The Race for Automated Mobility

Stephen Buckley, P.E., AICP

2018 ACEC-KY\FHWA\KYTC Partnering Conference

September 5, 2018

Agenda

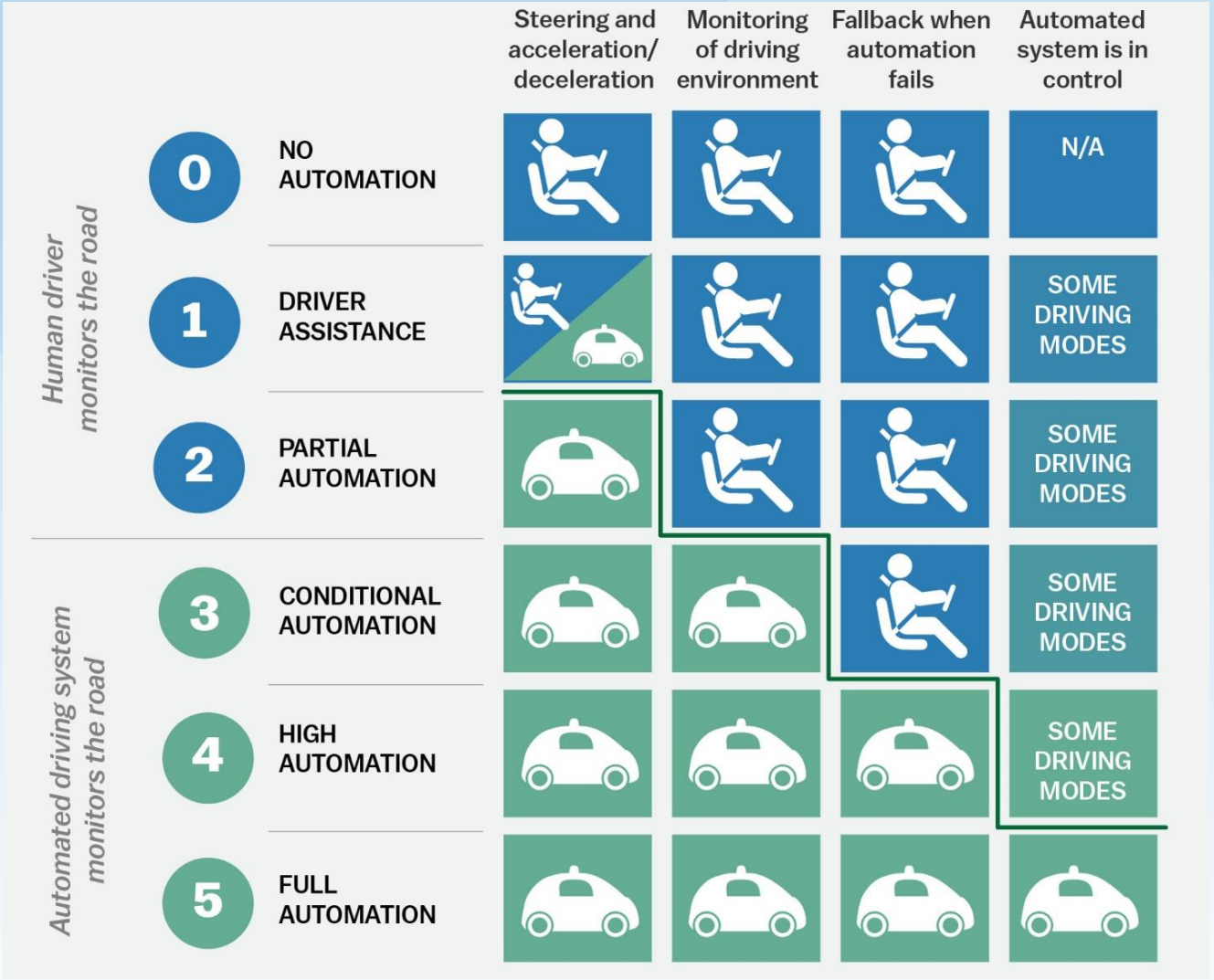
- Key Factors
- The Race
- Impacts of Ride-Hailing
- How Might This Play Out?
- Steps for Kentucky
- Resources

Source: Google, 2014.

New Mobility

Source: WSP, 2017.

SAE Levels of Automation



Source: SAE

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)

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

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

Key Factors

Speed of Technological Advancement

Economics

Public Acceptance

Political Support

Market for a Shared Model

Key Factors

Launched in March

https://www.youtube.com/watch?v=QqRMTWqhwzM

Things are Heating Up.....

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

Darrell Etherington, TechCrunch November 21, 2017

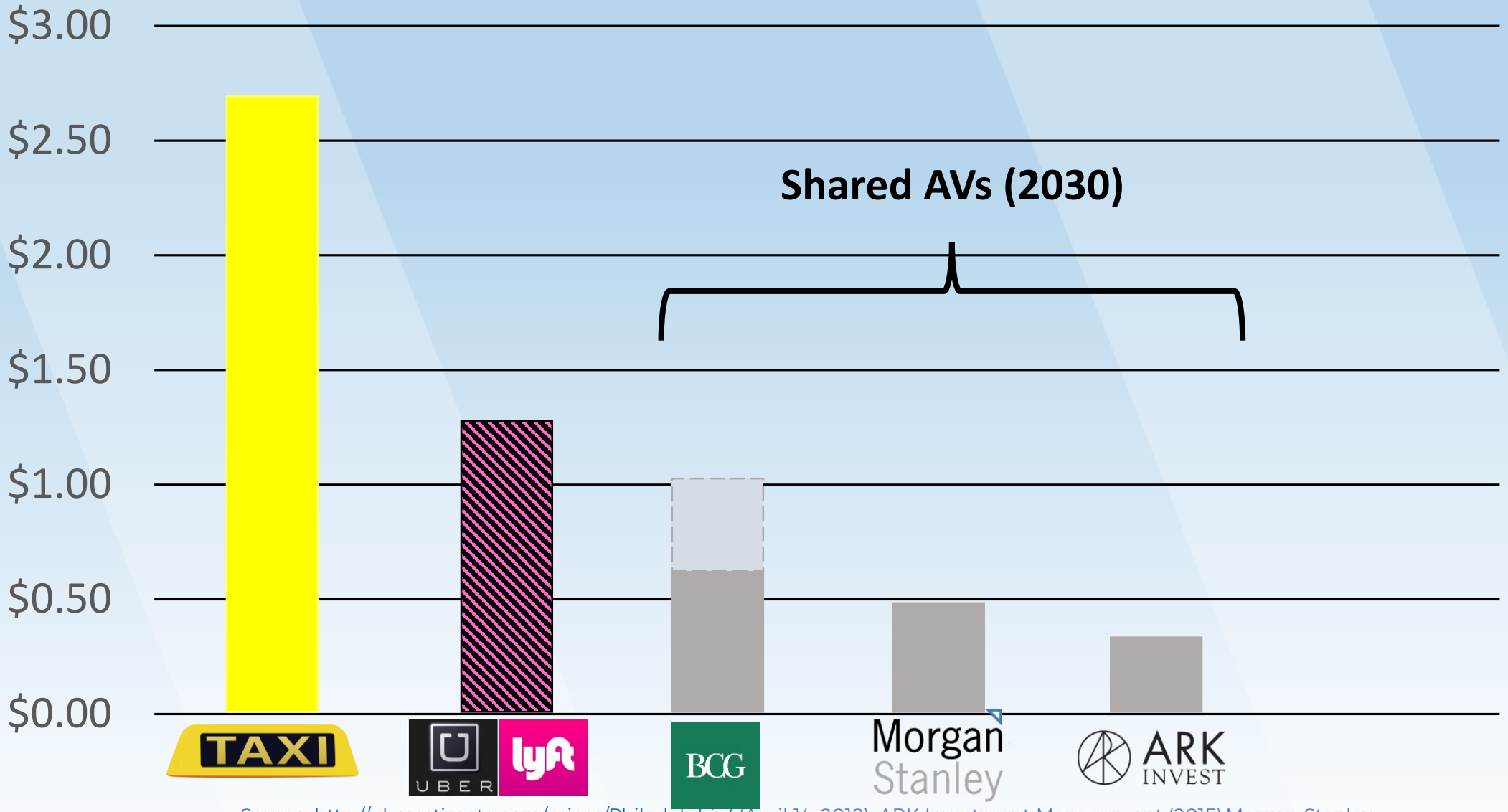
Waymo Orders Up to 20,000 Jaguar SUVs for Driverless Fleet – WSJ

Wall Street Journal, March 27, 2018

Up to 62,000 additional Chrysler Pacifica Hybrid minivans will join Waymo's driverless fleet, starting in late 2018

PRNewswire, May 31, 2018

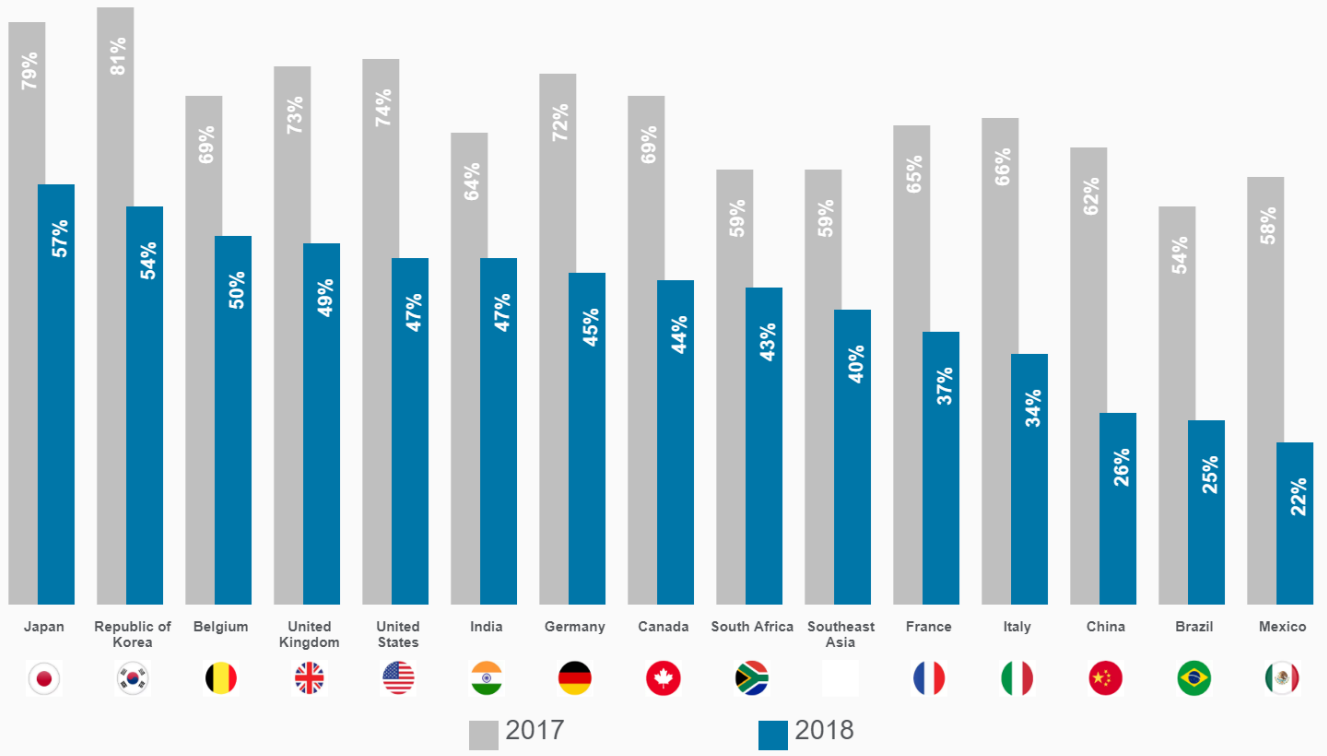
Cost Per Mile



Source: http://uberestimate.com/prices/Philadelphia/ (April 14, 2018); ARK Investment Management (2015);Morgan Stanley (2016); World Economic Forum/Boston Consulting Group (2016)

Public Acceptance

Figure 1. Percentage of consumers who think fully self-driving vehicles will not be safe (2018 vs. 2017)



Note: Percentage of respondents who strongly agreed or agreed have been added together.

Source: *2017 and 2018 Deloitte automotive global consumer studies.*

Political Support

Uber, Lyft dealt a major blow after New York City votes to cap vehicle licenses

Seung Lee, www.mercurynews.com, August 8, 2018

Ride-Hailing Companies Agree to Tax in San Francisco

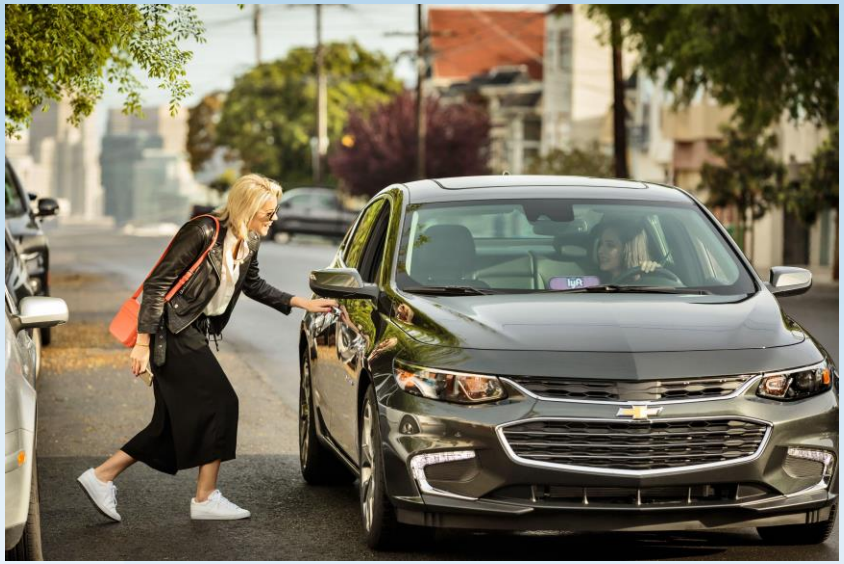
James Brasuell, www.planetizen.com, August 18, 2018

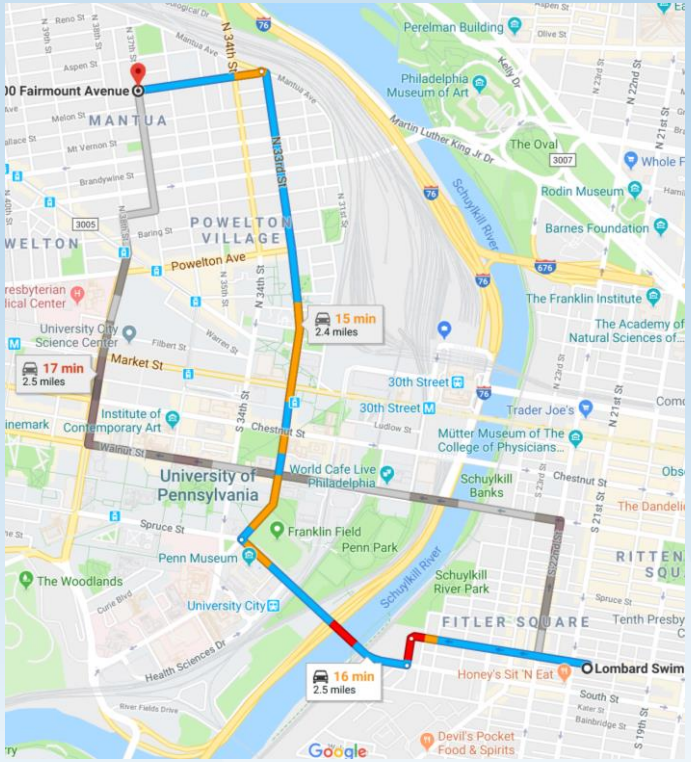
Gov. Doug Ducey welcomes Uber self-driving cars with open arms

The Arizona Republic, December 23, 2016

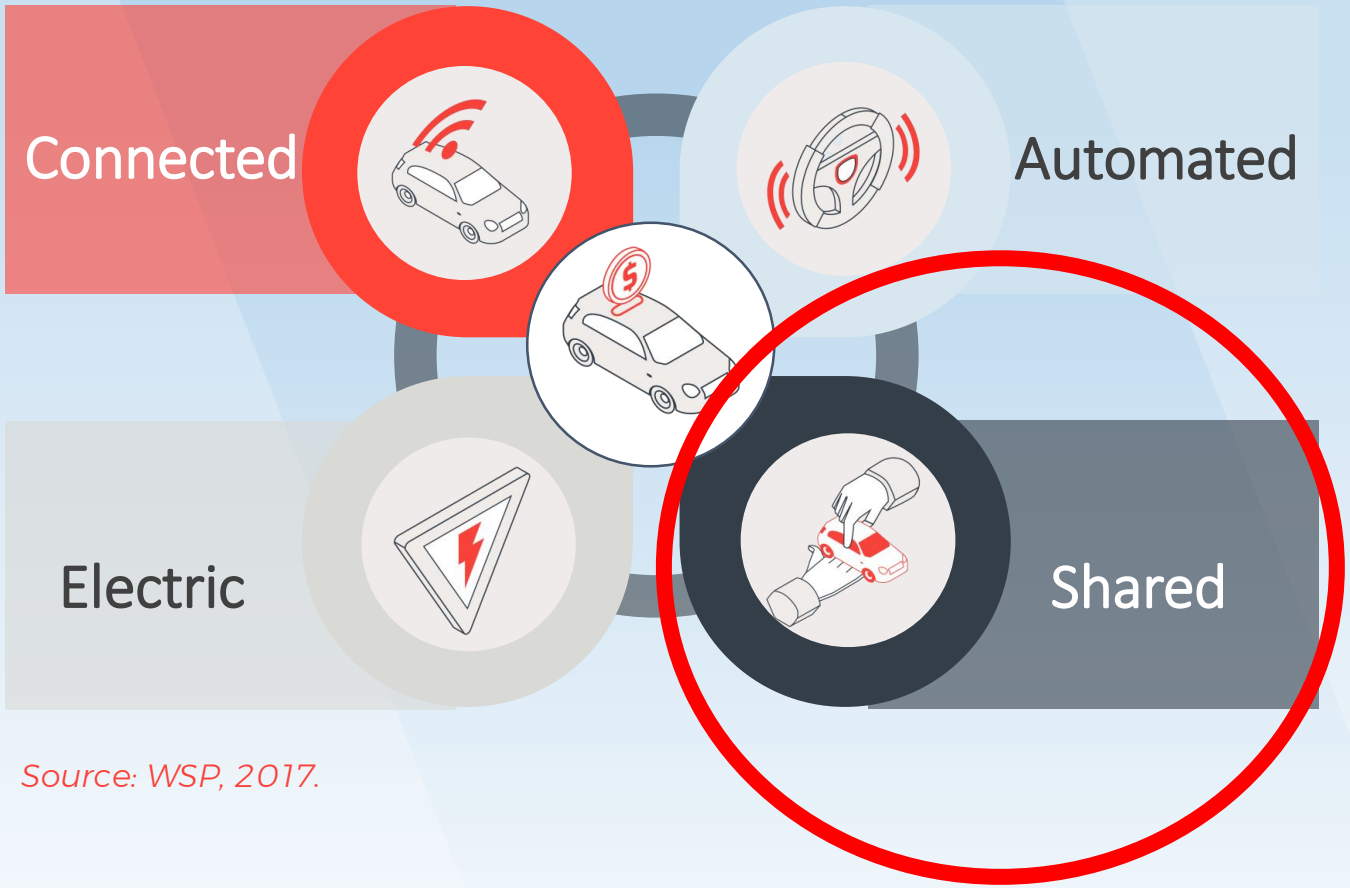
What is Mobility-as-a-Service?

What is Mobility-as-a-Service?





New Mobility

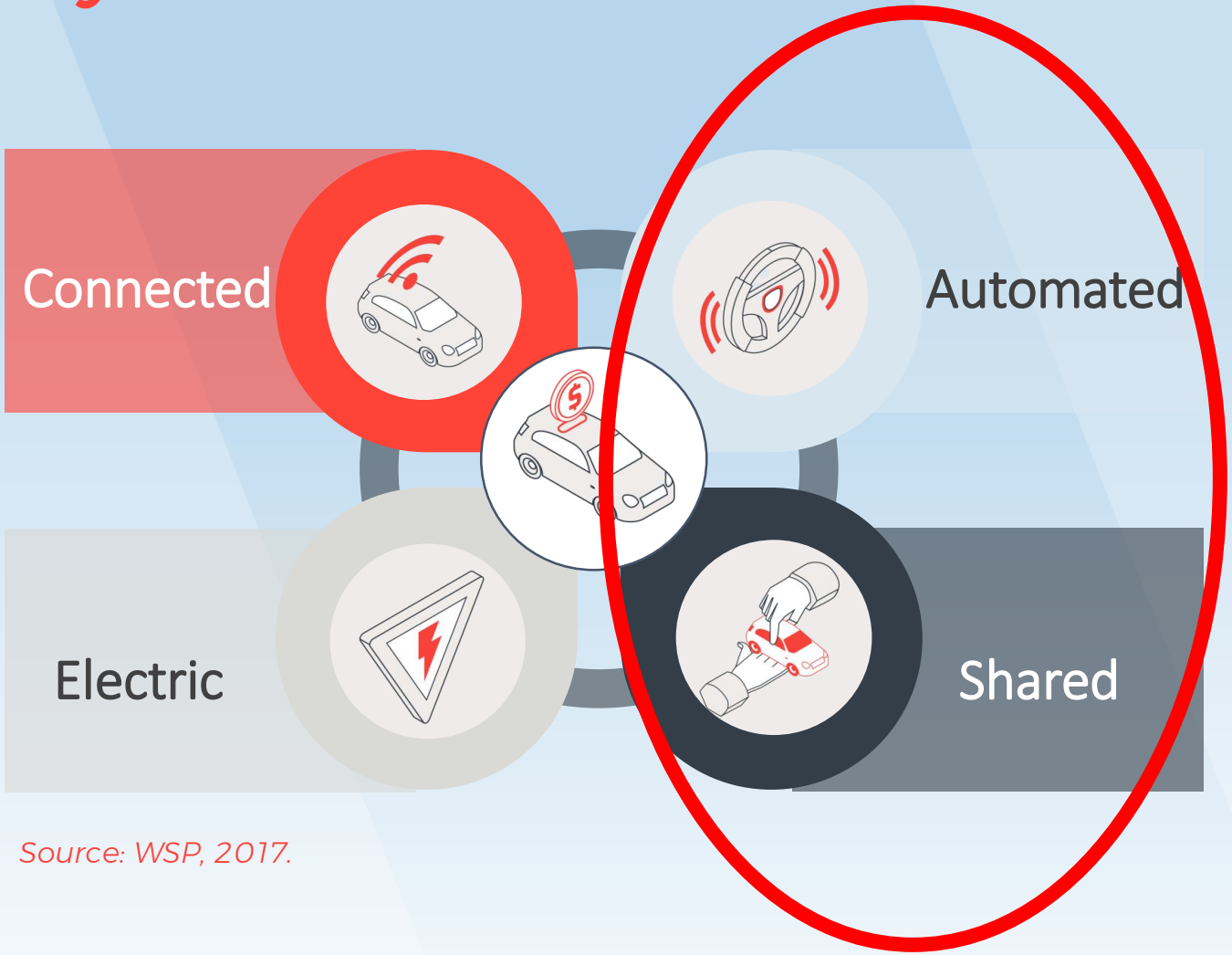


Source: WSP, 2017.

UBER

lyft

New Mobility



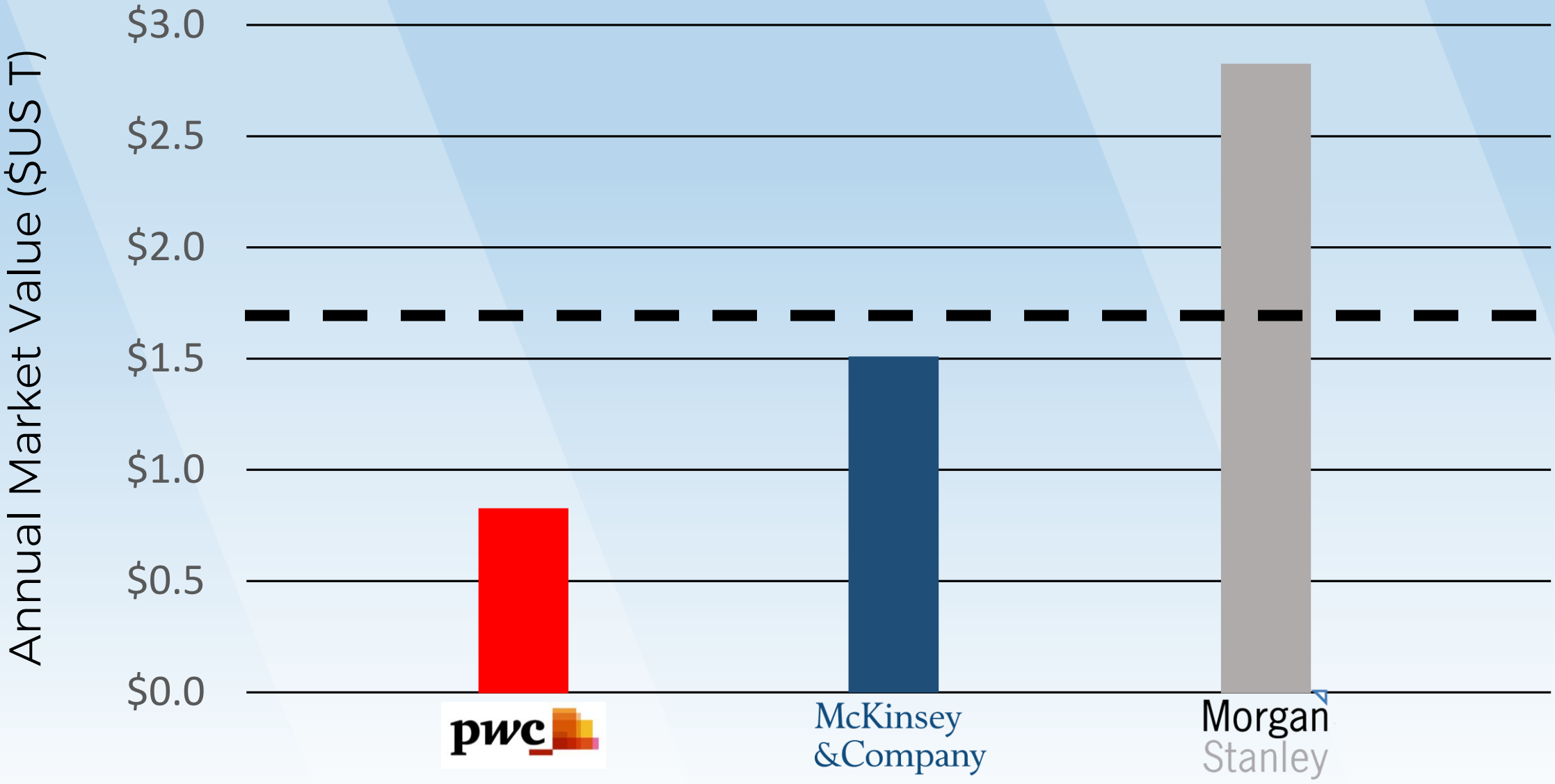
Source: WSP, 2017.

UBER

lyft

The Race

Market Value of Shared Mobility in 2030



Waymo Miles Driven

Source: Waymo, November 27, 2017.

Things are Heating Up.....

GM WILL LAUNCH ROBOCARS WITHOUT STEERING WHEELS NEXT YEAR

Lex Davies, Wired, January 18, 2018

https://www.wired.com/story/gm-cruise-self-driving-car-launch-2019/

WAYMO LAUNCHES ITS SELF-DRIVING ARMADA

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

https://www.wired.com/story/waymo-launches-self-driving-minivans-fiat-chrysler/

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

https://www.theverge.com/2018/6/11/17449076/tesla-autopilot-full-self-driving-elon-musk

Wildcards

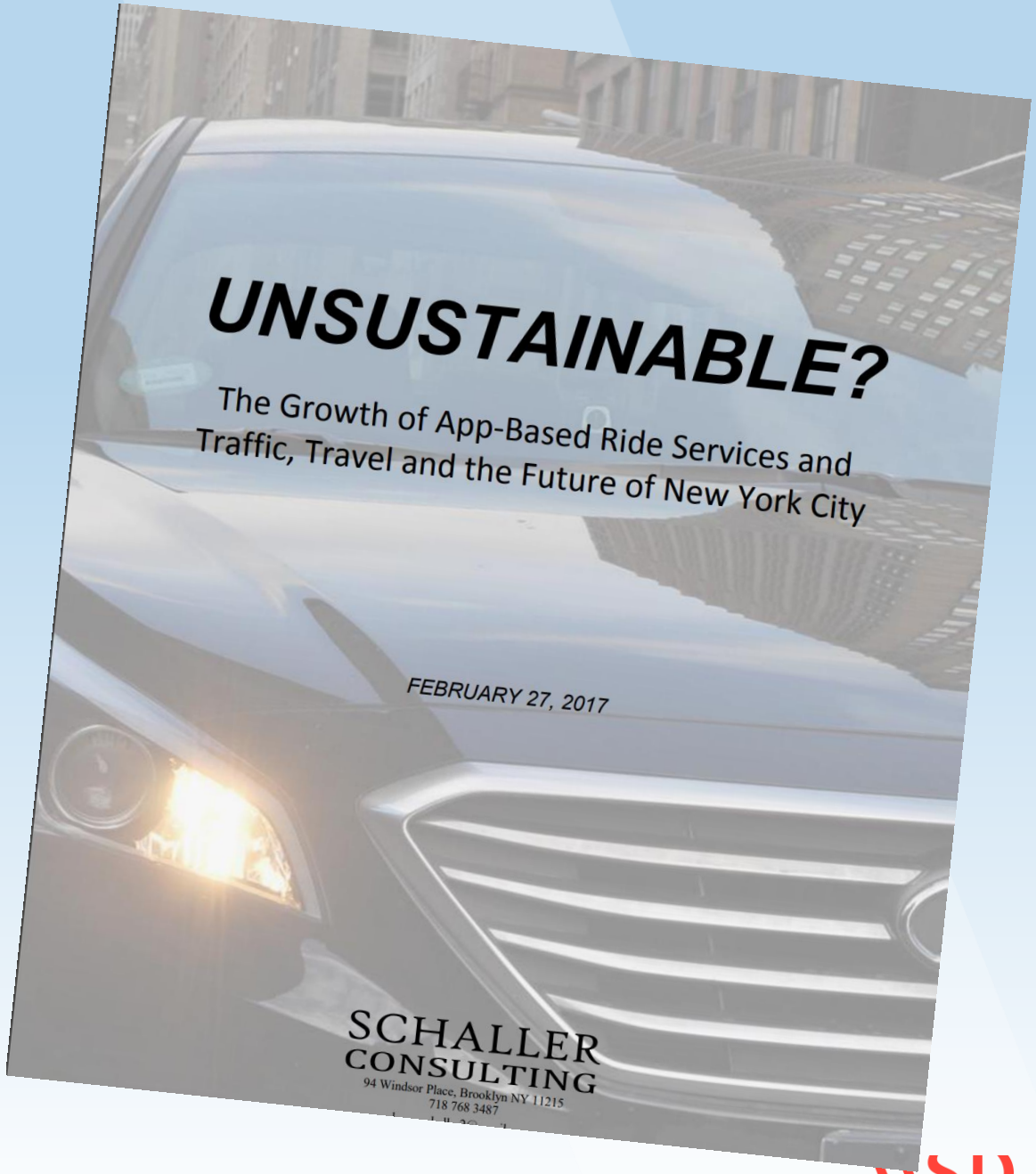
Catastrophic Event

Public Backlash Regarding Data and Privacy

Impacts of Ride-Hailing

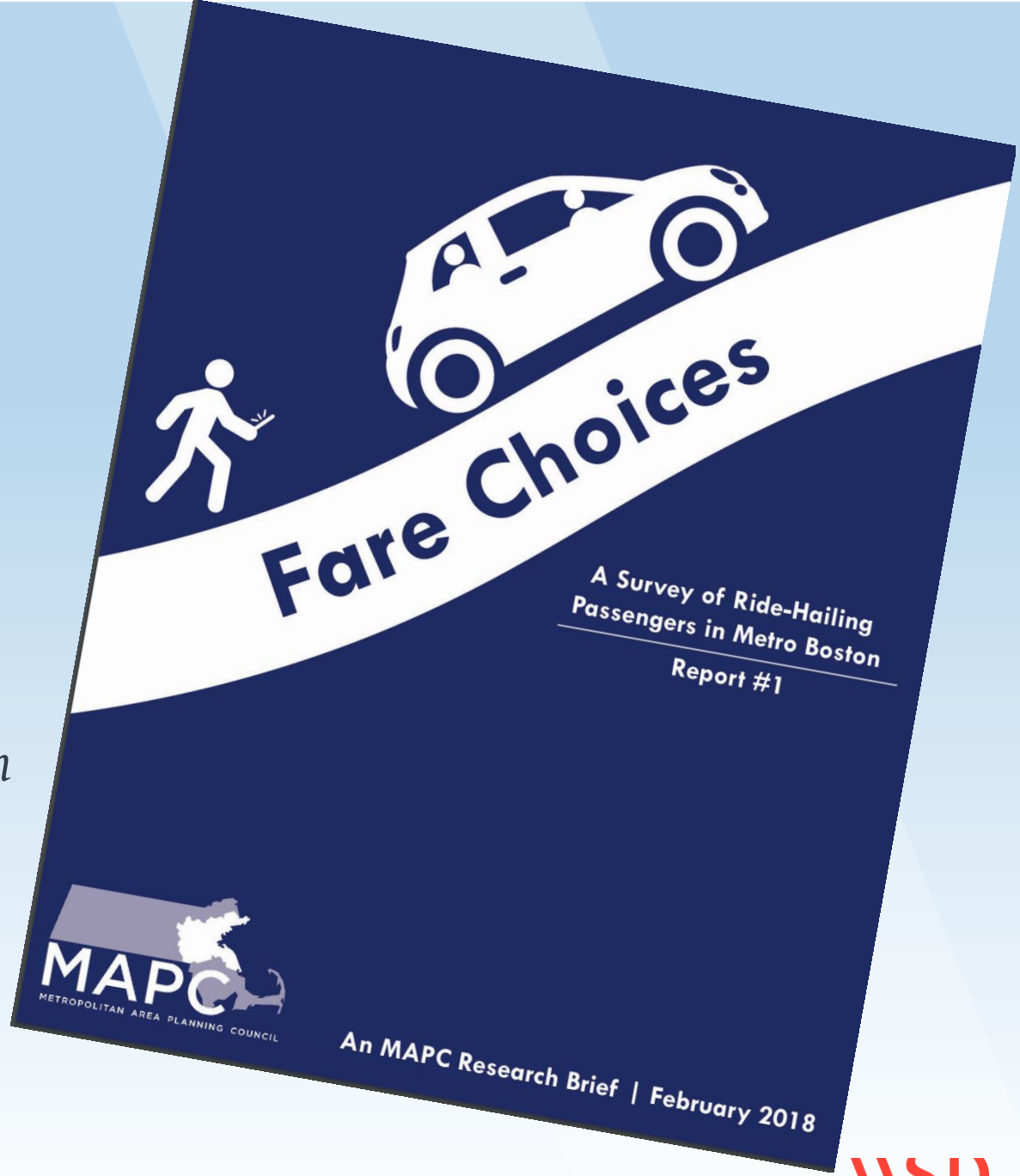
TNCs and Transit

- Conventional wisdom is that TNCs are cannibalizing transit ridership
- With automation, prices will likely decrease, making (automated) TNCs 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:
  - *rider incomes are similar to the region overall,*
  - *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?

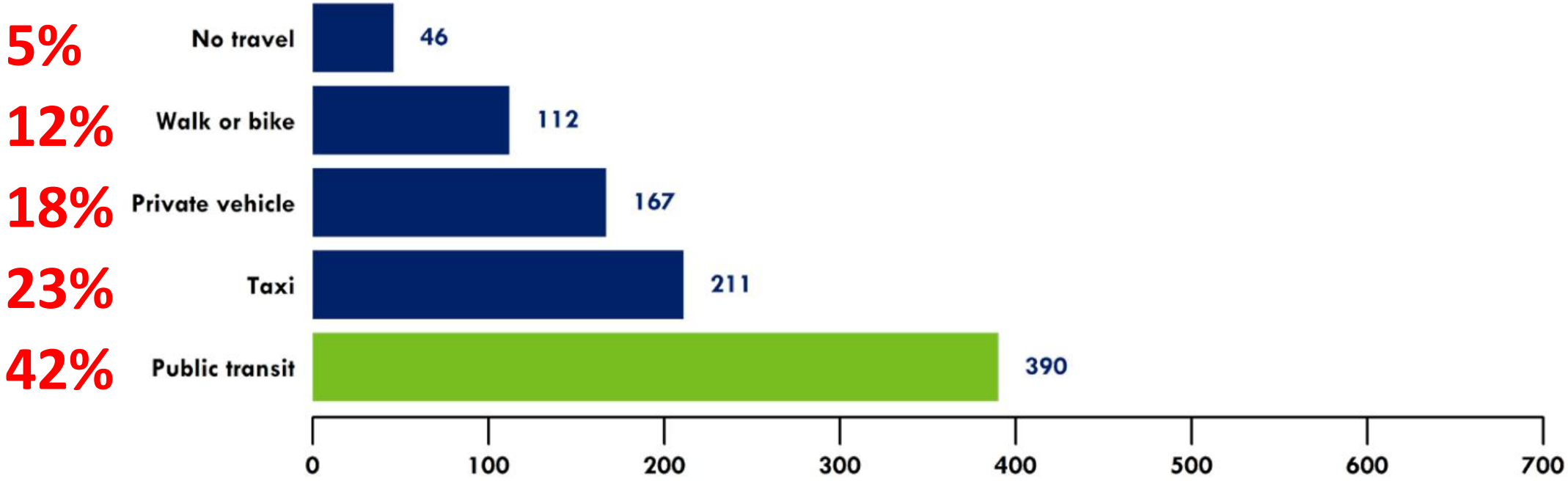


Figure 11. Travel mode being substituted by ride-hailing services for sampled trips.

Fare Choices: Private to Shared?

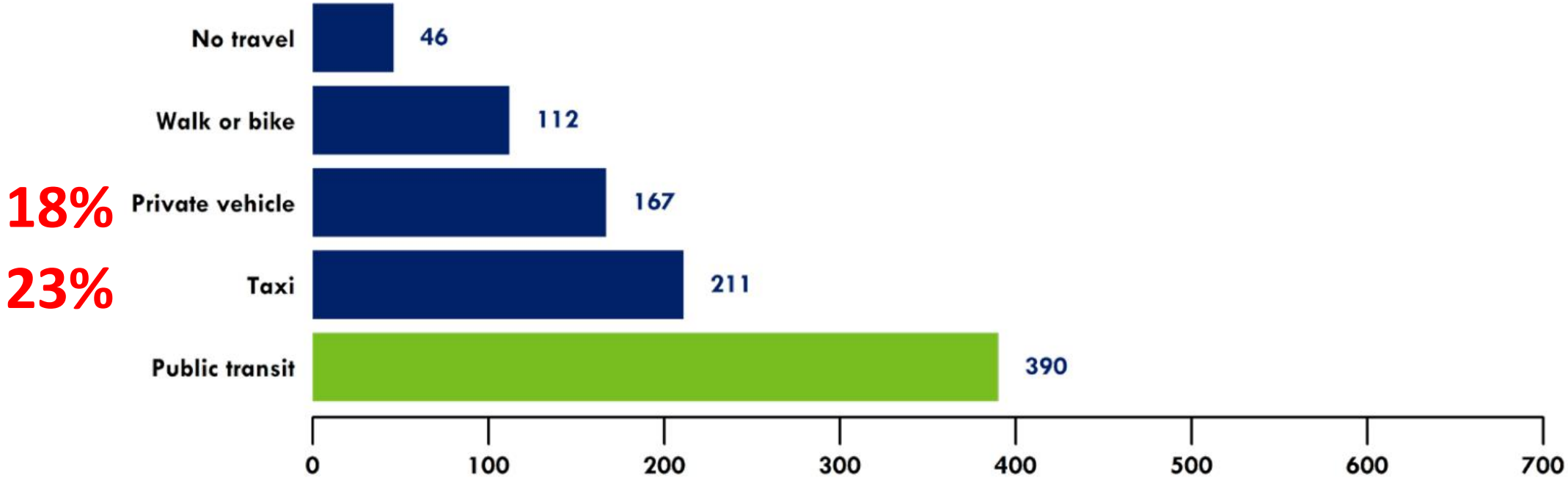


Figure 11. Travel mode being substituted by ride-hailing services for sampled trips.

41% of trips were previous in private motor vehicles

Fare Choices: New Vehicle Trips?

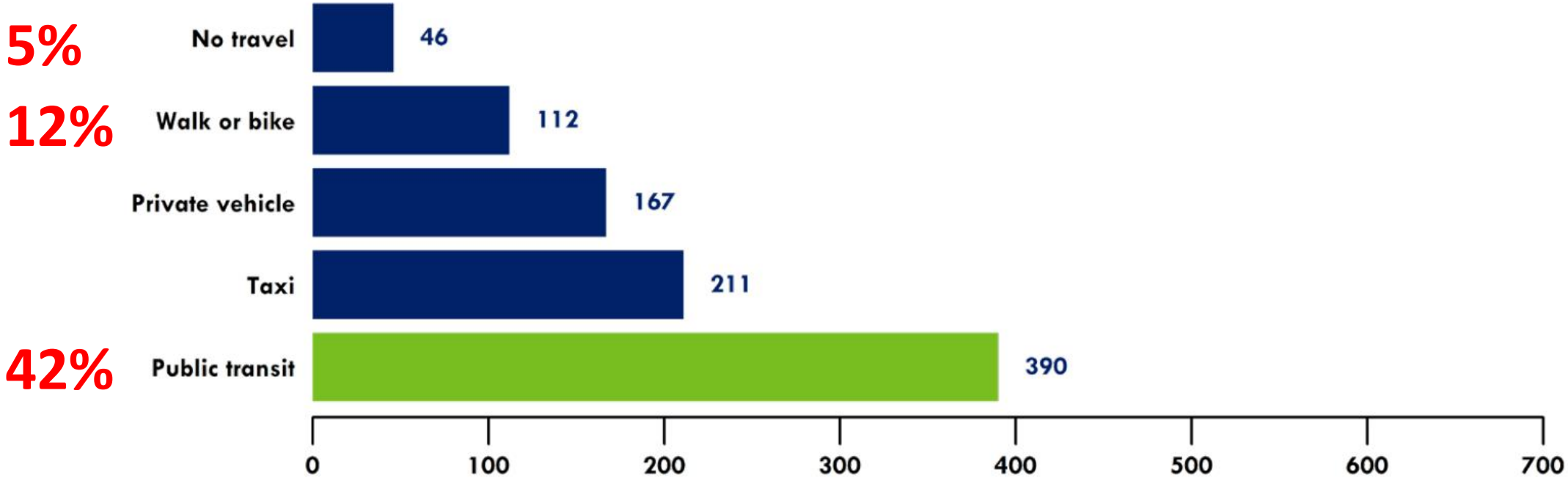
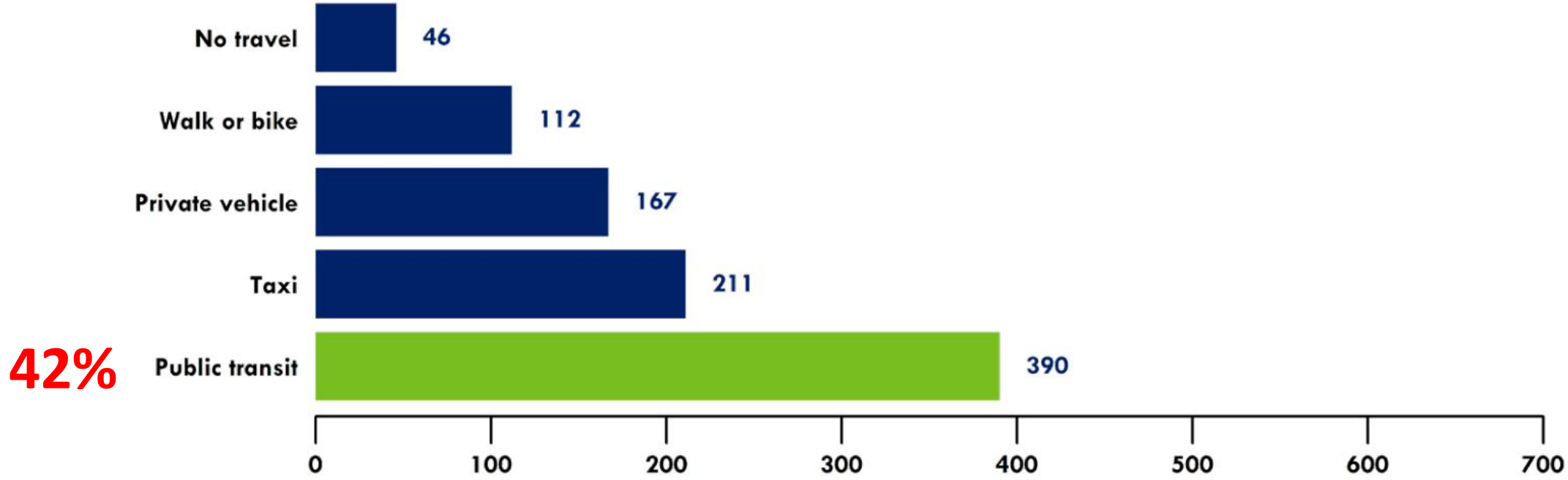


Figure 11. Travel mode being substituted by ride-hailing services for sampled trips.

59% of trips were previous not in private motor vehicles

Fare Choices: Shift from Transit Trips?

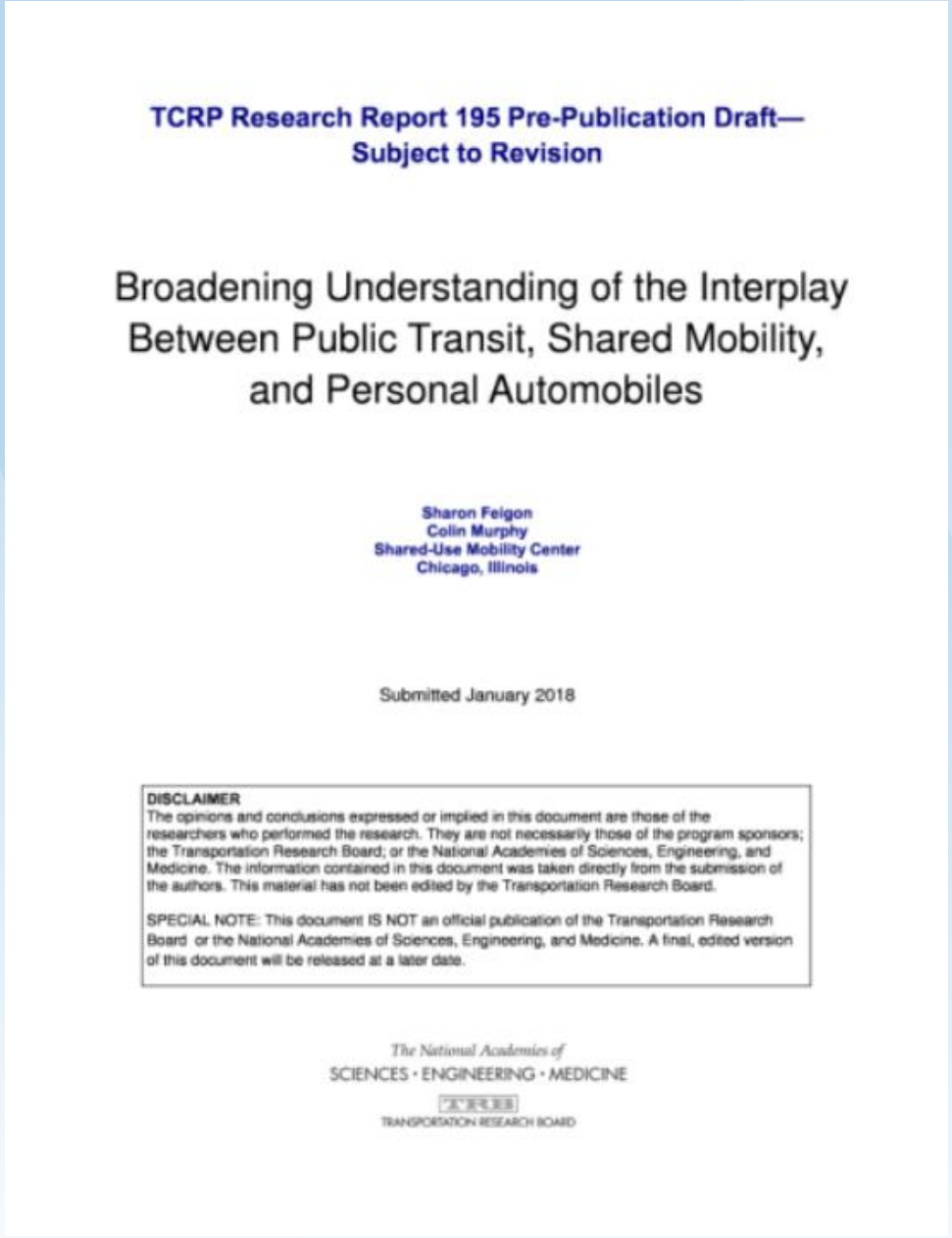


42%

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

42% of trips were previous on transit

TCRP 195



TCRP Research Report 195 Pre-Publication Draft—
Subject to Revision

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

The National Academies of
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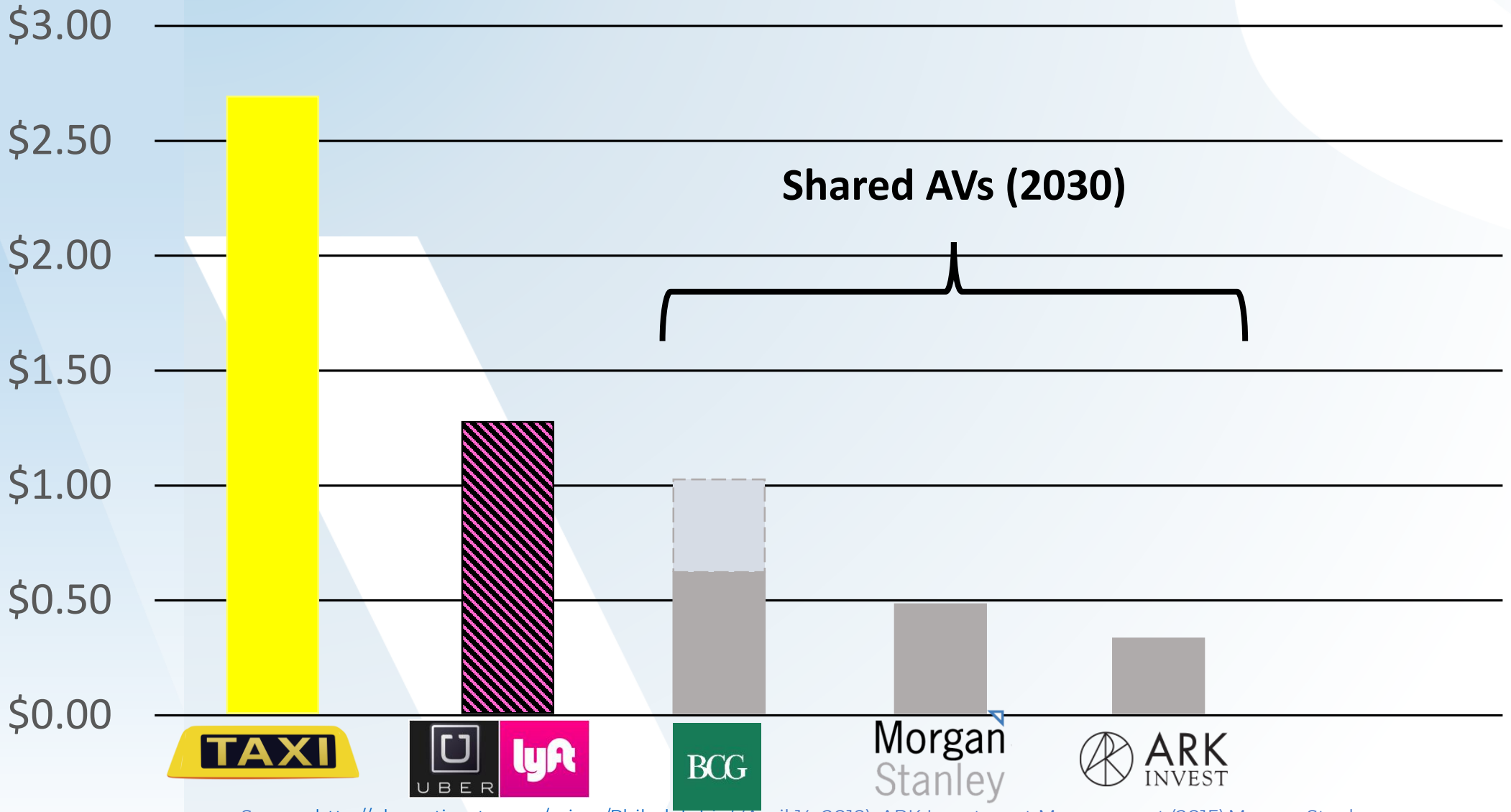
https://www.nap.edu/catalog/24996/broadening-understanding-of-the-interplay-between-public-transit-shared-mobility-and-personal-automobiles

TRR 195: Key Findings

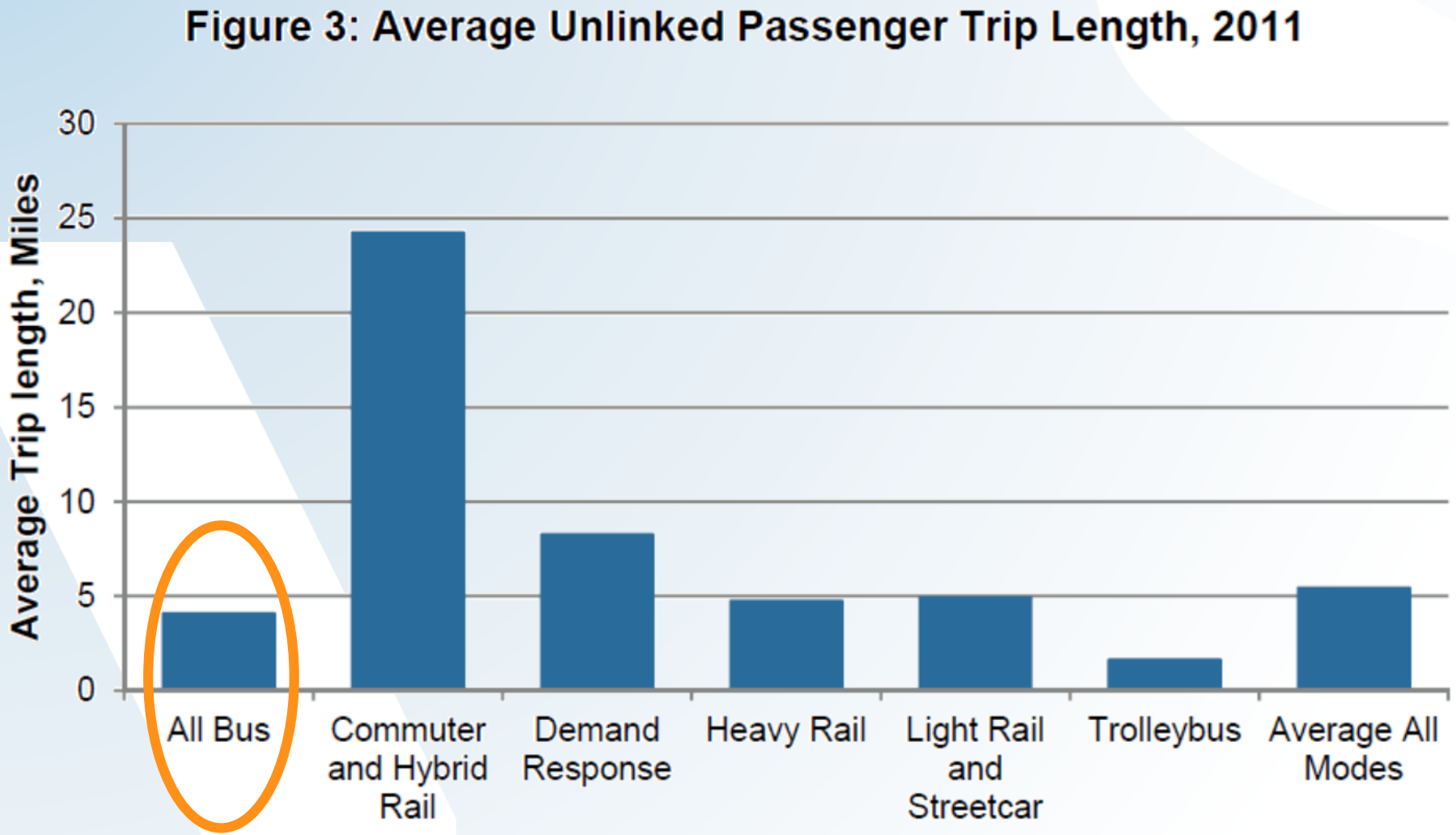
- The heaviest use is during evening hours and weekends.
- Most TNC trips in the study regions are short and concentrated in downtown core neighborhoods.
- There is no clear relationship between the level of peak-hour TNC use and public transit usage.
- TNCs are used on a more occasional basis.
- Transit travel and wait times were top concerns of transit users.
- TNC usage takes place in communities of all income levels.

Cost Per Mile



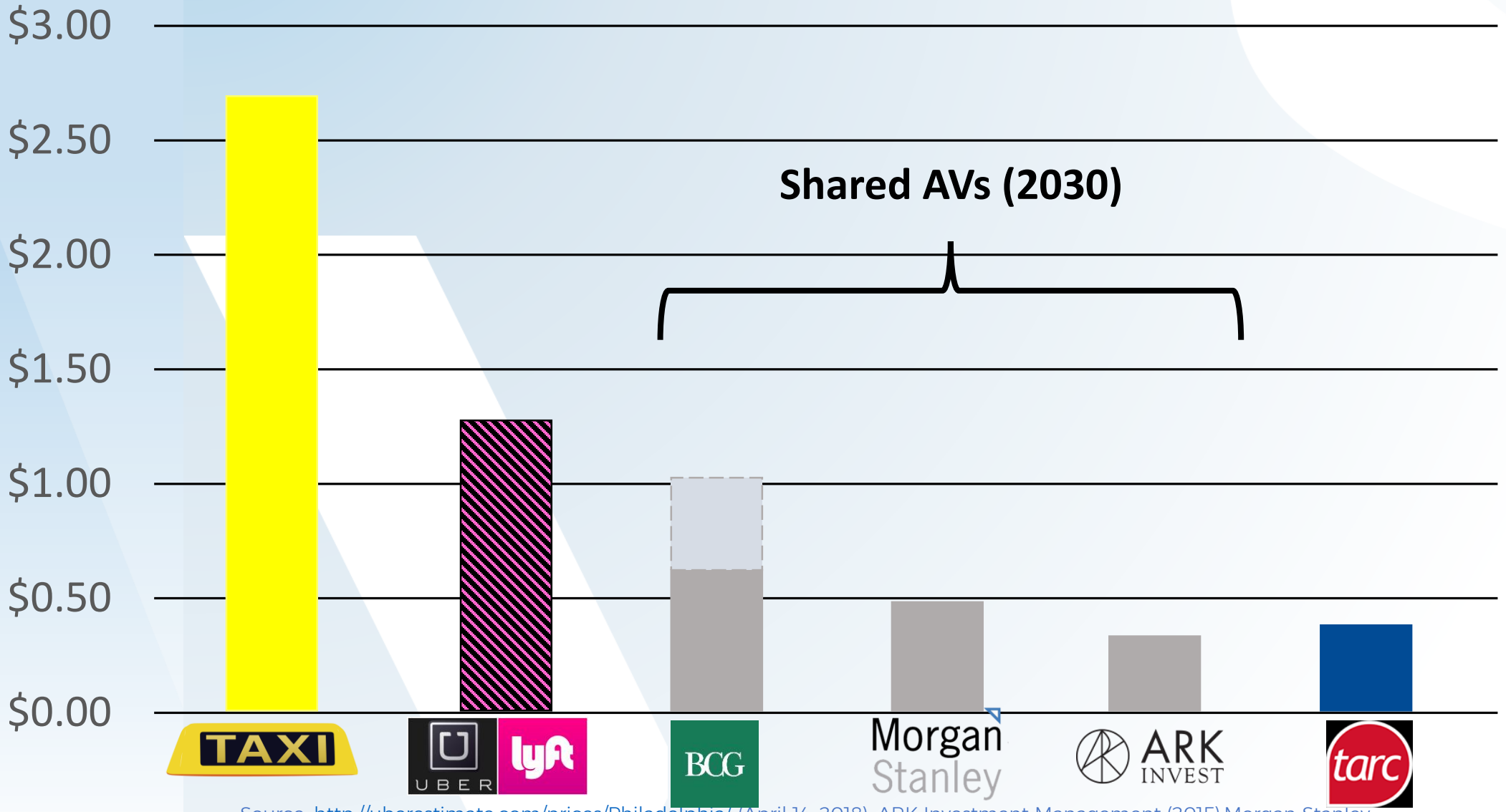
Source: http://uberestimate.com/prices/Philadelphia/ (April 14, 2018); ARK Investment Management (2015);Morgan Stanley (2016); World Economic Forum/Boston Consulting Group (2016)

Average Length of Transit Trips



Source: APTA 2011 Fact Book

Cost Per Mile

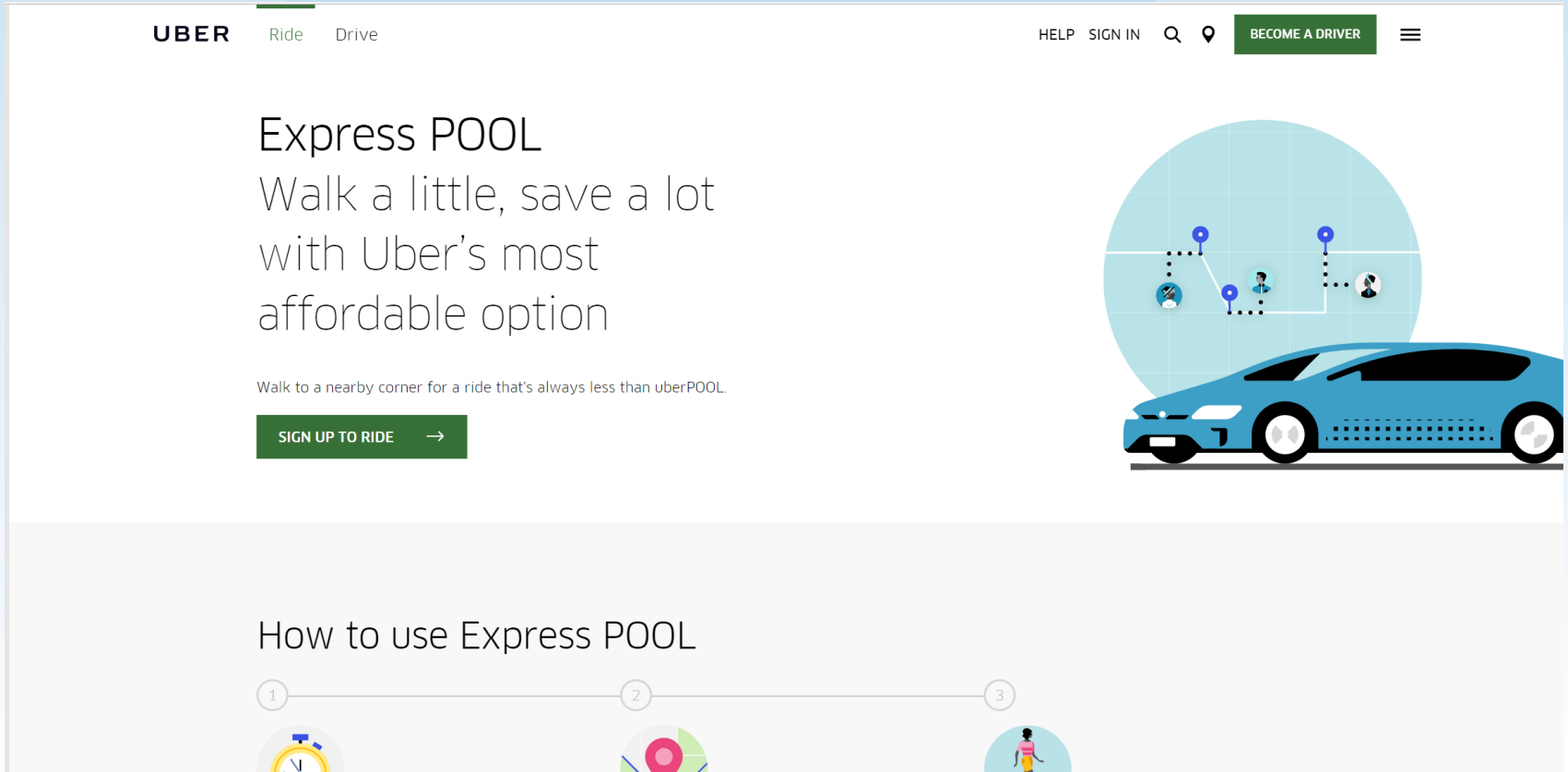


Source: http://uberestimate.com/prices/Philadelphia/ (April 14, 2018); ARK Investment Management (2015);Morgan Stanley (2016); World Economic Forum/Boston Consulting Group (2016)

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



Transit Attention

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The Future of Mobility - From Transit Authority to Mobility Integrator

This uniquely-designed event is a discussion-based summit that puts the attendee at the center of the conversation by featuring a series of in-depth panel discussions and roundtable breakouts, which will focus on how traditional public transportation modes must adapt to compete in the new mobility marketplace.

The event will be led by senior transit officials, business executives, advocates and other mobility experts serving as thought leaders and conversation starters who will delve into the crux of critical issues facing public transportation agencies today, highlight innovations underway around the country and discuss ways public transportation can be the backbone of multimodal lifestyles.

Don't miss this opportunity to learn how public transportation providers can strategically position themselves in the *New Mobility Paradigm*.

Questions?

Registration & Summit Logistics

Kwakuita Spence
(202) 496-4845
kspence@apta.com

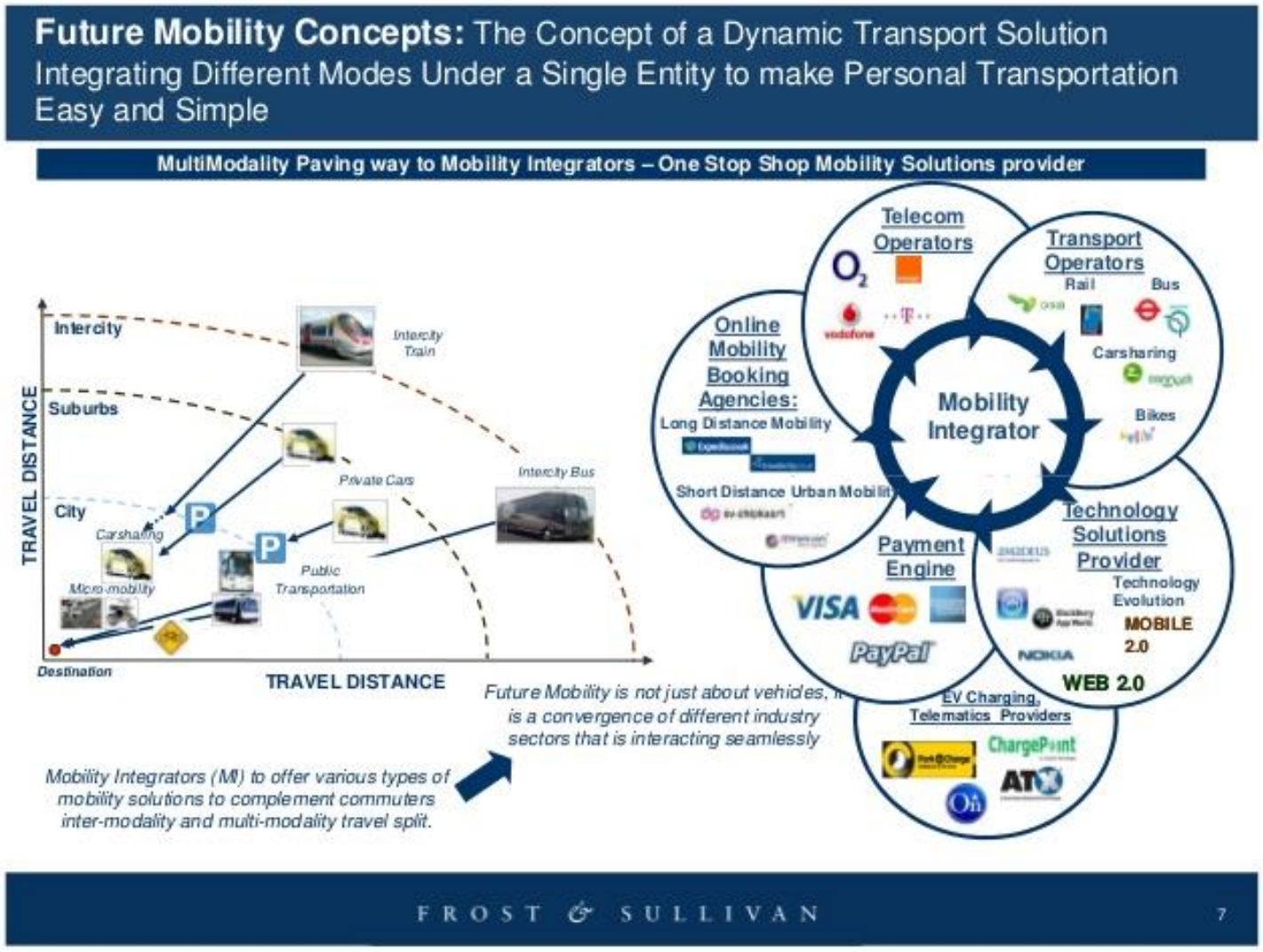
Program Information

Cynthia Owens
(202) 496-4851
cowens@apta.com

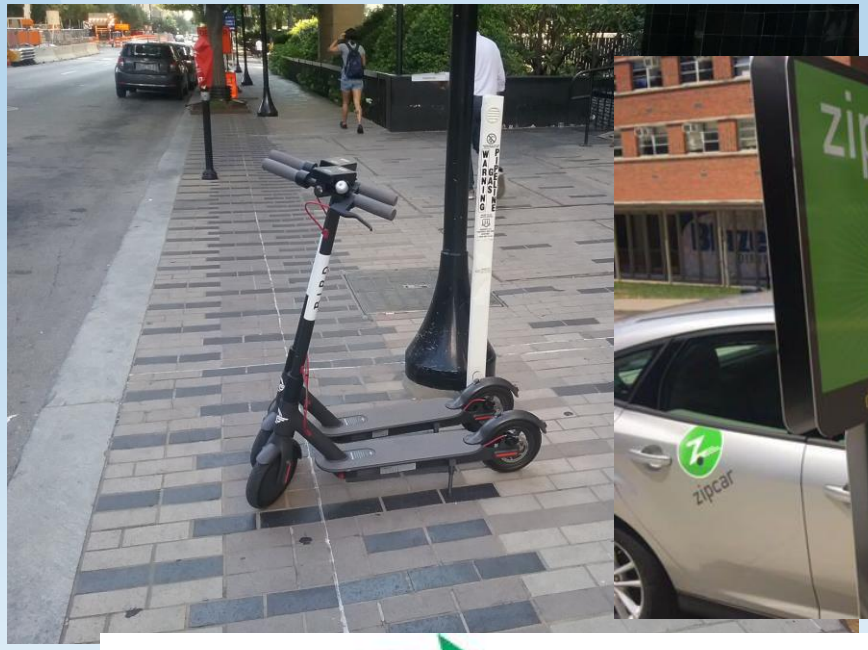
Sponsorship Information

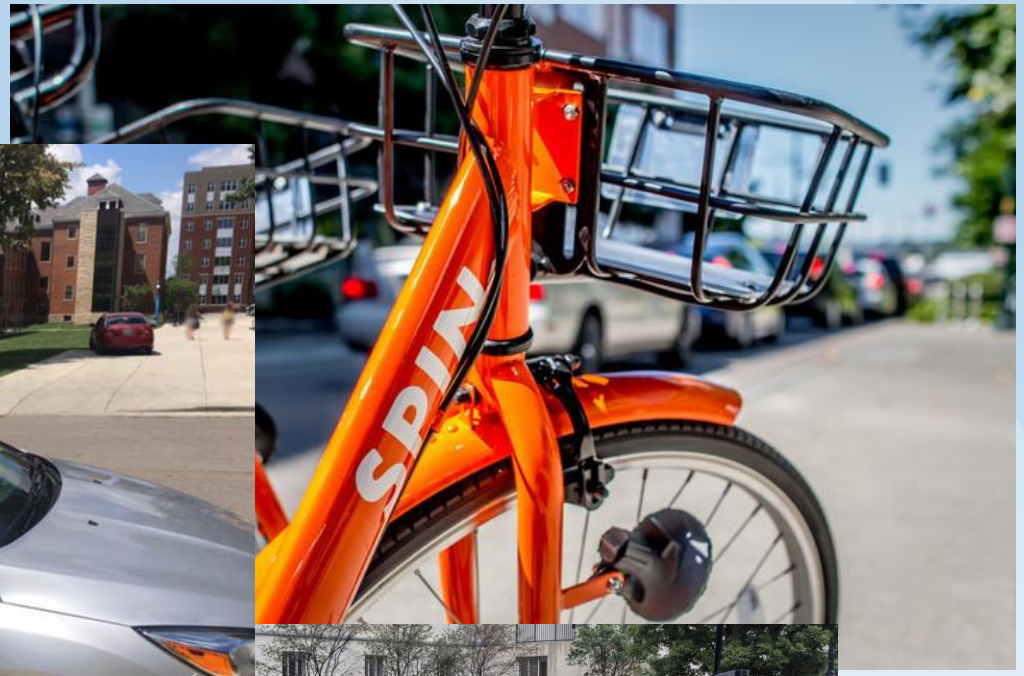
Alex Skeete
(703) 706-8224
APTAconference@ntpevents.com

From Transit Agency to Mobility Integrator



From Transit Agency to Mobility Integrator





Rideshare by-enterprise

How Might This Play Out?

Viable Scenarios

	Automation (Speed of Technological Advancement)	Connectivity	Cooperation	Price	Private Uptake	Shared Uptake (in areas served)	Shared Footprint	Scenario Name
	Slow	Possibly	Low; competing platforms	More than current TNCs	High	Less than current	Smaller than current	**Slow Roll**
	Fast	Not Required	Low; competing	Less than current TNCs	Moderate (in areas served) High (in areas not served)	Moderate	Most profitable locations	**Competing Private**
	Fast	Some	Among Privates	More than Competing Privates	Moderate (in areas served) High (in areas not served)	Moderate	Profitable Locations	**Cooperative Private**
	Fast	Necessary	Among Privates and Public; Centralized	?????	Moderate (in areas served) High (in areas not served)	Higher	Comparable to your current transit system	**Integrated Public/Private**

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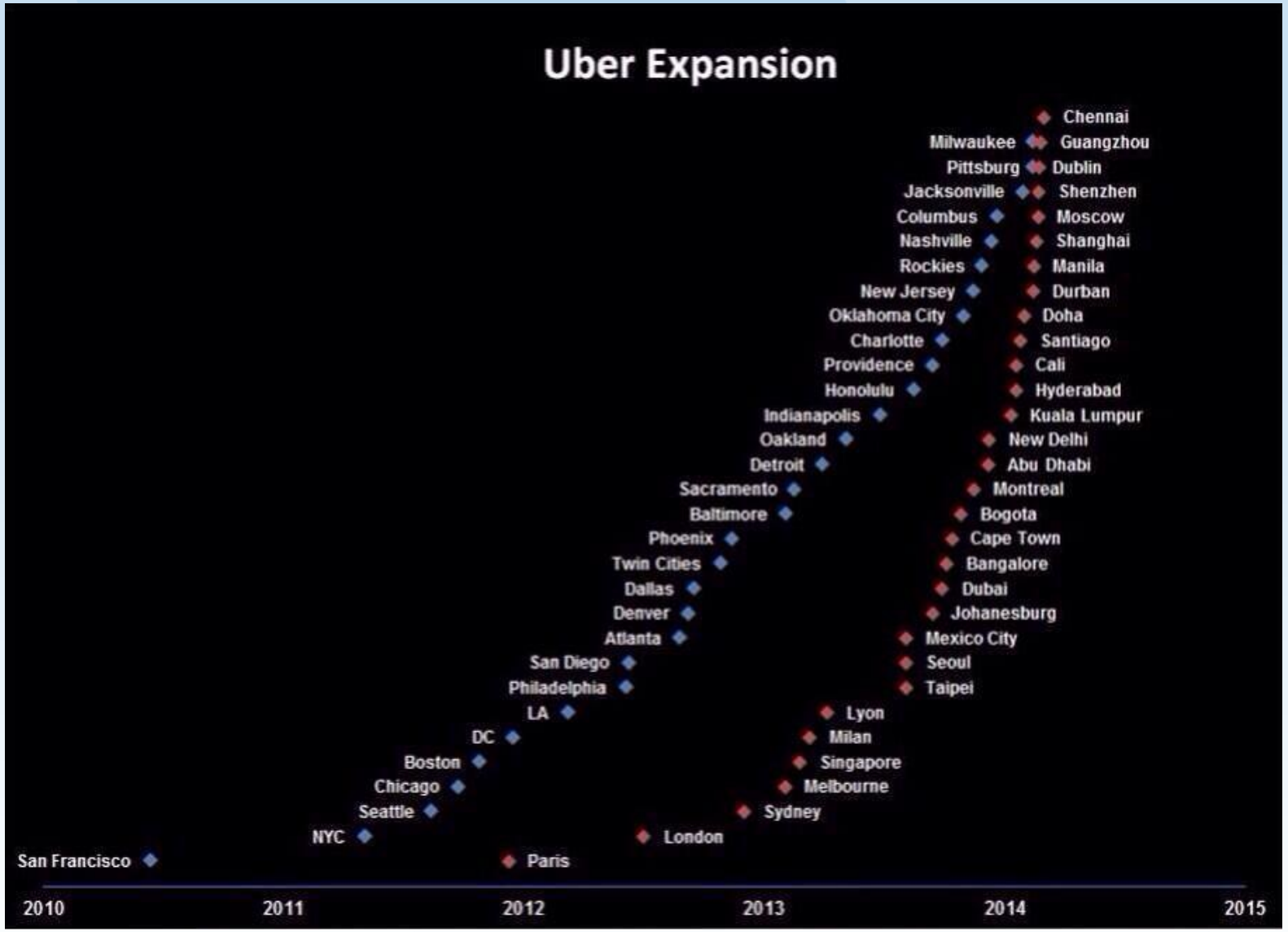
Shared Mobility Deployment



Source: Uber website (5/22/17).

Potential MaaS Markets

Key Takeaways……

- Currently being driven by the private sector and market (…..follow the industry……)
- Pricing will influence usage
- Shared won't be everywhere, so what it looks like will depend on local conditions
- Ride-hailing is impacting transit usage, so how do we integrate the positives while managing the negatives?
- We need to begin to rethink the mission and roles of our departments of transportation and transit agencies

Steps for Kentucky

Steps to Take....

Louisville AV Playbook: Values

- Connected
- Healthy
- Authentic
- Sustainable
- Equitable

Louisville AV Playbook: Plays

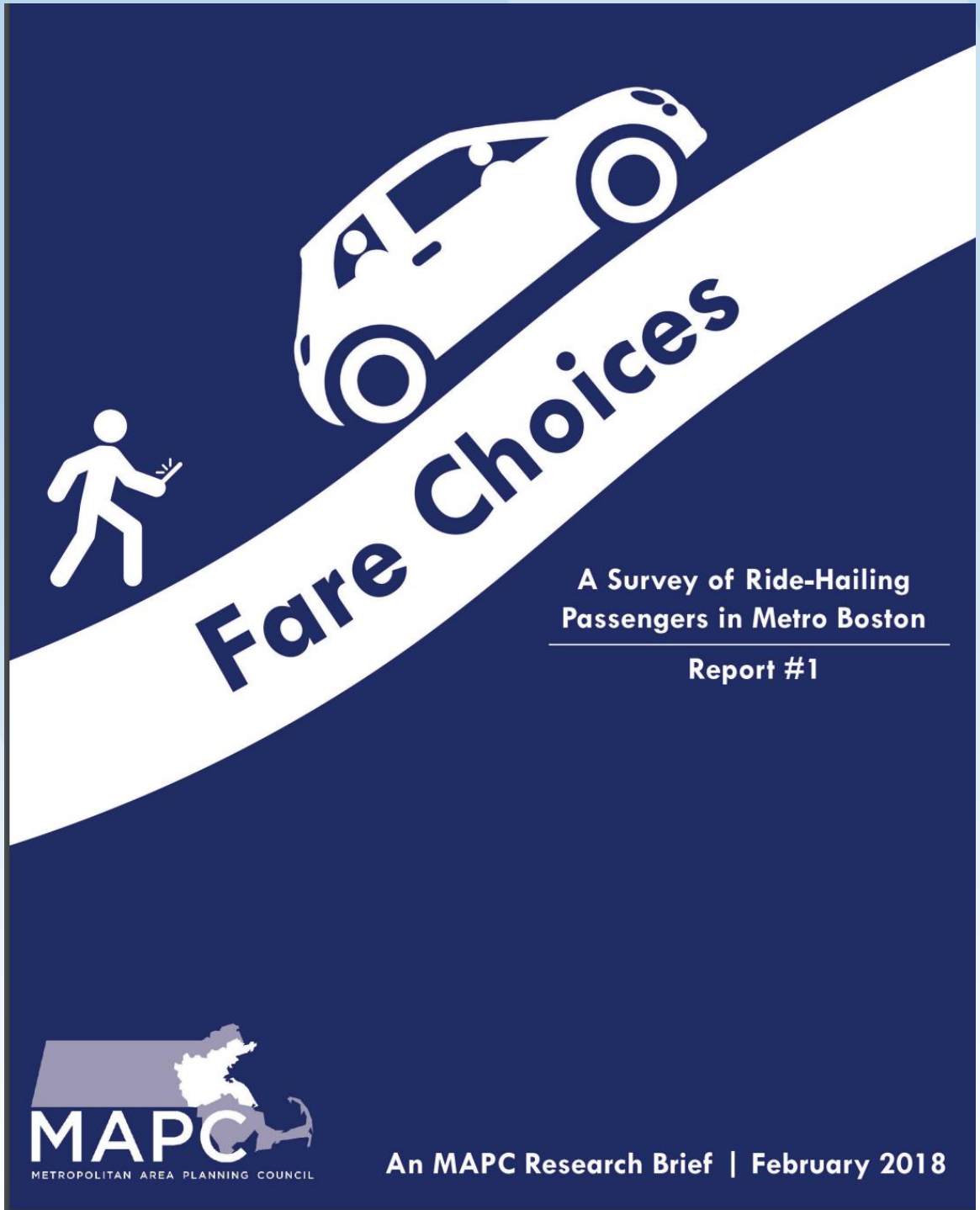
- **Play 1: *Ensure* that major infrastructure *decisions focus on moving people* and consider the effects of AVs**
- **Play 2: *Forge public and private partnerships* to prepare for new regulatory and technological challenges, anticipate emerging technologies, and establish best practices.**
- **Play 3: Prepare for fundamental shifts in *parking* demand**
- **Play 4: Ensure AV technology supports TARC operations to strengthen our *transit system***
- **Play 5: *Develop* and maintain *transportation technology and data infrastructure* to encourage innovation and promote accountability**

“The best way to predict the future is to create it.”

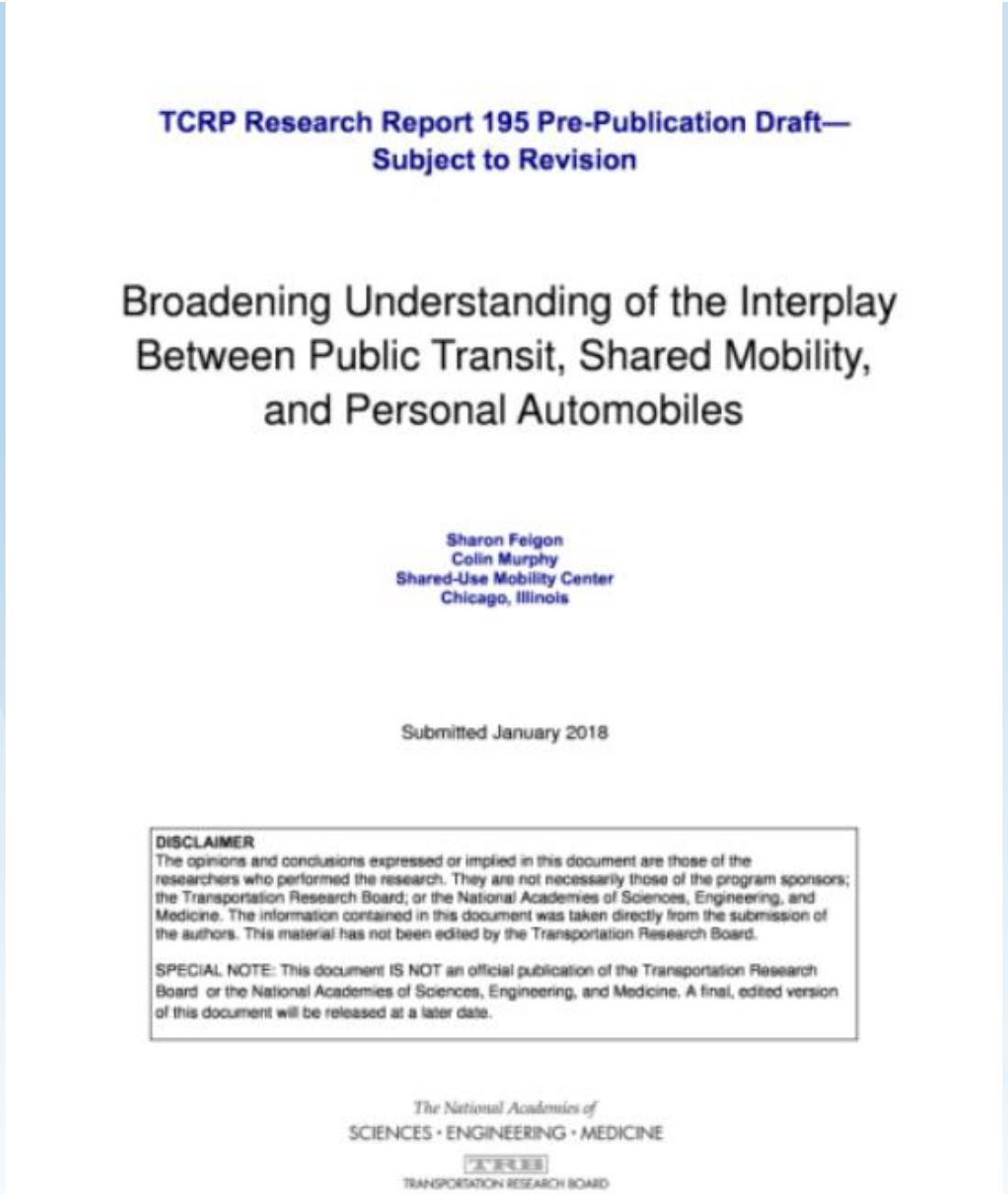
What We're Reading

Resources

Resources


Fare Choices
A Survey of Ride-Hailing Passengers in Metro Boston
Report #1
MAPC
METROPOLITAN AREA PLANNING COUNCIL
An MAPC Research Brief | February 2018

Resources



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Resources

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System Initiative on Shaping the Future of Mobility

Reshaping Urban Mobility with Autonomous Vehicles

Lessons from the City of Boston

In collaboration with The Boston Consulting Group

June 2018

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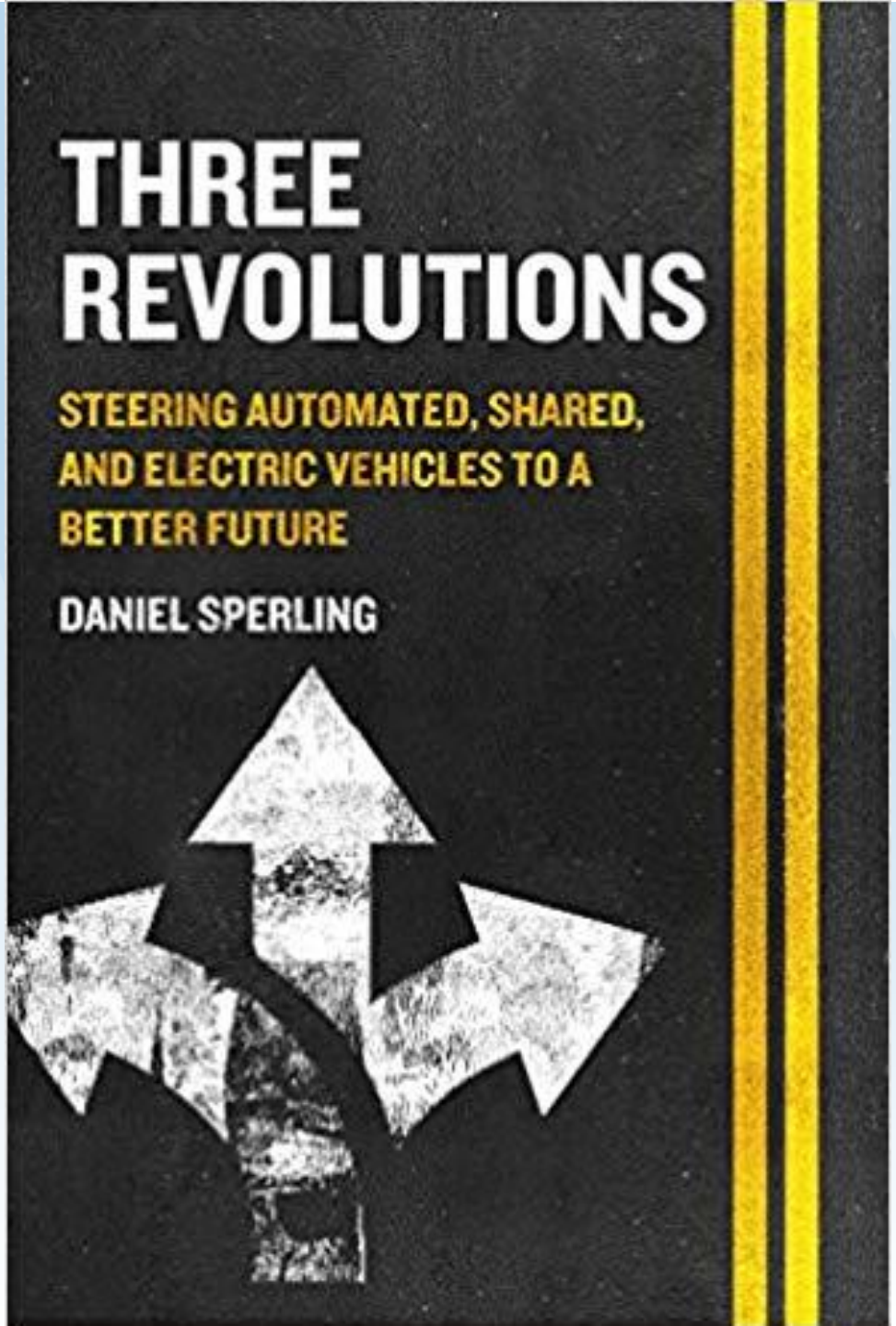
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DANIEL SPERLING

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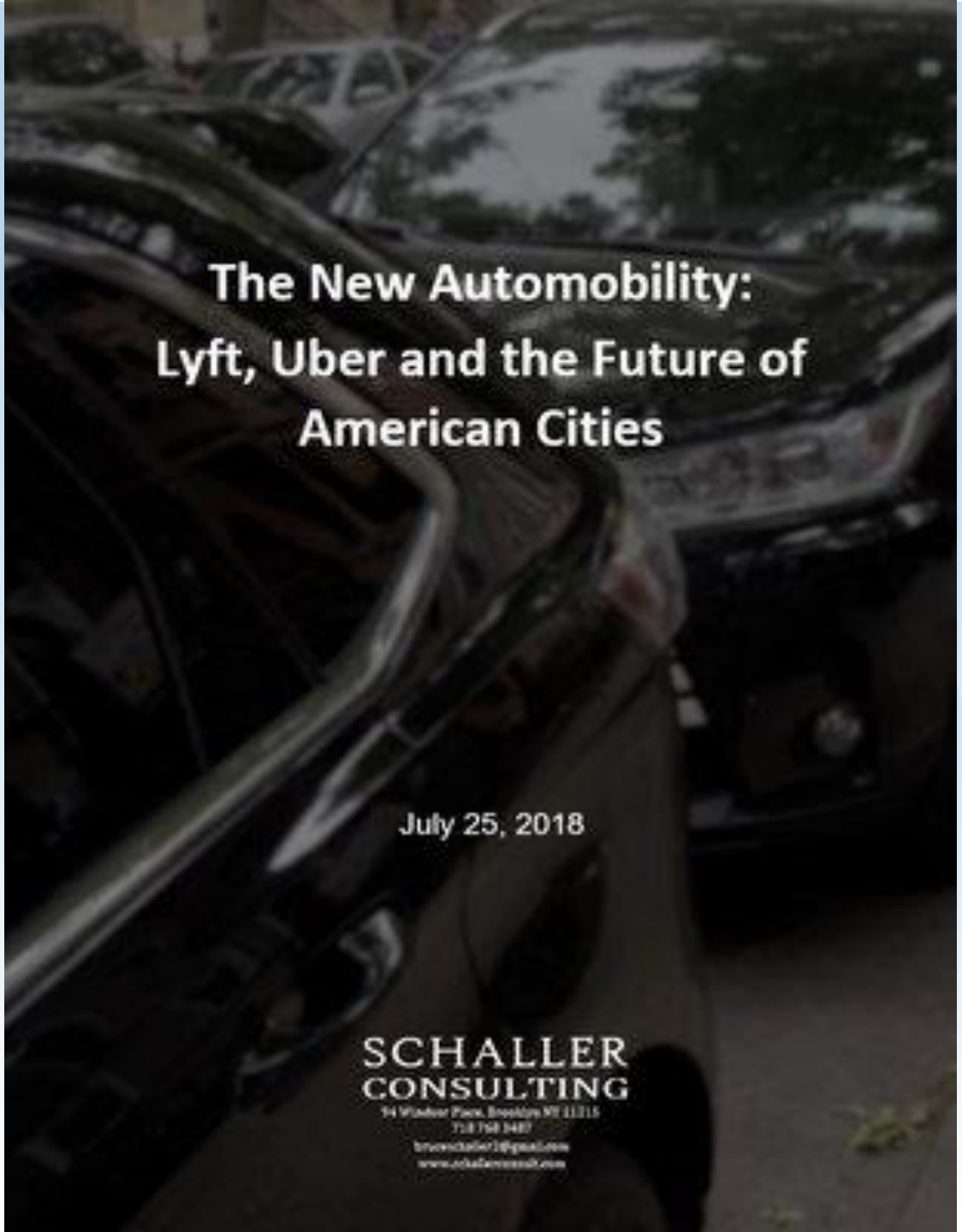

The New Automobility:
Lyft, Uber and the Future of American Cities
July 25, 2018
SCHALLER
CONSULTING

Resources

SMART DRIVING CARS

http://smartdrivingcar.com/GreenLight-092316

Friday, September 23, 2016

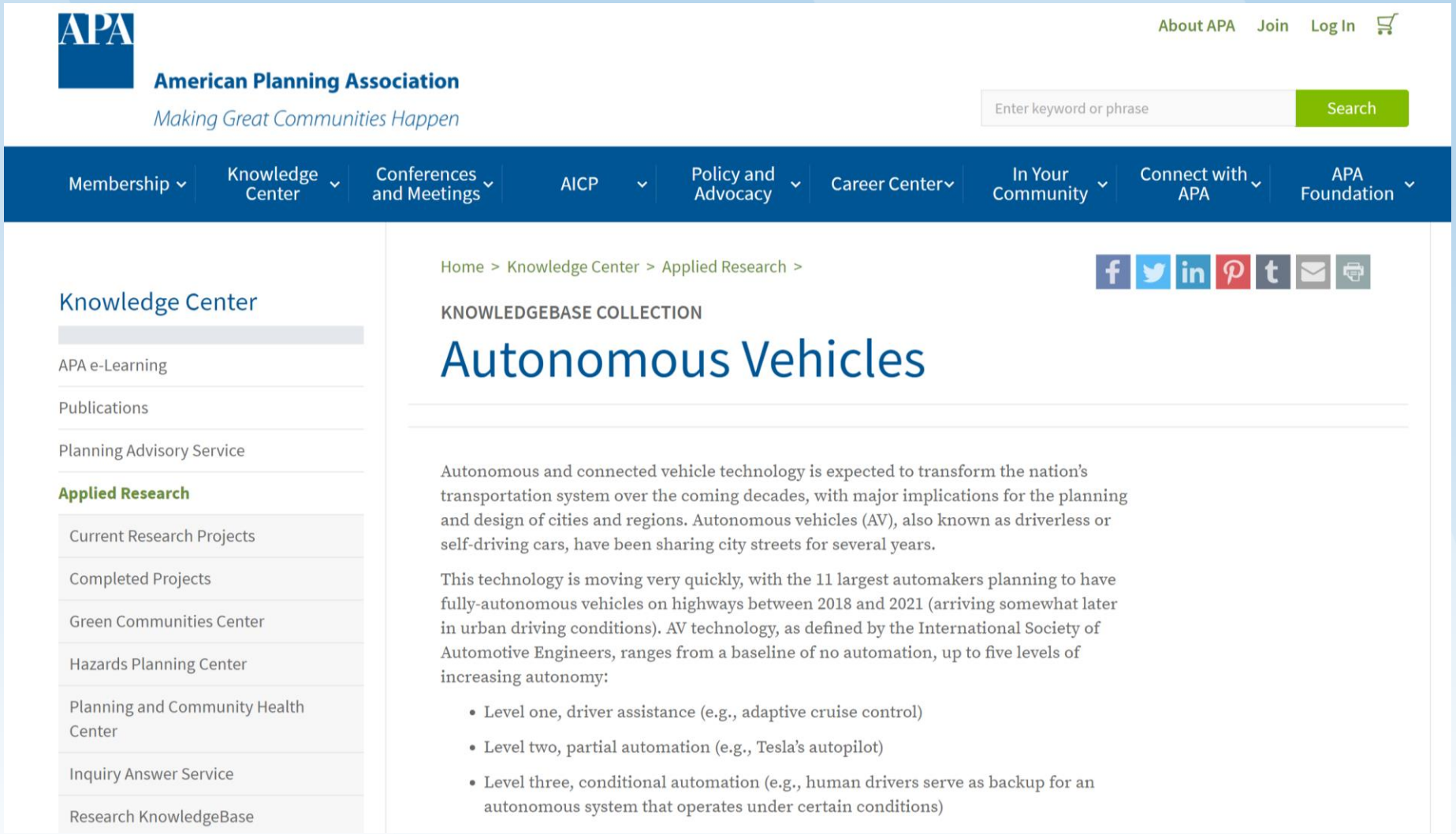
NHTSA **Federal Automated Vehicles Policy: Accelerating the Next Revolution In Roadway Safety**

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

Resources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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)

Resources


Intelligent Transportation Systems
Joint Program Office
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 Kevin Viita (ITS America) at kviita@itsa.org.
Date & Time:
Thursday, November 9, 2017
1:00 PM - 2:00 PM ET
Presenters:

The Race for Automated Mobility

Stephen Buckley, P.E., AICP

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Discussion Questions

- How do we use technology to capture the positives and manage the negatives?
- Should we be shifting to a more demand-responsive system? If so, how do we do it without undermining existing transit services?
- What does “public transportation” of the future look like?
- What does the public transportation agency of the future look like?
- What is the road map for migrating to a new model?
- What steps can agencies take now?