New Mobility

Connected

Automated

Electric

Shared

Source: Google, 2014.
The Promise of AVs

- Improved road safety
- More equitable access for all
- Economic benefits of less lost productivity
- Increased travel options
- Reduced stress of driving
- Reduced fuel consumption and emissions
- Reduced collisions, reducing incident-related congestion
- *In the future*, potentially greater capacity, reducing recurring congestion
Key Factors

- Speed of Technological Advancement
- Economics
- Public Acceptance
- Political Support
- Market for a Shared Model
Two Paths

Private Ownership Model

- Driven by Auto Industry
- Incremental Moves in Functionalities
- Mostly Privately Owned
- Here Today

Shared Mobility Model (MaaS/TaaS/Robo-taxis)

- Initially Driven by Tech and Ride-Hailing Companies
- Jump to Fully Automated Transportation-as-a-Service
- A few (or many, many) years away
New Mobility

New Mobility

Recent Trends in Transit Ridership
Ridership Trends

Transit ridership fell in 9 of 10 largest markets in 2017

Researchers attributed the decline to ride-hailing services, cheap fuel, and the increase of car ownership, among other factors.

**DECREASE**
- New York -1.1%
- San Francisco -1.3%
- Atlanta -2.6%
- Boston -3.1%
- Chicago -3.2%
- Washington, DC -3.4%
- Los Angeles -5.4%
- Philadelphia -7.3%
- Miami -8.7%

**INCREASE**
- Seattle +3%

Source: TransitCenter, National Transit Database

GABRIEL FLORIT/THE WASHINGTON POST
Ridership Trends

Bus Ridership by Select Agencies

- Muni / San Francisco
- King County Metro / Seattle
- MTA Bus Company / New York
- NJ Transit
- MTA / New York
- MBTA / Boston
- CTA / Chicago
- WMATA
- SEPTA / Philadelphia
- MTA / Baltimore & Washington
- LA County Metro

Impacts of Ride-hailing on Transit
Annual TNC Trips

- **2014**: 172.18 million
- **2015**: 1000.54 million
- **2016**: 2000.163 million

*Total rides since launch: Uber vs. Lyft, in millions*
Ride-hailing and Transit

- Conventional wisdom is that Ride-hailing services are cannibalizing transit ridership.

- With automation, prices will likely decrease, making (automated) ride-hailing even more attractive.
Fare Choices

– In line with the narrative:
  – most users are under the age of 35,
  – most use the service on a weekly basis,
  – most don’t own a car.

– Less predictably:
  – a substantial number of trips are by people from households earning less than $38,000 per year
  – NOT linking to transit
  – high off-peak usage
Fare Choices: Complement or Competition?

Figure 11. Travel mode being substituted by ride-hailing services for sampled trips.
Fare Choices: Private to Shared?

Figure 11. Travel mode being substituted by ride-hailing services for sampled trips.

41% of trips were previous in vehicles
Fare Choices: New Vehicle Trips?

5% No travel
12% Walk or bike
12% Private vehicle
42% Taxi

59% of trips were previous not in vehicles
Fare Choices: Shift from Transit Trips?

42% of trips were previous on transit

Figure 11. Travel mode being substituted by ride-hailing services for sampled trips.
Fare Choices

Key Findings:

- 59% of all ride-hailing trips are adding additional cars to the road system
- 42% of passengers would have used public transit for their trip
Broadening Understanding of the Interplay Between Public Transit, Shared Mobility, and Personal Automobiles

Sharon Feigon
Colin Murphy
Shared-Use Mobility Center
Chicago, Illinois

Submitted January 2018

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TRANSPORTATION RESEARCH BOARD

1. The heaviest TNC use across the regions in this study is during evening hours and weekends.

2. Most TNC trips in the study regions are short and concentrated in downtown core neighborhoods. Across the five regions represented in the TNC trip data, the mean TNC trip was between 2 and 4 miles.

3. There is no clear relationship between the level of peak-hour TNC use and longer-term changes in the study regions’ public transit usage.

4. Among survey respondents, people who use transit or commute by driving solo do so as part of a routine; TNCs are used on a more occasional basis.

5. Transit travel and wait times were top concerns of survey respondents who replaced transit trips with TNC trips.

6. TNC usage takes place in communities of all income levels.

7. TNC use is associated with decreases in respondents’ vehicle ownership and single-occupancy vehicle trips.
Understanding Recent Ridership Changes

- Erosion of Time Competitiveness
- Reduced Affinity
- Erosion of Cost Competitiveness
- External Factors

Should Transit Be Concerned?
Cost Per Mile

Average Length of Transit Trips

Figure 3: Average Unlinked Passenger Trip Length, 2011

Source: APTA 2011 Fact Book
Cost Per Mile

Launched in February

With new Express Pool option, Uber customers walk a block or two to catch a ride

- Chicago Sun Times, February 26, 2018
How Close are AVs?
Things are Heating Up.....

**GM WILL LAUNCH ROBOCARS WITHOUT STEERING WHEELS NEXT YEAR**

Lex Davies, Wired, January 18, 2018

**WAYMO LAUNCHES ITS SELF-DRIVING ARMADA**

ARIAN MARSHALL, Wired.com, Jan. 30, 2018

**Tesla will start rolling out its ‘full self-driving’ package in August, Elon Musk says**

Andrew J. Hawkins, The Verge, June 11, 2018, 1:58pm
Market Value of Shared Mobility in 2030

TRILLIONS ($US)

$0.0
$0.5
$1.0
$1.5
$2.0
$2.5
$3.0

$0.0
$0.5
$1.0
$1.5
$2.0
$2.5
$3.0

pwc
McKinsey & Company
Morgan Stanley
Things are Heating Up.....

Uber orders up to 24,000 Volvo XC90s for driverless fleet

Waymo to buy 'thousands' of minivans for self-driving vehicle service

Waymo Orders Up to 20,000 Jaguar SUVs for Driverless Fleet – WSJ
Launched in March

https://www.youtube.com/watch?v=QqRMTWqhwzM
Launched in October
Launched in March

EasyMile autonomous shuttle bus makes history in California
AUVSI (3/7/2018)

An EasyMile autonomous shuttle bus became the first vehicle to operate on California’s roads without a driver behind the wheel on Tuesday, March 6. The vehicle operated on the roads of San Ramon, California. With its historic journey, EasyMile’s autonomous shuttle bus became the first vehicle to take advantage of recently approved regulations governing the driverless testing and public use of autonomous vehicles on California roads.

“An EasyMile autonomous shuttle bus became the first vehicle to operate on California’s roads without a driver behind the wheel....”
- AUVSI, March 7, 2018
What Might this Mean for Transit?
What Might this Mean for Transit?

- **Challenges**
  - Continued pressures on ridership and farebox
  - Redefining your mission
  - Workforce transition and (re)development

- **Opportunities**
  - Potential reduction in labor costs
  - Opportunities for use of micro-transit
  - Opportunities to partner with private producers
Operational Realities
Operational Realities
How Might Fleets Deploy?
How Might Fleets Deploy?
Wildcards

- Catastrophic Event
- Public Backlash Regarding Data and Privacy
The Public-Private Disconnect
### The Models

<table>
<thead>
<tr>
<th>Ownership</th>
<th>High Public Sector Involvement</th>
<th>Low Public Sector Involvement</th>
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<td>Private Individual</td>
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The Disconnect

Ownership
- Public Fleet
- Private Fleet
- Private Individual

Dispatch and Control
- Centralized Public
- Centralized Private
- Coordinated Private
- Individual Private
- Unrestricted

Operational Restrictions
- Heavily Restricted
- Concessioned Routes
- Concessioned Areas
- Market

Pricing
- Regulated (Subsidized?)
How Might this Play Out?

Willing Partner  Unwillingly Regulated  Death Fight
Why Transit Agencies Need to Act Now.....

- We are seeing slides in ridership, particularly with surface transit.

- Even minor losses in farebox revenue may begin a downward spiral.

- When AVs arrive, ride-hailing prices may drop considerably (30-40%), further challenging the cost competitiveness of transit.

- Need to proactively address issues with mission, governance and labor.
Beyond Speculation
Automated Vehicles and Public Policy

An Action Plan for Federal, State, and Local Policymakers
Broadening Understanding of the Interplay Between Public Transit, Shared Mobility, and Personal Automobiles

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Seattle Department of Transportation

NEW MOBILITY PLAYBOOK

Version 1.0
September 2017

Resources
Resources

http://smartdrivingcar.com/GreenLight-092316

**Friday, September 23, 2016**

**NHTSA**

Federal Automated Vehicles Policy: Accelerating the Next Revolution In Roadway Safety

September 2016, "Executive Summary...For DOT, the excitement around highly automated vehicles (HAVs) starts with safety. (p5)

...The development of advanced automated vehicle safety technologies, including fully self-driving cars, may prove to be the greatest personal transportation revolution since the popularization of the personal automobile nearly a century ago. (p5)

...The benefits don’t stop with safety. Innovations have the potential to transform personal
Autonomous Vehicles

Autonomous and connected vehicle technology is expected to transform the nation's transportation system over the coming decades, with major implications for the planning and design of cities and regions. Autonomous vehicles (AV), also known as driverless or self-driving cars, have been sharing city streets for several years.

This technology is moving very quickly, with the 11 largest automakers planning to have fully-autonomous vehicles on highways between 2018 and 2021 (arriving somewhat later in urban driving conditions). AV technology, as defined by the International Society of Automotive Engineers, ranges from a baseline of no automation, up to five levels of increasing autonomy:

- Level one, driver assistance (e.g., adaptive cruise control)
- Level two, partial automation (e.g., Tesla’s autopilot)
- Level three, conditional automation (e.g., human drivers serve as backup for an autonomous system that operates under certain conditions)
Integrating Ridesharing into Transit Operations (November 9, 2017)

The U.S. Department of Transportation (USDOT) will be hosting a webinar which will discuss how to integrate ridesharing opportunities into transit operations. This webinar will allow interested stakeholders to learn about different approaches for rideshare-transit integration.

Participants will hear from Uber and Via regarding their partnerships and integration with transit operations.

Traditional transit operations are designed to maximize the number of people served and optimize the service provided to as many of those people as possible. However, if a potential rider lives or works outside a half-mile radius from the nearest stop, the rider usually forgoes transit use. Ridesharing (and other Mobility on Demand) services have been rapidly growing to bridge this first-mile/last-mile gap in transit coverage. Our speakers will discuss the integration of their ride sharing platforms with traditional transit operations.

This webinar is sponsored by the USDOT Intelligent Transportation Systems Joint Program Office (ITS JPO) and is free and open to the public.

To learn more about the ITS JPO, please visit: www.its.dot.gov

If you have any questions about this webinar, please contact Keivan Fizal (ITS America) at kfizal@itaa.org.

Date & Time:
Thursday, November 9, 2017
1:00 PM - 2:00 PM ET

Presenters:
Actions You **MUST** be Taking....

- Educate your team and political leadership on what is happening
- Begin to revisit your vision, mission, principles and goals
- Begin to discuss models, and how they support your goals
- Create a road map, and revisit it every year
- Understand potential impacts to your revenue
- Begin to think about the details
- Pilot and test to build capacity

**SHARE, SHARE, SHARE!**
Key Takeaways…..

– This is coming fast – you can guide it or respond to it

– Government has a chance to shape this, but needs to move

– While ride-hailing companies have been saying the right things, they are profit-driven and will follow the market
“The best way to predict the future is to create it.”
AVs and Transit

Stephen Buckley, P.E., AICP
NACV Summit
June 12, 2018