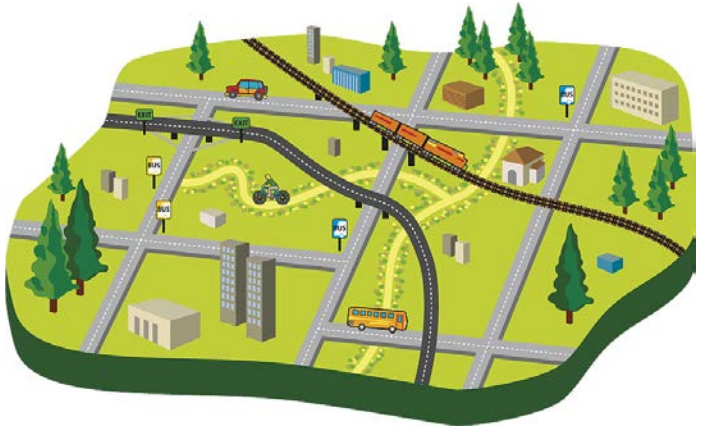
# Shared Automated Vehicles: Review of Business Models

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# Overview

- Introduction
- Current Shared Mobility Business Models
- Shared Mobility + Automation Developments
- Potential SAV Business Models (w/ high/full automation)
- Potential SAV Service Models (w/ high/full automation)
- Possible SAV Impacts
- Conclusion
- Acknowledgements

# Introduction

- Over 30 companies worldwide developing AV technology
- Highly automated vehicles are coming, not an “if” but “when” and “how”
- Shared + Automated Vehicles (SAV) concept gaining traction
- What SAV business models might emerge?
- Review of existing shared mobility services

# Current Shared Mobility Business Models

| Business-to-Consumer (B2C) | Peer-to-Peer Service Models (P2P) | For-Hire Service Models |
|---|---|---|
| • **Carsharing**<br>• Bikesharing<br>• Scooter Sharing<br>• **Microtransit** | • **P2P Carsharing**<br>• **Hybrid P2P-Traditional Carsharing**<br>• **Fractional Ownership**<br>• P2P Marketplace<br>• **Ridesharing** | • **Ridesourcing/ TNCs**<br>• Taxis/E-Hail<br>• Courier Network Services (CNS) |

# Business-to-Consumer (B2C) Service Models

## Carsharing:

Allows access to vehicles owned by carsharing companies as part of a shared fleet on an as-needed basis. Includes roundtrip and one-way carsharing.

# Business-to-Consumer (B2C) Service Models

## Microtransit:

Service that employs shuttles or vans to pick up passengers with fixed route/schedule or flexible route/schedule, depending on the service

# Peer-to-peer (P2P) Service Models

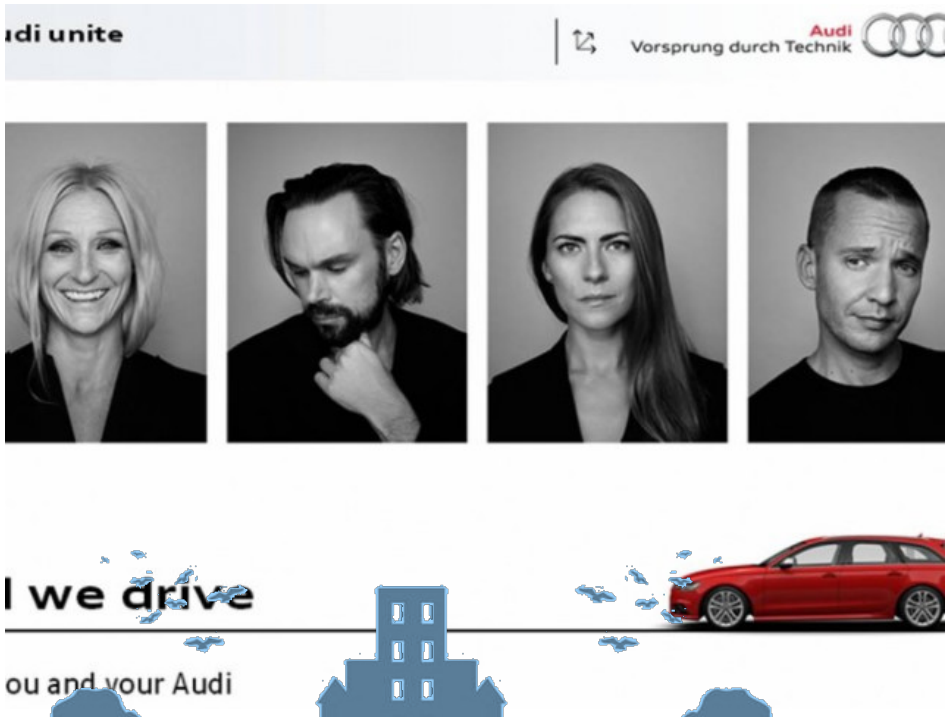
## P2P Carsharing

Service that employs privately-owned vehicles made available for shared use by an individual or member of a P2P carsharing company

# Peer-to-peer (P2P) Service Models

## Fractional Ownership

Multiple individuals lease a vehicle, and each pay a portion of the expenses for access to the shared vehicle



# Peer-to-peer (P2P) Service Models

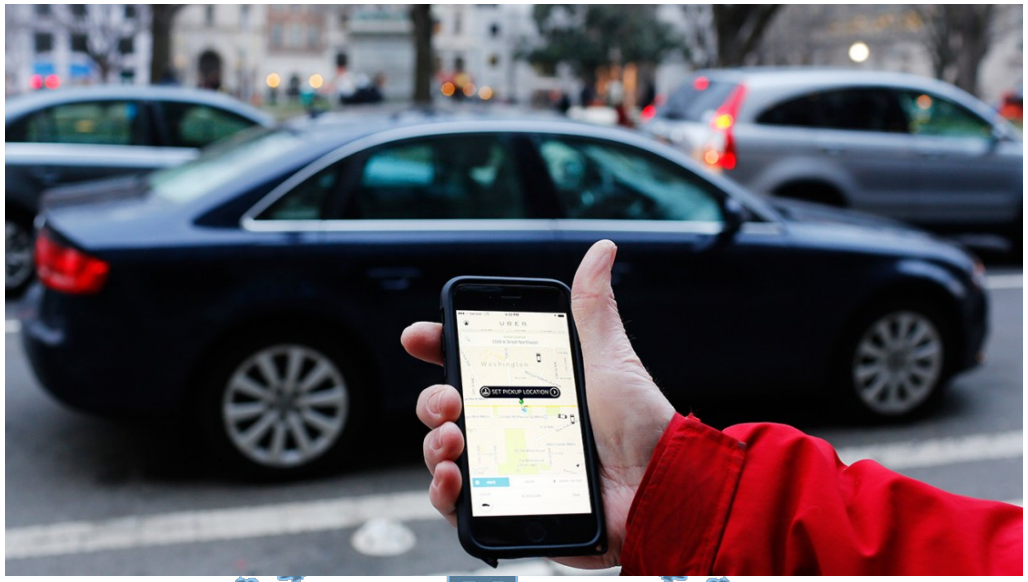
## Ridesharing

Service that facilitates shared rides between drivers and passengers with similar origins and/or destinations

# For-Hire Service Models

## Ridesourcing/TNCs:

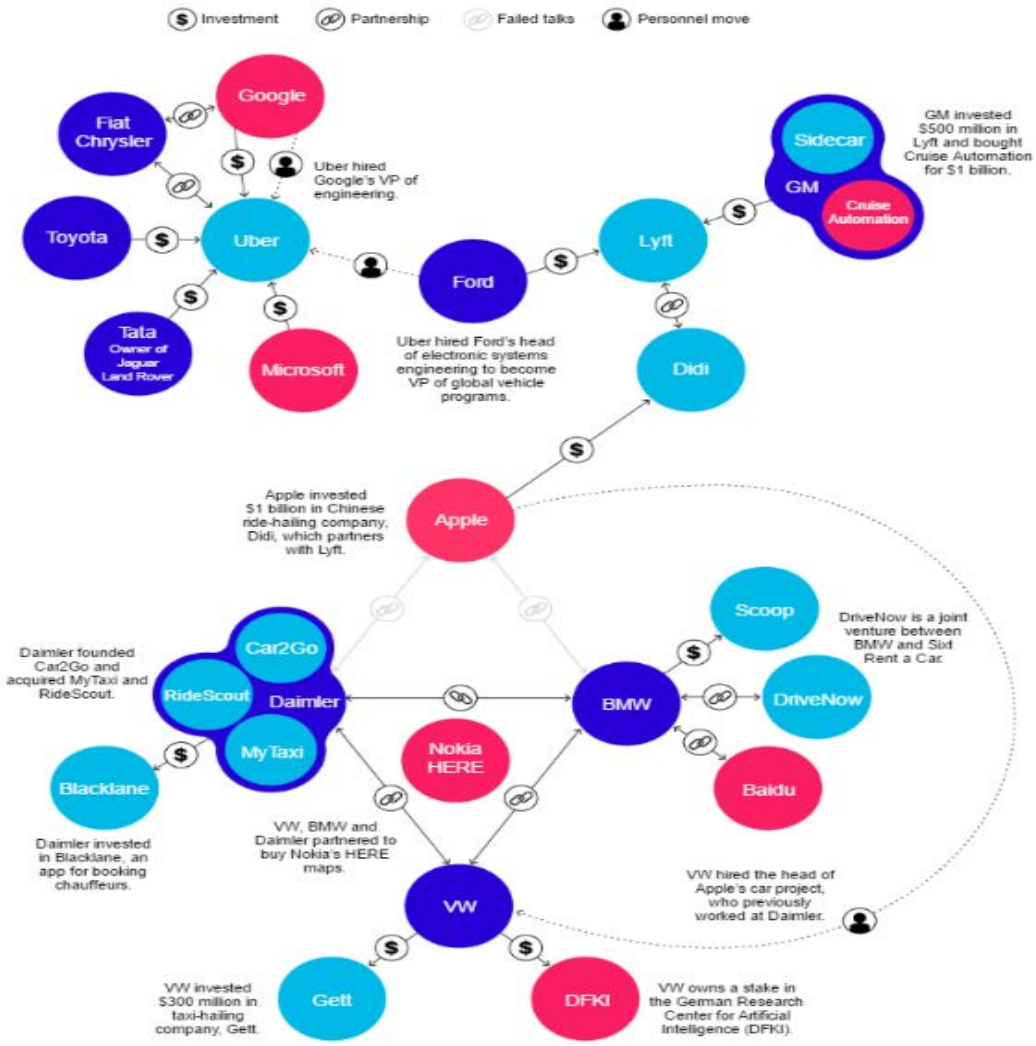
Service that allows passengers to connect with and pay drivers who use their personal vehicles for trips facilitated through a mobile application



# Shared Mobility + Automation Developments

- SAV pilots are small-scale at present
- Uber in Pittsburgh
- nuTonomy in Singapore
- EasyMile, CityMobil2, Olli

# Shared Mobility + Automation Developments



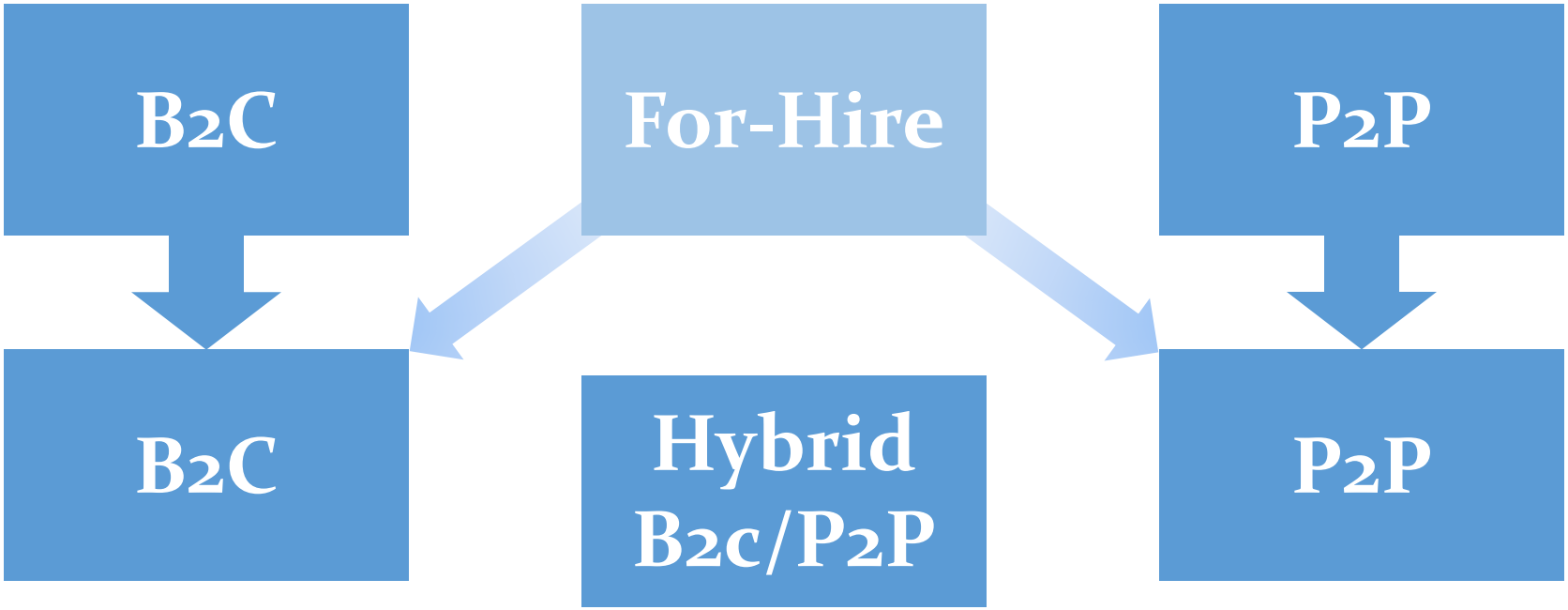

Bloomberg, 2016

# Potential SAV Business Models (w/ high/full automation)

- Putting futurist glasses on…
- Assumptions:
  - Level 4 or higher AVs
  - ODD = most public roads in a given city or metro area
  - Can legally operate unmanned

# Shared Mobility Lines Begin to Blur

*Non-automated shared mobility business models*




*Highly/fully-automated SAV business models*

- For-Hire service model blurs into B2C/P2P assuming high/full automation (no longer "hire" someone)
- Carsharing vs. pooling considering automation

# Potential SAV Business Models (w/ high/full automation)

- **Two main aspects** define SAV business models:

## 1) Vehicle Ownership

- Business/Entity (B2C)
- Individuals (P2P)
- Hybrid Business/Individuals (B2C/P2P)

## 2) Network Operator

- Network operator controls fleet-level decisions
- Same entity owns and operates or not

# Potential SAV Business Models (w/ high/full automation)

| **Vehicle Ownership** | Business (B2C) | Individuals (P2P) | Hybrid Business/ Individuals (B2C/P2P) |
|---|---|---|---|
| **Network Operations** | • Same entity owns and operates<br>• Different entity owns and operates | • Third-party entity operates<br>• Decentralized peer-to-peer operations | • Same entity that owns (some) vehicles operates<br>• Third-party entity operates |

# B2C with Single Owner-Operator

**Vehicle Ownership:** Business/Entity (B2C)
**Network Operator:** Same entity owns and operates

- SAV fleet that is both owned and operated by the same organization

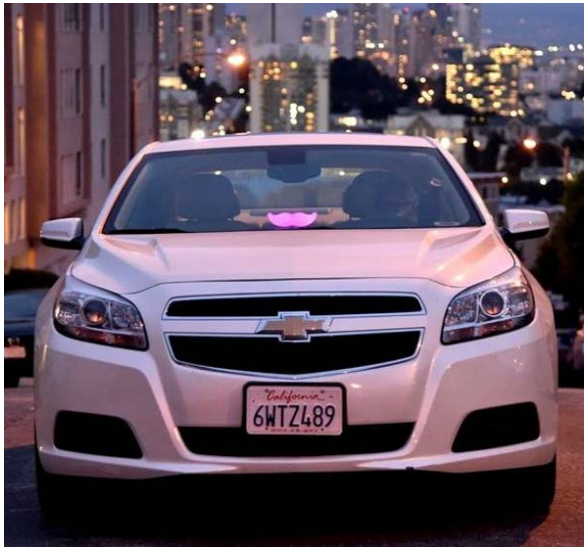
**Example:** B2C carsharing

# B2C with Different Entities Owning and Operating

**Vehicle Ownership:** Business/Entity (B2C)
**Network Operator:** Different entity owns than operates

- SAV fleet with different owner than operator where two or more companies partner to provide services

**Example:** GM-Lyft partnership



# P2P with Third-Party Operator

**Vehicle Ownership:** Individually-owned (P2P)
**Network Operator:** Third-party entity operates

- Individually-owned SAV network, with a third-party entity controlling network operations

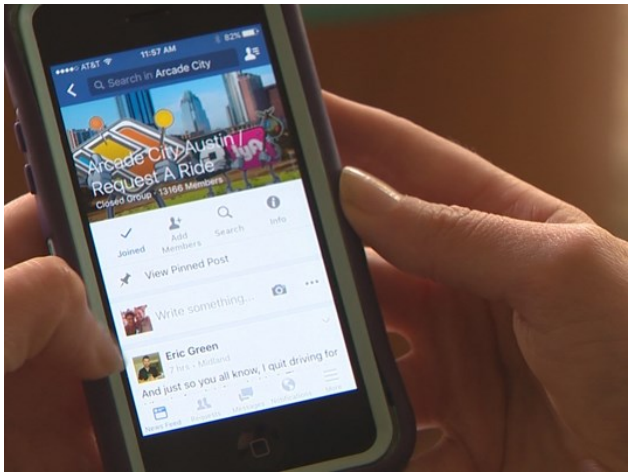
- **Example:** 'Tesla Network,' P2P carsharing

# P2P with Decentralized Operations

**Vehicle Ownership:** Individually-owned (P2P)
**Network Operator:** Decentralized peer-to-peer operations

- Individually-owned SAV(s) where operational aspects are not controlled by any one centralized third party and are instead decided upon by groups of individual owners

**Example:** Arcade City, fractional ownership

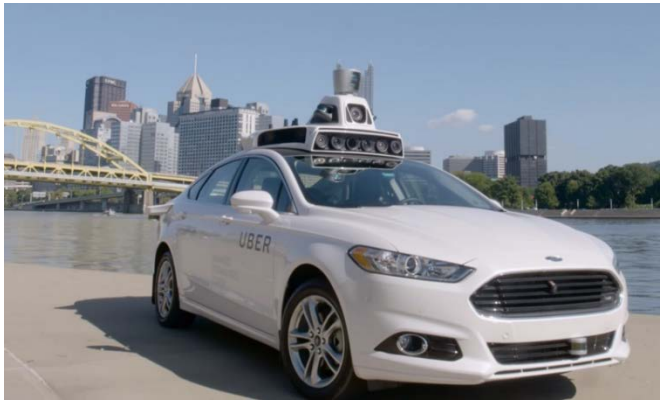


# Hybrid Ownership with Same Entity Operating

**Vehicle Ownership:** Hybrid Business/Individuals (B2C/P2P)
**Network Operator:** Same entity that owns (some) vehicles operates

- Entity-owned SAV fleet that also may comprise of individually-owned AVs that join the network as-needed

**Example:** Ridesourcing/TNC mixed-ownership fleet



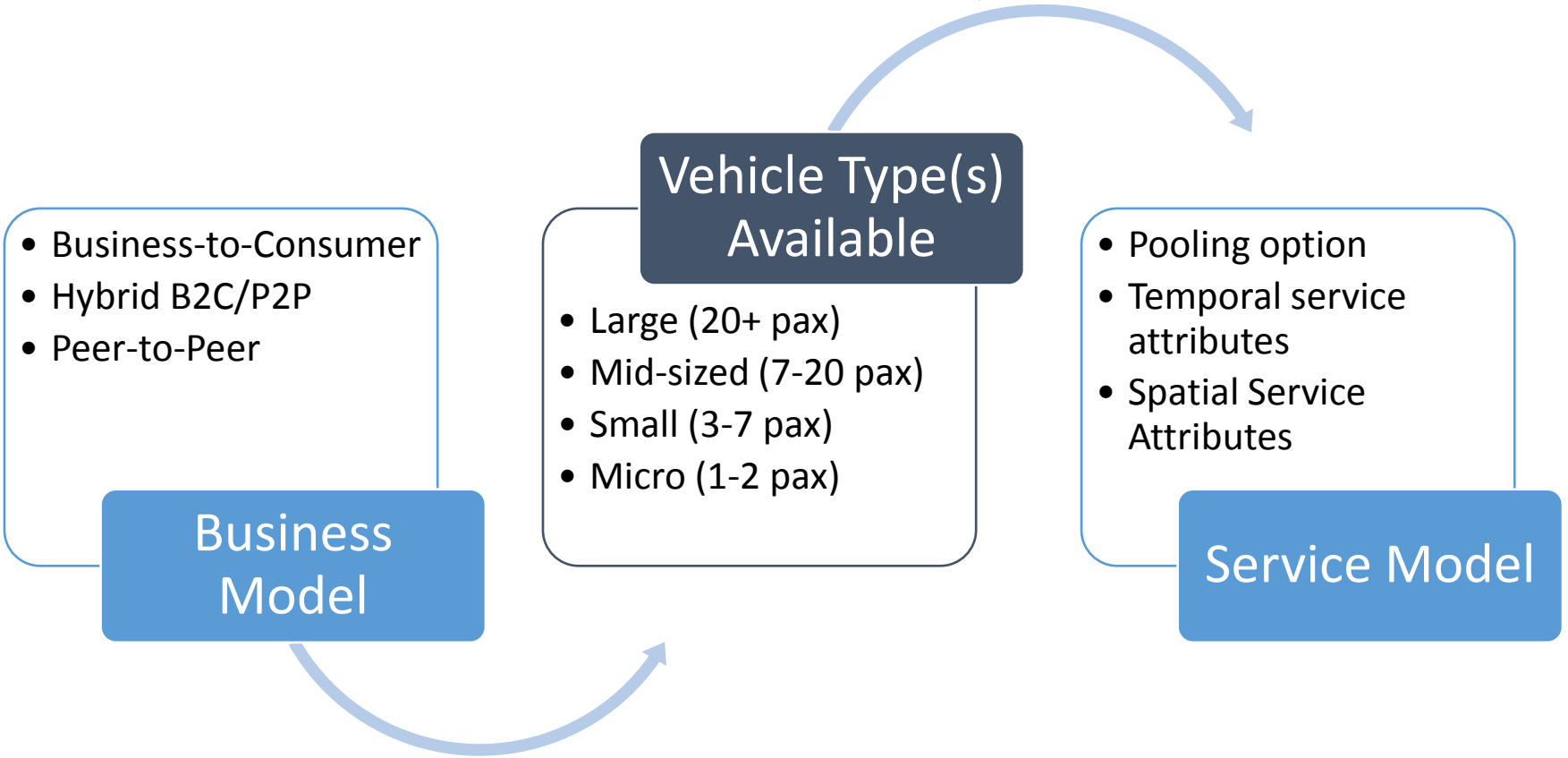
# Hybrid Ownership with Third-Party Operator

**Vehicle Ownership:** Hybrid Business/Individuals (B2C/P2P)
**Network Operator:** Third-party entity operates

- Third-party that does not own SAVs themselves comprised of both individually-owned and entity-owned AVs on a shared network of vehicles which they operate

**Example:** Getaround/City CarShare recent partnership in Bay Area

# Potential SAV Service Models (w/ high/full automation)




- SAV Business Models Partially Influence Service Models via Vehicle Types Available
- "Micro-sized" (1 or 2 pax) vehicles could become more commonplace

# SAV Framework Limitations

- Many business/service models might emerge even in a single city or metro area
- Transition period of mixed SAV/non-AV fleets
- Some business/service models may become more dominant than others
- Depends on many factors, including: automation price and availability, regulation, land-use context, etc.

# Possible SAV Impacts: Opportunities

- Increase vehicle occupancies
- Reduce per mile cost (over privately-owned vehicles)
- Unlock urban space dedicated to parking
- Downsize number of privately-owned household vehicles
- Reduce GHG emissions

# Possible SAV Impacts: Challenges

- Increased VMT / induced demand
- Will people give up private ownership?
- Increased urban sprawl
- Congestion solved?

# Conclusion

- SAVs have the potential to fundamentally change the transportation industry
- SAV impacts are uncertain at this time
- Business models, travel behavior preferences, and public policy are key components to SAV development

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