Autonomous vehicles – looking beyond the technology

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Challenges in public transport

Main challenges:

- Capacity (urban)
- Efficiency /Financial viability
- Accessibility (rural)
- First- & last mile accessibility

Scheltes et al. 2019

Technology trends

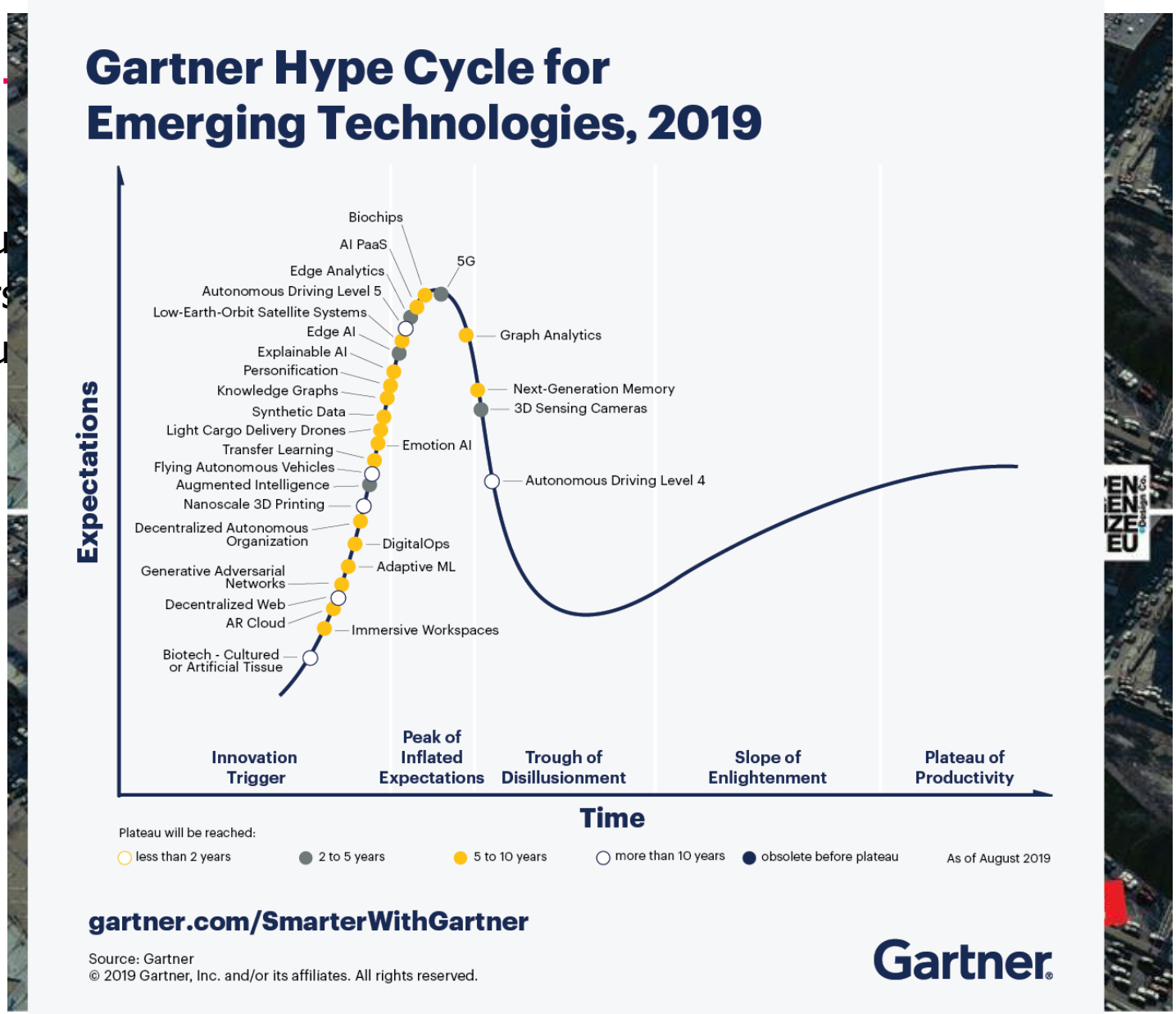
New modes

Access and egress

What is the optimal mix?

Au

- Mu
- Firs
- Mu


Gartner Hype Cycle for Emerging Technologies, 2019
Expectations
Biochips
AI PaaS
Edge Analytics
Autonomous Driving Level 5
Low-Earth-Orbit Satellite Systems
Edge AI
Explainable AI
Personification
Knowledge Graphs
Synthetic Data
Light Cargo Delivery Drones
Transfer Learning
Flying Autonomous Vehicles
Augmented Intelligence
Nanoscale 3D Printing
Decentralized Autonomous Organization
Generative Adversarial Networks
Decentralized Web
AR Cloud
Biotech - Cultured or Artificial Tissue
5G
Graph Analytics
Next-Generation Memory
3D Sensing Cameras
Emotion AI
Autonomous Driving Level 4
DigitalOps
Adaptive ML
Immersive Workspaces
Innovation Trigger
Peak of Inflated Expectations
Trough of Disillusionment
Slope of Enlightenment
Plateau of Productivity
Time
Plateau will be reached:
less than 2 years
2 to 5 years
5 to 10 years
more than 10 years
obsolete before plateau
As of August 2019
gartner.com/SmarterWithGartner
Source: Gartner
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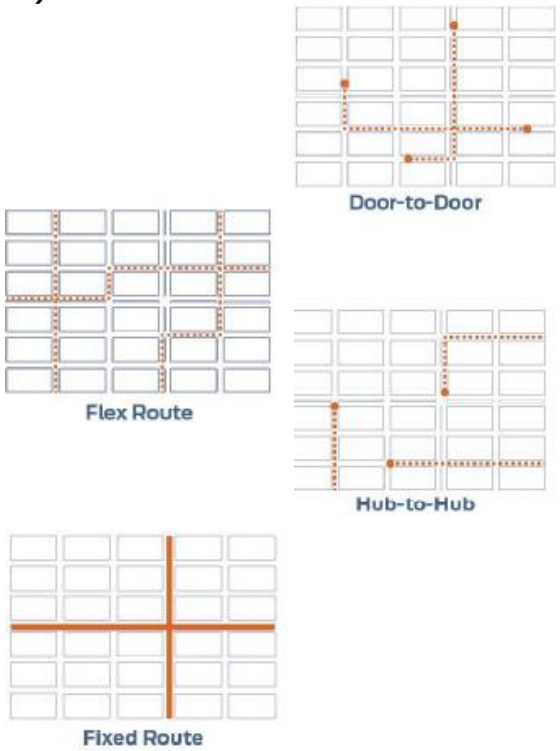
Gartner

Driverless Public Transport

"Driverless PT is a form of PT which can be operated without the required presence of a driver or attendant in the vehicle."

- New routing/service options (e.g. dynamic in stead of fixed)
- A higher capacity
- Supply and demand coordination
  - Reduction of operational costs
  - Improved financial viability
- Efficient operation and fleet management
- Passenger oriented services

- Increased safety
- Reduction of costs
- Increase of flexibility/control
- Increased passenger experience



#Road2Space

"***Autonomous vehicles*** will reshape the public transport landscape. It is important to jointly investigate what their role in the ***total mobility mix*** will be and how they could improve public transport quality and efficiency."

Niels van Oort, Co-director Smart Public Transport Lab
TU Delft

SPACE
SHARED - PERSONALISED - AUTOMATED - CONNECTED - VEHICLES

UITP ADVANCING PUBLIC TRANSPORT

Team Automation in Public Transport



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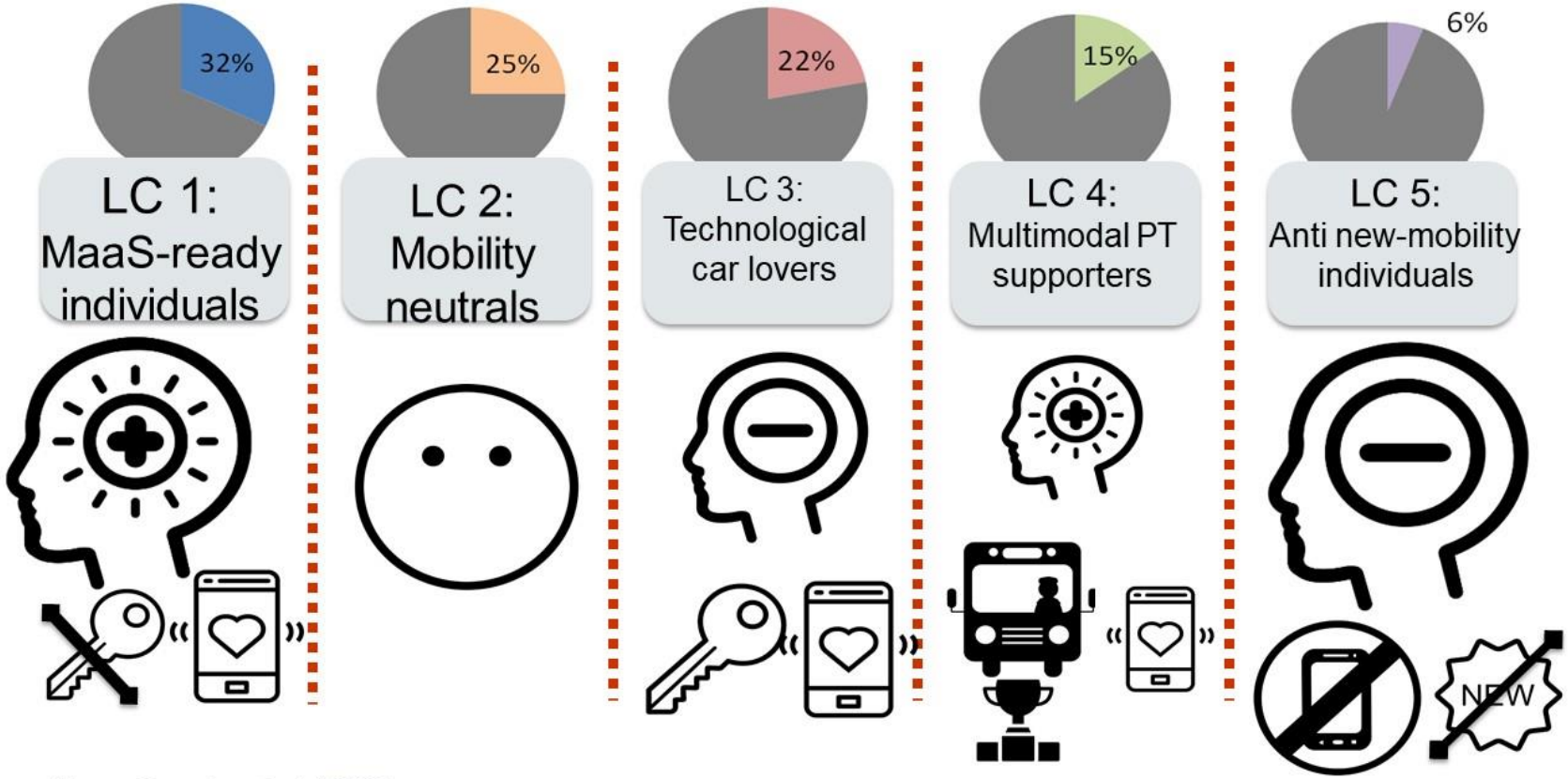
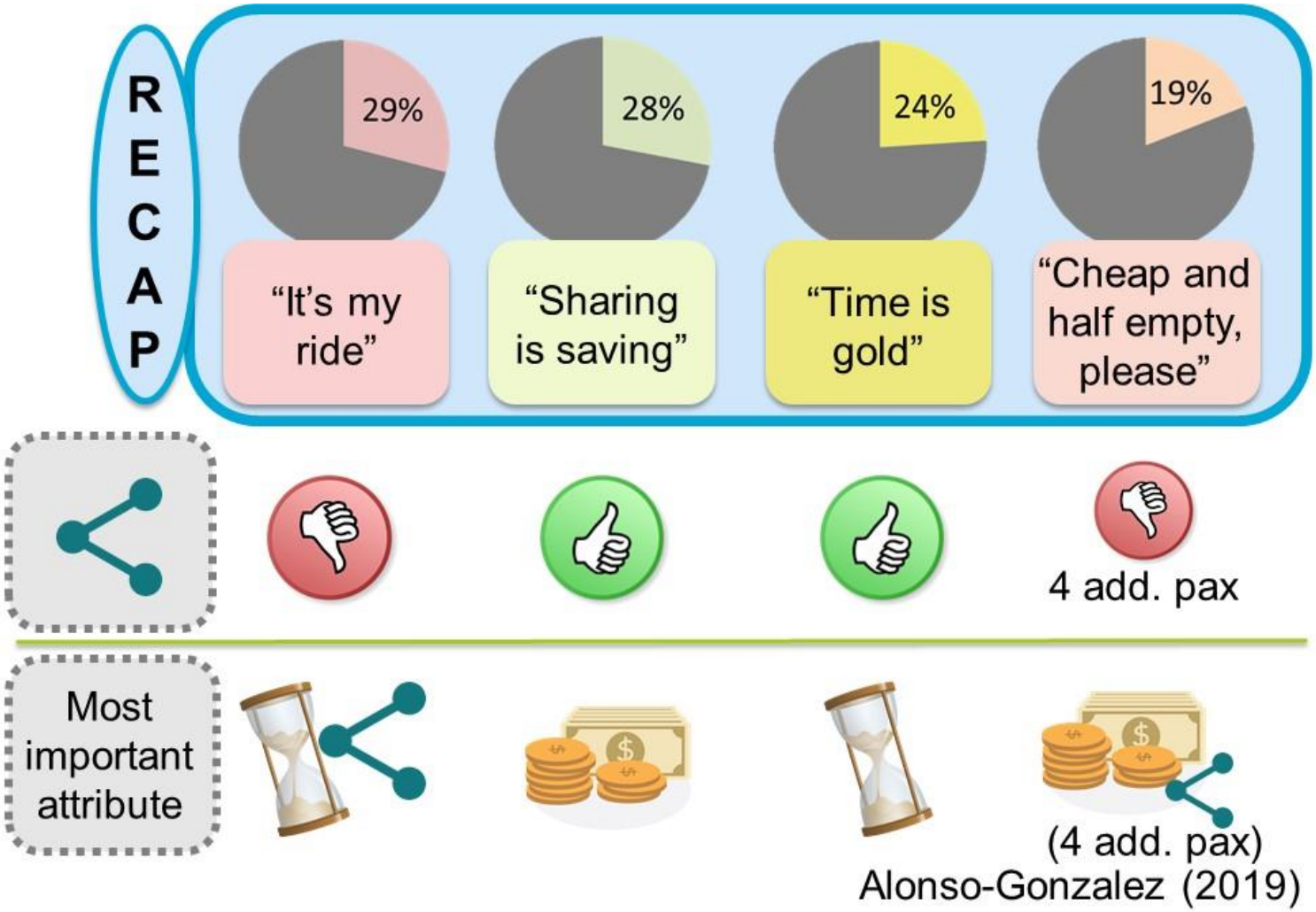
On demand PT: passenger preferences Flexibility



Alonso-Gonzalez et al. (2019)

On demand PT: passenger preferences Sharing



Expectations authorities

Provincie Noord-Brabant

provincie groningen

provincie :: Utrecht

METROPOOLREGIO ROTTERDAM DEN HAAG

provinsje fryslân
provincie fryslân

Provincie Zeeland

provincie limburg

provincie Overijssel

Vervoerregio Amsterdam

provincie Gelderland

provincie Drenthe

Provincie Noord-Holland

SWOT

Flexible On demand Driverless (EU)	Low speed Customer focus lacking Slow development
Access rural areas First & last mile Inclusive mobility	Interaction bicycles/pedestrians Unions Social safety

SWOT

Willingness to invest

DO

- Improving accessibility and liveability
- Clear added value, societal benefits

DON’T

- Unsafe/unreliable
- Lack of business case
- No added value

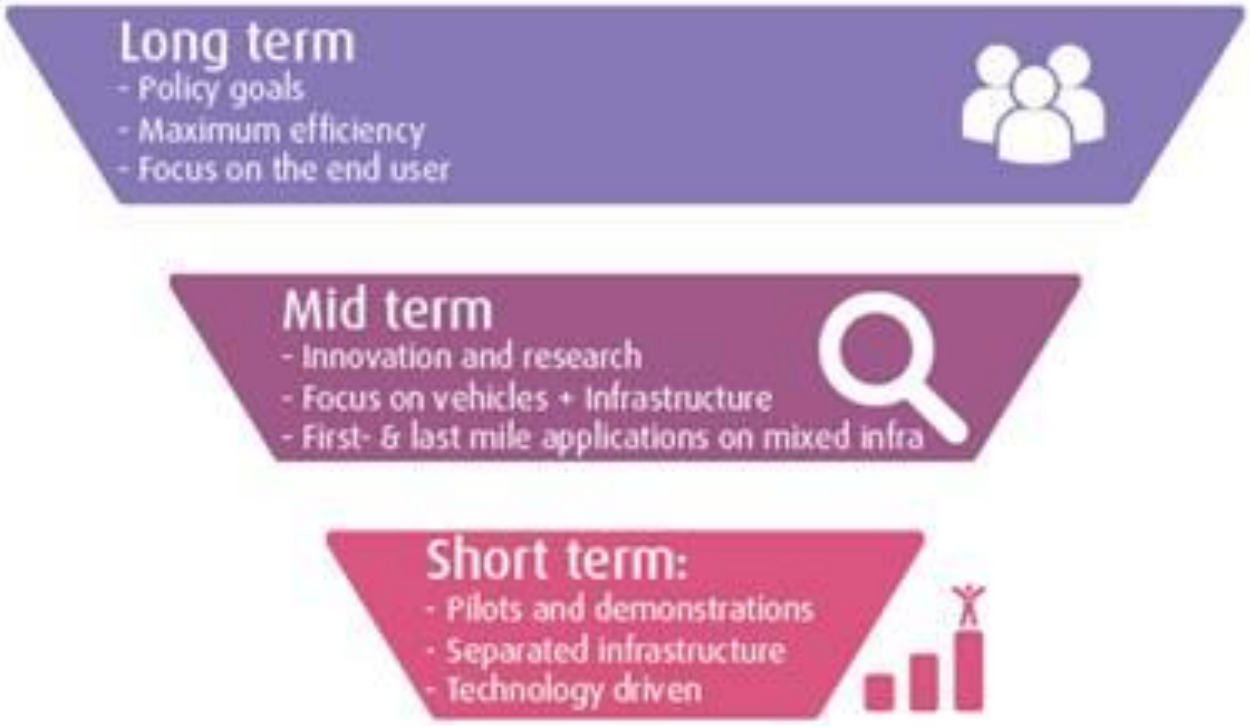
Rural vs. Urban

ban-

Accessibility and social inclusion

First and last mile
Missing links

Short vs. Long term

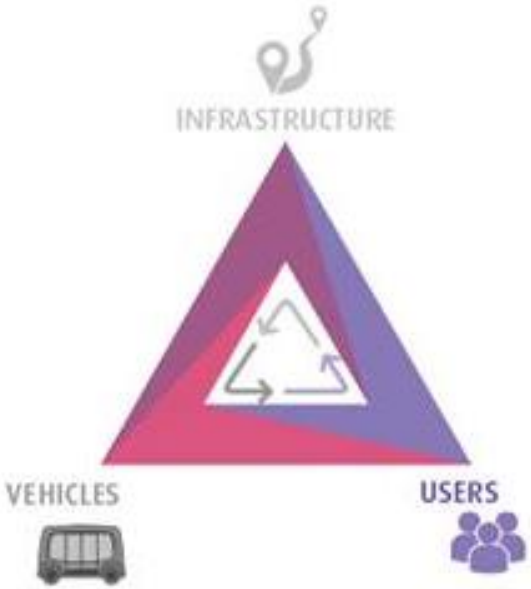


Challenge

Chicken-egg problem:

Big scale application: reliable system

Developing reliable system:
big scale application



Pilots and implementations in NL

(Future) research directions AVs+PT

- Lessons learnt pilots and projects
  - User experience and preferences
  - Operations
  - Safety
- Simulation and operations
- Passenger acceptance and choice behaviour
- Interaction other modes
- Contribution to societal benefits
- Network design; hybrid networks?

Forum on integrated and sustainable transportation systems

http://forum-ists2020.org/

Connected Automation · Sharification · Electrification

Contact/questions

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