Mobility as a Service (MaaS) Webinar:
Understanding the Concept, Current Status
and the Role of Data

July 11, 2019
Webinar & Audio Information

• The call-in phone number is: x-xxx-xxxx & enter xxxxxxx# at the prompt

• Participants will be in “Listen Only” mode throughout the webinar

• Please press *0 to speak to an operator for questions regarding audio

• Please call Justin Ferri at xxx-xxx-xxxx for difficulties with the web or audio application

• This webinar will be recorded.

• Presentations will be posted to the I-95 Corridor Coalition website. Participants will receive a link to the presentations after they are posted.
Asking Questions

• Please pose your questions using the chat box

• Questions will be monitored then answered by the speakers either at the end of their presentation or at the end of the webinar
Welcome and Introductions

Denise Markow, PE
I-95 Corridor Coalition
TSMO Director
## Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:00 pm to 1:05 pm</td>
<td>Welcome and Introductions</td>
<td>Denise Markow, I-95 Corridor Coalition</td>
</tr>
<tr>
<td>1:05 pm to 1:35 pm</td>
<td>MaaS: Understanding the Concept and Current Status</td>
<td>Carol Schweiger, Schweiger Consulting</td>
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<tr>
<td>1:35 pm to 2:05 pm</td>
<td>MaaS: TNCs &amp; Data</td>
<td>Joe Castiglione, San Francisco County Transportation Authority</td>
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<tr>
<td>2:05 pm to 2:25 pm</td>
<td>Question &amp; Answer Session</td>
<td>Led by</td>
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<td></td>
<td>Denise Markow, I-95 Corridor Coalition</td>
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<tr>
<td>2:25 pm to 2:30 pm</td>
<td>Wrap Up</td>
<td>Denise Markow, I-95 Corridor Coalition</td>
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</tbody>
</table>
I-95 Corridor Coalition Sponsored Event

225 Registered

19 States

DOTs  Turnpike Authorities  MPOs  Federal Agencies  Universities  Vendors  Consultants

I-95 Corridor Coalition – Mobility as a Service Webinar
July 11, 2019
16 states + D.C.

In the Corridor

2nd Largest Economy in the World
$4.7 Trillion
40% of US GDP

37% Of America’s population: 110 Million people

46 Major Seaports
$172 Billion Imports
34% of U.S. total

Boston, Massachusetts
New York, New York
Washington, D.C.
Philadelphia, Pennsylvania
Raleigh, North Carolina
Charleston, South Carolina
Savannah, Georgia
Orlando, Florida
Miami, Florida

July 11, 2019
Introductions

Carol Schweiger
Schweiger Consulting
President

Joe Castiglione
San Francisco County Transportation Authority
Deputy Director for Technology, Data and Analysis
Understanding the Concept & Current Status

Carol Schweiger
Schweiger Consulting
MOBILITY AS A SERVICE (MAAS): UNDERSTANDING THE CONCEPT AND CURRENT STATUS

Carol Schweiger
President, Schweiger Consulting
I-95 Corridor Coalition Webinar

MaaS: Understanding the Concept, Current Status and the Role of Data
Thursday, July 11, 2019
What is MaaS? How is it different from Mobility on Demand (MOD)?

LA Metro

Dallas Area Rapid Transit

Greater Dayton Regional Transit Authority – Agency provides MaaS

Tompkins County, NY

Where is the US in the MaaS Topology?

Importance of Data

Balancing Customer Needs, City Goals & Private Sector Opportunities
<table>
<thead>
<tr>
<th><strong>DEFINITIONS</strong></th>
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<tbody>
<tr>
<td><strong>MaaS</strong></td>
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<tr>
<td><strong>Mobility on Demand</strong></td>
</tr>
<tr>
<td><strong>New mobility services</strong></td>
</tr>
<tr>
<td><strong>Transportation Demand Management</strong></td>
</tr>
<tr>
<td><strong>Mobility Management</strong></td>
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</table>

# MOBILITY ECOSYSTEM

<table>
<thead>
<tr>
<th>Public Transit</th>
<th>Taxis</th>
<th>Car Rental</th>
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<tbody>
<tr>
<td>Microtransit</td>
<td>Bikesharing</td>
<td>P2P Carsharing/Rental</td>
</tr>
<tr>
<td>Ridesourcing</td>
<td>Carsharing</td>
<td>Shared Ride Services</td>
</tr>
<tr>
<td>Automated Vehicles</td>
<td>Scooter Sharing</td>
<td>Electric Scooter Sharing</td>
</tr>
<tr>
<td>Private Automobile</td>
<td>???</td>
<td></td>
</tr>
</tbody>
</table>
LA METRO’S MULTI-SYSTEM APPROACH

TAP Wallet

APIs

TAPforce

Transit System

Olympics and more!

Courtesy Robin O’Hara, Executive Officer, Regional TAP Customer Experience, LA Metro
BENEFITS

• Offer account loading choices:
  • Different options for Mobile App, Computer, Call Center and Retail Locations
  • Connected by APIs to the programs

• Offer rewards:
  • Alternative to transfers
  • Let the customer choose

• Incentivize behavior:
  • Bad Air Day?
  • Offer easily configurable discounts that incentivize transit and get people off the freeways

• Cross-Program Discounts: Provides discounts across multiple programs
  • One sign-up for customers
  • Easy customization
  • Configurable by programs such as Metro’s Low Income Subsidy Program (LIFE)

Courtesy Robin O’Hara, Executive Officer, Regional TAP Customer Experience, LA Metro
DART’s Mobility as a Service Framework

Mobility Services
- Scooters
- Bike Sharing
- Dynamic Car Pooling
- Car Sharing
- Interactive Kiosk
- WiFi
- Smart Payments
- Trip Planning
- Real-Time Information
- Rewards + Incentives
- Connected Traveler
- Automated Vehicles

APPS + Services

P3 Agreements
- Paratransit
- Uber
- Microtransit
- Car Companies
- Air Taxi

Connected Services

Data Hub

Currently in process
Not currently in process

DART’S PATH TO LEVEL 3

Source: Gary Thomas, President/Executive Director, Dallas Area Rapid Transit, “Mobility as a Service: DART Case Study,” June 18, 2018 TRB Webinar, Handouts, pages 84-104
DART’s Mobility as a Service Development Cycle

MaaS Definition
- Personalized journey planning and management
- Hassle-free digital payment and ticketing
- First/Last mile transportation combining public transit, on-demand and shared mobility services
- Optimization of data exchange to expand services

Phase I
(Emphasis on sharing, integrations and evaluations)
- Payment Integrations
- P3 Agreements
- Piloting Programs
- Intermodal Integrations
- Ride Hailing, Bike, Scooter & Carsharing

Phase II
(Emphasis on automated driving)
- Automated Vehicles
- Business Modeling
- Mobility Planning
- Resource Planning
- Mobility Behavior

“Mobility as a Service”

High
Level of value
Low

Shared Intermodal Mobility

2014
Point of Entry

2021+

2030+

Source: Roland Berger – Global Strategy Consulting Firm
GREATER DAYTON REGIONAL TRANSIT AUTHORITY

Service Overview
• Montgomery and western Greene counties
• Fixed route, demand response and first/last mile services
• 300 vehicles; 29 routes; 3,000 stops
• 5 transit centers, RTA Connect transfer points, PnR lots
• 9 million annual passengers
• Planned service expansion to 9+ counties

Goals
• Seamless Regional Mobility Ecosystem
• Equitable Access
• Open Data
• Integrated Payment

“All mobility providers will collaborate with us delivering one unified mobility network via Dayton MaaS platform”

Adapted from Santosh Mishra, IBI Group and Nick Mantia, RTA, “Mass Transit to MaaS Transit: Are We Ready?” presentation to 2018 APTA Fare Collection/Revenue Management & TransITech Conferences, https://www.apta.com/resources/mobility/Documents/DaytonRTA_FarePaymentSolsSys.pdf
Mobility Coordination Center

Tompkins County, NY MaaS Vision

MaaS as Customer Service Integrator

“... shift from selling features & benefits to building relationships with consumers...”
VALUE PROPOSITION

• Mobility Education
• Member Organization
  • Member recruitment
  • Governance/ Operations

• Financial Services
  • Individual Mobility Plans, estimates of annual use & budget
  • Monthly Budget Billing or Single Payments
  • Coordinate Fare Payment with mobility operators & customers
  • Streamline how Public agencies purchase travel for clients
  • Credit volunteer driver mileage reimbursements as revenue
  • Credit employer subsidies as revenue

• Customer Service
  • Concierge Service 24/7 & Guaranteed Ride
  • Feedback to mobility operators
  • Business Co-Marketing & Discounts

• Capacity to adapt & innovate: Increase supply of volunteers & rideshare drivers
## MOBILITY MENU

<table>
<thead>
<tr>
<th>Service</th>
<th>Unit Cost</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Annual Adult Bus Pass</td>
<td>$450</td>
<td>Annual</td>
</tr>
<tr>
<td>Annual Youth Bus Pass</td>
<td>$110</td>
<td>Annual</td>
</tr>
<tr>
<td>Ithaca Carshare &quot;Its my car&quot; Plan</td>
<td>$8</td>
<td>Hour</td>
</tr>
<tr>
<td>Ithaca Carshare &quot;Just in Case&quot; Plan</td>
<td>$11</td>
<td>Hour</td>
</tr>
<tr>
<td>Car Rental</td>
<td>$55</td>
<td>Day</td>
</tr>
<tr>
<td>Taxi trip - City</td>
<td>$8</td>
<td>Urban Trip</td>
</tr>
<tr>
<td>Taxi trip - Rural</td>
<td>$20</td>
<td>Rural Trip</td>
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<tr>
<td>Bicycle Maintenance</td>
<td>$50</td>
<td>Voucher</td>
</tr>
<tr>
<td>Electric Bike Purchase</td>
<td>$2,000</td>
<td>HE Bike</td>
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<tr>
<td>Bike Purchase</td>
<td>$700</td>
<td>Bike</td>
</tr>
<tr>
<td>Rideshare Driver – Miles</td>
<td>$0.54</td>
<td>Mile</td>
</tr>
<tr>
<td>Rideshare Rider – Miles</td>
<td>$0.15</td>
<td>Mile</td>
</tr>
<tr>
<td>GADABOUT Paratransit</td>
<td>$4</td>
<td>Trip</td>
</tr>
<tr>
<td>Vanpool Membership</td>
<td>$125</td>
<td>Month/Seat</td>
</tr>
<tr>
<td>Guaranteed Ride</td>
<td>$30</td>
<td>Annual</td>
</tr>
<tr>
<td>Small City Mobility Budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>(1 car, 2 adults, 1 youth, Walkscore = 96)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carshare</td>
<td>$ 900</td>
<td></td>
</tr>
<tr>
<td>Annual Bus Passes (2)</td>
<td>$ 560</td>
<td></td>
</tr>
<tr>
<td>Taxi</td>
<td>$ 192</td>
<td></td>
</tr>
<tr>
<td>Bicycle Maintenance</td>
<td>$ 100</td>
<td></td>
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<tr>
<td>Guaranteed Ride</td>
<td>$  30</td>
<td></td>
</tr>
<tr>
<td>Member Support</td>
<td>$ 178</td>
<td></td>
</tr>
<tr>
<td><strong>Annual Total</strong></td>
<td><strong>$ 1,960</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Monthly Payment</strong></td>
<td><strong>$ 163</strong></td>
<td></td>
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</table>

Source: Dwight Mengel, Tompkins County Dept of Social Services
<table>
<thead>
<tr>
<th>Service</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Vanpool Membership</td>
<td>$1,500</td>
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<tr>
<td>Carshare (Discount Plan)</td>
<td>$480</td>
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<td>Taxi</td>
<td>$200</td>
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<tr>
<td>Guaranteed Ride</td>
<td>$30</td>
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<tr>
<td>Member Support</td>
<td>$121</td>
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<tr>
<td>Volunteer Driver Revenue</td>
<td>$(400)</td>
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<tr>
<td>Vanpool Program Subsidy</td>
<td>$(600)</td>
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<tr>
<td><strong>Annual Total</strong></td>
<td><strong>$1,331</strong></td>
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<tr>
<td><strong>Monthly Payment</strong></td>
<td><strong>$111</strong></td>
</tr>
</tbody>
</table>
MAAS TOPOLOGY: US MARKET

Source: Jana Sochor, Hans Arby and MariAnne Karlsson, “The topology of Mobility as a Service: A tool for understanding effects on business and society, user behavior, and technical requirements,” Paper No. EU-SP1013, 2017 ITS World Congress, Montreal
KEY ENABLERS IN OPEN MAAS ECOSYSTEM

1. Access to **dynamic, high-quality data**
2. Access to mobility services
3. Access to integration:
   a) Technical bottlenecks - Harmonized APIs
   b) Market bottlenecks - Sharing best practices and experiences

• MaaS Alliance Data Vision “Data Makes MaaS Happen”
USE CASES TO DEMONSTRATE MAAS DATA FLOWS

• MaaS Operator Use Case
• Public Transport Use Case
• Fleet Management For Car/Bike/Scooter sharing Operations
• **Traffic Management Use Case**
  • Traffic management has been mostly one way
  • Traffic optimization measures can also be provided by mobility service providers and used to enable some advanced services to end-users
  • Traffic management data flow key actors: content (=data) providers, transport authorities, transport service providers, traffic management operators, service providers, MaaS operators and travelers
Travelers choose mobility services

Private Sector provides mobility services or technology to access services

The City or Region tries to attain specific goals and objectives
THANK YOU!

Carol Schweiger
President
Schweiger Consulting LLC
781-424-2208
carol@tech4transit.com
TNCs & Data

Joe Castiglione
San Francisco County Transportation Authority
TNCs & Data

I-95 Corridor Coalition

San Francisco County Transportation Authority
Outline

- What is the SFCTA?
- What questions do we want to answer?
- How did the SFCTA get data to answer these questions?
- What did we find?
- How should agencies get and manage data?
What is the SFCTA?

- Congestion Management Agency for San Francisco County
- Required by state law to:
  - Monitor congestion
  - Adopt plans for mitigating traffic congestion
  - Program and allocate federal, state and local funds
  - Prepare a bi-annual Congestion Management Program
  - Develop San Francisco’s long-range transportation plan
- Manage ½ cent sales tax revenues for transportation projects
Why does the SFCTA need data?

- In SF, seemed like lots of TNCs, but...
  - How many?
  - What are the effects?
- In a period of rapid change, data is more important than ever
  - Planning
  - Policy-making
  - Accountability

- Risk: public policy-making without transparent data

Source: https://blog.usejournal.com/the-tyranny-of-the-s-curve-b791772ba8af

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What questions does SF want to answer?

- **Existing Conditions**
  - How many TNCs operate in SF?
  - How many TNC trips are occurring in SF?
  - When are TNC trips occurring in SF?
  - Where are TNC trips occurring in SF?
  - How much VMT do TNCs generate in SF?
  - Do TNCs provide good geographic coverage throughout the entire city?
What questions does SF want to answer?

- **Congestion**
  - How do TNCs affect roadway congestion?

- **Transit Ridership**
  - How do TNCs complement or compete with public transit?

- **Equity**
  - Can TNCs be accessed by all San Francisco residents?

- **Street Safety**
  - How do TNCs affect the safety of people who use the roads?

- **Policy**
  - What is the role of government in regulating TNCs?
What data does the SFCTA need?

- **Inventory**
  - Assets, networks
- **Network performance**
  - Volumes, speeds, reliability
- **Demand**
  - Trips by mode, location, time-of-day
- **Demographic**
  - Income, race/ethnicity, auto ownership
- **Behavior**
  - How do people make tradeoffs between modes?
What data was available to the SFCTA?
How did the SFCTA get data?

- **Data “scraped” from Uber & Lyft APIs**
  - GPS Telemetry data (“breadcrumbs”)
  - Sampled every 5 seconds for 6 weeks
  - Mid-November to Mid-December 2016
  - Northeastern University collaboration
  - Impute trips from changes in supply

- **Limitations**
  - Trips not directly observed
  - No info on TNC trip purposes, travel party size, fares paid, traveler attributes
What are the existing conditions?

- At least 170,000 TNC intra-SF vehicle trips on typical weekday
  - 15% of intra-SF vehicle trips
  - 13 times the number of taxi trips
  - Conservative estimate (excludes trips with one or both ends outside SF)
  - At least 9% of intra-SF person trips
- Generate 570,000 vehicle miles of travel (VMT) on a typical weekday
  - 6.5% of total weekday VMT
  - 20% of intra-SF weekday VMT

Vehicle Trips by Mode
- Drive
- Transit
- Bike
- Walk
- Taxi
- TNC

Person Trips by Mode
- Drive
- Transit
- Bike
- Walk
- Taxi
- TNC

Vehicle Miles Traveled by TNCs & Taxis in SF

<table>
<thead>
<tr>
<th></th>
<th>TNCs</th>
<th>Taxis</th>
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</thead>
<tbody>
<tr>
<td>Trips</td>
<td>170,400</td>
<td>14,400</td>
</tr>
<tr>
<td>VMT</td>
<td>569,700</td>
<td>65,900</td>
</tr>
<tr>
<td>Average Total Trip Length</td>
<td>3.3</td>
<td>4.6</td>
</tr>
<tr>
<td>Average In-service Trip Length</td>
<td>2.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Average Deadhead Trip Length</td>
<td>0.7</td>
<td>2.0</td>
</tr>
<tr>
<td>% Deadhead Trips Length</td>
<td>21.0%</td>
<td>43.6%</td>
</tr>
</tbody>
</table>
Where and when are TNC trips in SF?

- Most congested areas of the city
- Most congested times of day

TNC Trips by Travel Analysis Zone (TAZ)

TNC & Taxi Trips by Time-of-Day and Day-of-Week

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Do TNCs Affect Congestion?

- How could TNCs decrease congestion?
  - Increased vehicle occupancy
  - Mode shift to transit due to easier access (first/last mile)
  - Mode shift away from auto due to reduced auto ownership

- How could TNCs increase congestion?
  - Add dead-heading or out-of-service vehicle miles
  - Mode shift away from transit and non-motorized modes
  - Disrupt traffic flow due to pickups and drop-offs

- Background traffic and roadway performance
  - Network changes (roadway capacity)
  - Population changes
  - Employment changes

- Other

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Cause of Changes in Congestion (2010-2016)

SHARE OF CHANGE IN DELAY BY FACTOR
- TNCs: 51%
- Population: 24%
- Employment: 23%
- Network: 2%

SHARE OF CHANGE IN VMT BY FACTOR
- TNCs: 47%
- Population: 30%
- Employment: 22%
- Network: 1%

SHARE OF CHANGE IN SPEED BY FACTOR
- TNCs: 55%
- Population: 19%
- Employment: 22%
- Network: 4%

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Factors Affecting Speed by Time Period

SHARE OF CHANGE IN SPEED BY FACTOR

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Network Change</th>
<th>Population Change</th>
<th>Employment Change</th>
<th>TNC Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:00a-6:00a</td>
<td>31%</td>
<td>57%</td>
<td>44%</td>
<td>21%</td>
</tr>
<tr>
<td>6:00a-9:00a</td>
<td>15%</td>
<td>40%</td>
<td>55%</td>
<td>24%</td>
</tr>
<tr>
<td>9:00a-3:30p</td>
<td>21%</td>
<td>20%</td>
<td>55%</td>
<td>26%</td>
</tr>
<tr>
<td>3:30p-6:30p</td>
<td>24%</td>
<td>26%</td>
<td>45%</td>
<td>12%</td>
</tr>
<tr>
<td>6:30p-3:00a</td>
<td>12%</td>
<td>12%</td>
<td>75%</td>
<td></td>
</tr>
</tbody>
</table>

Network Change | Population Change | Employment Change | TNC Change

July 11, 2019
Do TNCs Affect Transit Ridership?

- TNCs have significant negative effect on bus and heavy rail ridership
- TNCs have insignificant positive effect on commuter and light rail ridership

Source: Erhardt, Graehler & Mucci, "Understanding the Recent Transit Ridership Decline in Major US Cities: Service Cuts or Emerging Modes?"
What about equity?

Source: Bradley, Ou, Tischler, “Including the TNC Mode in Mode Choice Models Estimated Using Smartphone-Based Household Travel Survey Data”
What we don’t know...

- What are the implications of TNCs for MaaS and MOD?
- Is the TNC business model sustainable?
- What are the effects of on-line shopping?
- What are the effects all the other emerging mobility technologies and services (e.g. courier networks)?
What data is reported to other cities?

- **NYC**
  - Automatically collected and transmitted to the Taxi & Limousine Commission
  - All E-Hail requests and the outcome of those requests
  - Data items include
    - Fulfillment status
    - Pickup & drop off locations (lat/long)
    - Fares / fees
    - Payments

Source: Global_Citizen_Festival_Central_Park_New_York_City_from_NYonAir_(15351915006).jpg
What data is reported to other cities?

### Seattle / King County
- Trip records
- Operational records
- Data items include
  - Total number of rides
  - Type of dispatch for each ride
  - Pickup and drop off ZIP codes of each ride.
  - % by ZIP code of rides that are requested but do not happen
  - Number of rides when an accessible vehicle was requested.

Source: https://commons.wikimedia.org/wiki/File:Seattle_from_Kerry_Park_(1).jpg
What data is reported to other cities?

**Boston**
- Trip Records
- Annual Reports
  - Number of rides and origin and destination of each trip
  - Aggregated and anonymized trip route and length (miles and minutes)
  - Accident locations
- Monthly
  - Detailed driver/rider complaints and the actions to respond to complaints.

Source: Boston_skyline_from_Longfellow_Bridge_Specember_2017_panorama_2.jpg
SF voters will likely have the opportunity to vote this year on imposing up to 3.5% tax on TNC trip fares

Size of TNC market has prompted regional and local agencies to incorporate TNCs into their forecasting tools

Transportation and land use development projects subject to more rigorous analysis of potential impacts

City again looking at downtown pricing
How should agencies get data?

- Need regulatory framework that reflects where impacts occur, and types of impacts
- Require data reporting
- Develop inter-agency data sharing guidelines that address privacy concerns
  - CA agencies are spending millions of dollars to collect relatively small samples of data because although data reported to CPUC, not shared with other agencies.
How should agencies manage data?

- **Aggregate data is less useful**
  - Can’t say anything about first/last mile
  - Can’t say anything about congestion impacts
  - Can’t say anything about transit impacts
  - Can’t say anything about curb management impacts

- **Need to protect potentially personally identifiable information**
  - Public sector already does this effectively
  - Should not be an excuse to avoid providing data

- **Transparency / accountability are key**
Where do we go from here?

- Identify key policy questions
- Require data reporting, using a common data standard (e.g. MDS) that can address these questions
- Adopt privacy protection and data sharing standards
- Encourage multi-jurisdiction / multi-agency collaborations (e.g. CA 4 big MPOs)
Reports and Visualizations

TNCs & Congestion
• www.sfcta.org/tncsandcongestion
• tncsandcongestion.sfcta.org
• https://advances.sciencemag.org/content/5/5/eaau2670

TNCs Today
• www.sfcta.org/tncstoday
• tncstoday.sfcta.org

Future Reports
• TNCs & Transit (Sept 2019)
• TNCs & Equity (Dec 2019)
Thank you.

Joe Castiglione
joe.castiglione@sfcta.org
Remaining Questions from the CHAT Box
Meeting information & presentations will be posted to the I-95 Corridor Coalition website. Participants will receive a link to the presentations after they are posted.
Contact Information

I-95 Corridor Coalition

• Denise Markow, PE, I-95 Corridor Coalition, TSMO Director - dmarkow@i95coalition.org, 301-789-9088

Speakers

• Carol Schweiger, Schweiger Consulting - carol@tech4transit.com
• Joe Castiglione, San Francisco County Transportation Authority - joe.castiglione@sfcta.org
Thank You!