Shared-Use Vehicle Services: An Evolutionary Path to Leverage Vehicle Automation

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Overview

- Autonomous Vehicles (AVs)
- Shared-Use Mobility Services
  - Carsharing
  - On-demand ride services
- Scenario Planning Study
  - AV Applications
  - Evolutionary Path of AVs
Autonomous Vehicles (AVs)

- Self-driving car, driverless car, driver-free car
- Vehicle operation without active physical control or monitoring by human driver
- Senses environment with advanced technologies
  - Radar/lidar, GPS, mapping, computer vision
Shared-Use Mobility Services

Carsharing: Short-term vehicle access

– Members share a vehicle fleet maintained, managed, and insured by third-party operator
– Self-service available 24/7
– Rates include fuel, insurance, and maintenance
– July 2013: 1.15 million members sharing 21,000 vehicles in the Americas
Carsharing Membership Growth

U.S.  Canada  Mexico  Brazil  Americas

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### Carsharing Vehicle Growth

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Shared-Use Mobility Services

Transportation Network Companies (TNCs): on-demand ride services

- Matches drivers and passengers minutes before the trip is to take place
- Uses Internet and mobile platforms
- Driver rating system
- Cashless payment, credit card on file
Shared-Use Mobility Services

Ridesharing services
  – Target commute and social trips, incidental

Traditional taxis: vehicles for hire
  – Rides via passenger hail or prearrangement
  – Recent development of mobile e-hail/payment apps
IATS Scenario Planning Study

• Research sponsored by FHWA
• Decreased use of personal vehicle a common theme in scenario worlds – linked to limited energy, population in cities & envt’l concern
• Examine exemplars to demonstrate AVs
2030 & 2050 Scenario Worlds

2030 Scenario Worlds:
I. Natural Disaster World
II. Changing Economies World
III. Cyber-Terrorism World

2050 Scenario Worlds:
I. Climate Catastrophe World
II. Changing Production World
III. Resource Constrained World
AV Applications

• Potential future impacts on carsharing, on-demand ride services, and taxis
  – Drive up to carsharing users
  – Self-park, self-charge
  – Door-to-door service (like taxis/TNCs)

• Provide first- and last-mile connectivity to public transit

• Fill gaps in the transportation network
Evolutionary Path: 2020

• Scenario: Major automakers will have developed and released Level 3 AVs
  – Level 3 AVs: partially automated; driver can yield some control to the vehicle, but still required to pay attention and take control in certain situations

• Impacts to carsharing industry
  – Augmented safety features could decrease insurance costs
  – Increased user convenience (self-park/charge)

• Impacts to taxis/TNCs uncertain
  – Insurance likely impacted
Evolutionary Path: 2020

- Scenario: Level 4 AVs (fully self-driving) available for lower speeds in certain rights-of-way
- Provide public early exposure to fully-automated tech
  - First- and last-mile connectivity to transit
  - Ride services in office complexes, retirement communities
- Establish future models for fully-automated fleets and services
Evolutionary Path: 2030

- Scenario: Level 4 AVs more readily available
- Benefits to taxis/TNCs and carsharing
  - Autonomous repositioning to increase efficiency and meet customers needs
  - Self-refueling/charging
  - Return for routine maintenance
  - Communicate with smartphones for ridesharing; locate and pick up passengers along the way
Evolutionary Path: 2030

- Shared fully-autonomous vehicles could merge taxis, TNCs, and carsharing into one mode
- Carsharing users would be driven rather than driving
- Point-to-point mobility in shared autonomous taxi/TNC fleet
  - Eliminates labor costs
- Remain in cities with highest demand
Evolutionary Path: 2050

- Scenario: Increased production of AVs, decreased costs will make more affordable to general public
- AV owners incentivized to rent car out via p2p carsharing service when not in use
  - Augment on-demand point-to-point mobility
  - Penetrate into suburban and rural areas
- Effect of shared AVs
  - Reduce energy/environmental impact of private vehicle travel
  - Repurpose parking lots to parks and housing
Conclusions

AVs implemented into shared-use mobility can make a major impact on the future of transportation

– Public education and exposure
– Links to public transit
– Self-fueling, charging, and parking
– Full automation to integrate carsharing and ride services into one mode
– Point-to-point mobility for general public

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