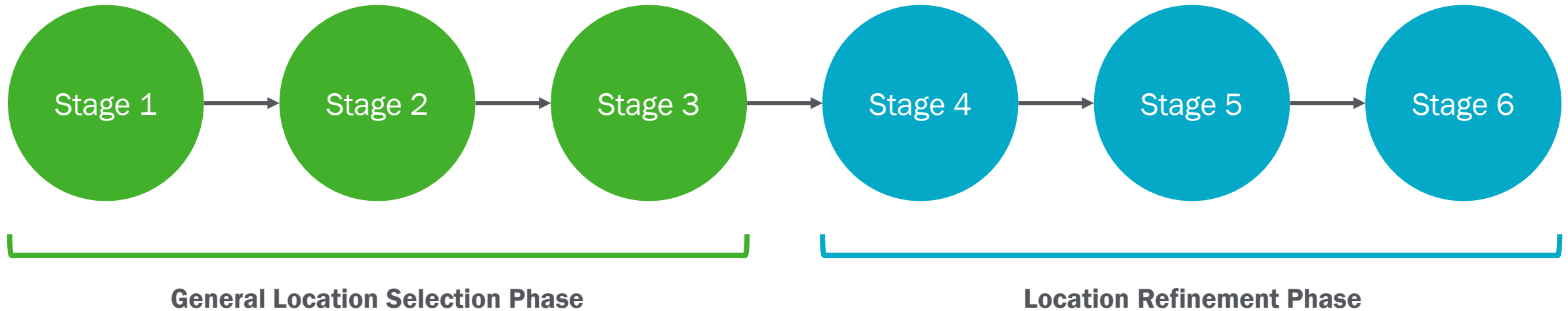(−) **Failing to face mobility challenges**

(−) **Accentuate Urban Sprawl**
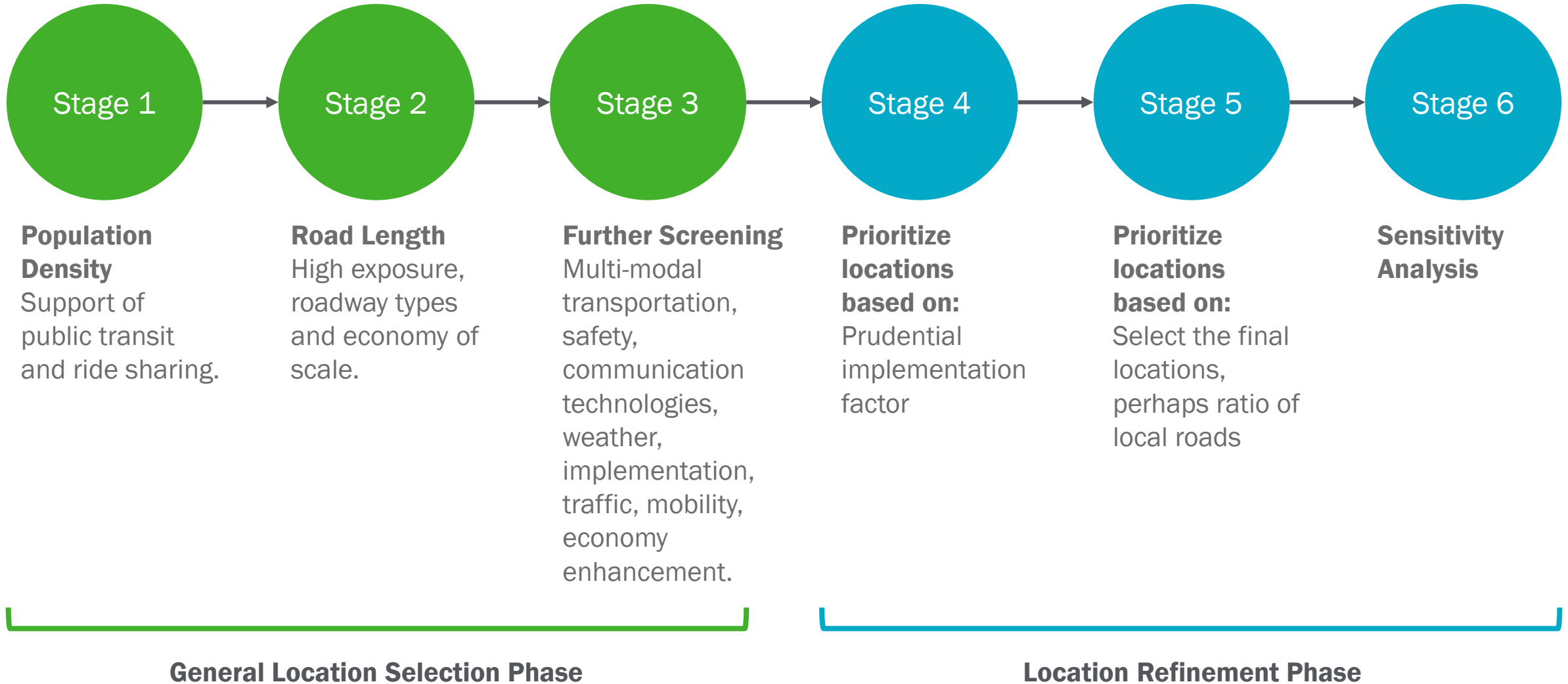
(−) **More cars/more congestion on the road**

V-Model
Systems development lifecycle

Location Analysis Process

Stage 1 → Stage 2 → Stage 3 → Stage 4 → Stage 5 → Stage 6

General Location Selection Phase

Location Refinement Phase

Potential Location Selection Criteria

Stage 1

Population Density
Support of public transit and ride sharing.

Stage 2

Road Length
High exposure, roadway types and economy of scale.

Stage 3

Further Screening
Multi-modal transportation, safety, communication technologies, weather, implementation, traffic, mobility, economy enhancement.

Stage 4

Prioritize locations based on:
Prudential implementation factor

Stage 5

Prioritize locations based on:
Select the final locations, perhaps ratio of local roads

Stage 6

Sensitivity Analysis

General Location Selection Phase

Location Refinement Phase

Land Use

Will convenience & higher speeds exacerbate sprawl?

Source: https://www.bcg.com/publications/2017/automotive-making-autonomous-vehicles-a-reality.aspx

Source: https://cars.usnews.com/cars-trucks/autonomous-vehicle-levels
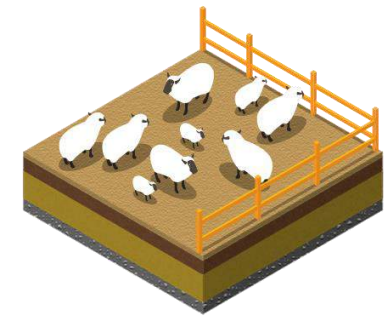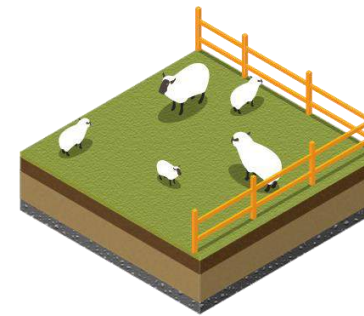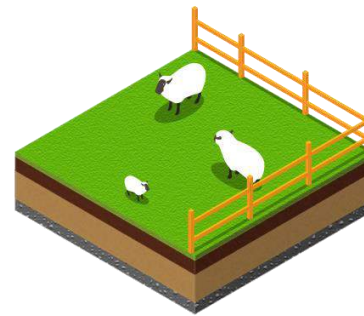
Transportation Demand Management
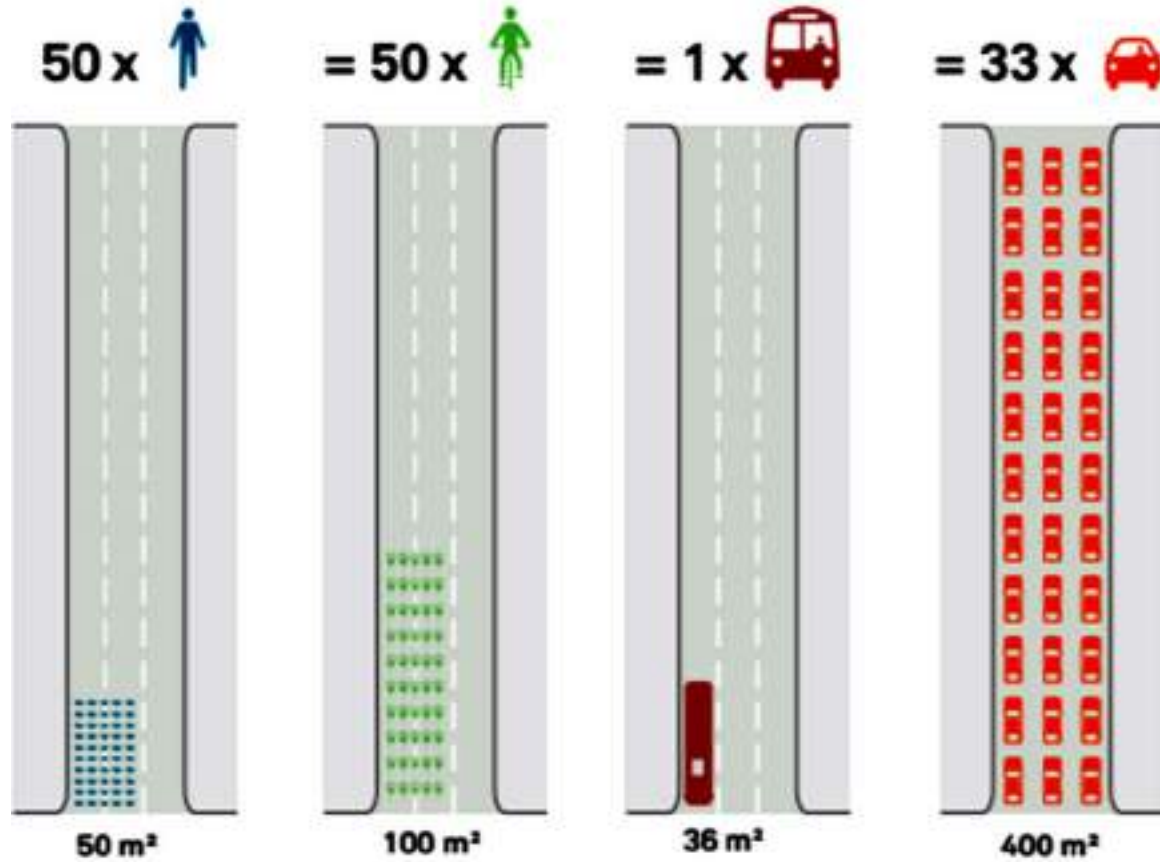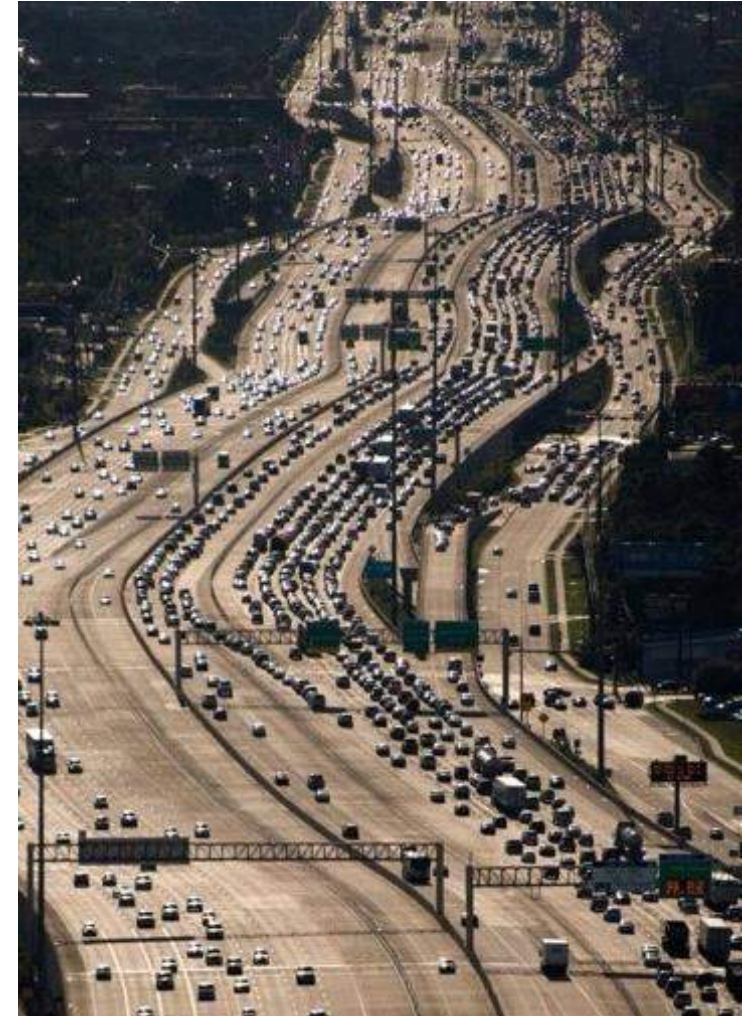
Transportation System Management
Tragedy of Commons

Individuals tend to act selfishly by depleting publicly accessible and underpriced or free resources, eventually degrading the public realm in terms of environment, energy consumption, health, and well-being.

Roads

Urban Planning Strategy

- Accommodate compact, mixed-use, high-density development
- Protect the city's green belt
- Limit urban sprawl
- Promote urban mobility
- Design low speed urban areas for AV's & pedestrians

Jumeirah Golf Estates Dubai, UAE
Parsons

Where it could lead?

Integrated AV transport system

More Efficient Transport System

Limit Urban Sprawl

Better Planning

Questions?