

# Bringing Mobility as a Service to the U.S.: Opportunities and Challenges

*ITS Canada, Advanced Public Transit Systems (APTS) Technical Committee*

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# Presentation Outline

- What is MaaS?
- Setting the U.S. stage
- Opportunities
- Challenges
- USDOT Mobility on Demand
- Mobility as a Service (MaaS) examples

# Mobility as a Service (MaaS)

- Scalable door-to-door mobility services without owning a car (better level of service than private car)
- Seamless and efficient flow of information, goods and people
- Open interfaces to transport services
- Example: Personal mobility package for 300 €/month:
  - Transportation from A to B according to service level agreement (SLA)
  - Including all transportation services
  - Including transport related services (city logistics, home deliveries etc.)
  - Roaming in other cities and countries

# MOBILITY AS A SERVICE FRAMEWORK



## MY MOBILITY SERVICES



# Setting the U.S. Stage

- Personal mobility dominated by personally owned vehicles, accounting for >80 % of trips
- Personally owned vehicles:
  - Produce 15% of U.S. emissions
  - Account for 30% of global oil combustion
  - Sit unused over 95% of the time
  - Consume 27% of income in U.S. median income households
- Reliance on costly personal vehicles leaves lower-income persons without access to affordable mobility

Source: Carlin, Kelly, Bodhi Rader, and Greg Rucks. Interoperable Transit Data: Enabling a Shift to Mobility as a Service. Rocky Mountain Institute, October 2015, [http://www.rmi.org/mobility\\_ITD](http://www.rmi.org/mobility_ITD)

# Setting the U.S. Stage (continued)

7 major trends over the past 5-10 years:

- Demographic changes, with Baby Boomers and Millennials in large numbers
- Preferences for urban living and more flexible lifestyles
- WiFi, GPS, sensors and smartphones
- Anywhere everywhere connectivity
- Car driving/ownership preference changes
- Travel as part of life experiences
- Redefining transport through new street designs, service providers and systems

Source: Timothy Papandreou, Director, Office of Innovation at San Francisco Municipal Transportation Agency, "The (Likely) future of Urban Mobility: Key trends, issues and opportunities for cities," LinkedIn post, August 25, 2015, <http://www.racfoundation.org/research/mobility/380610>

# Setting the U.S. Stage (concluded)

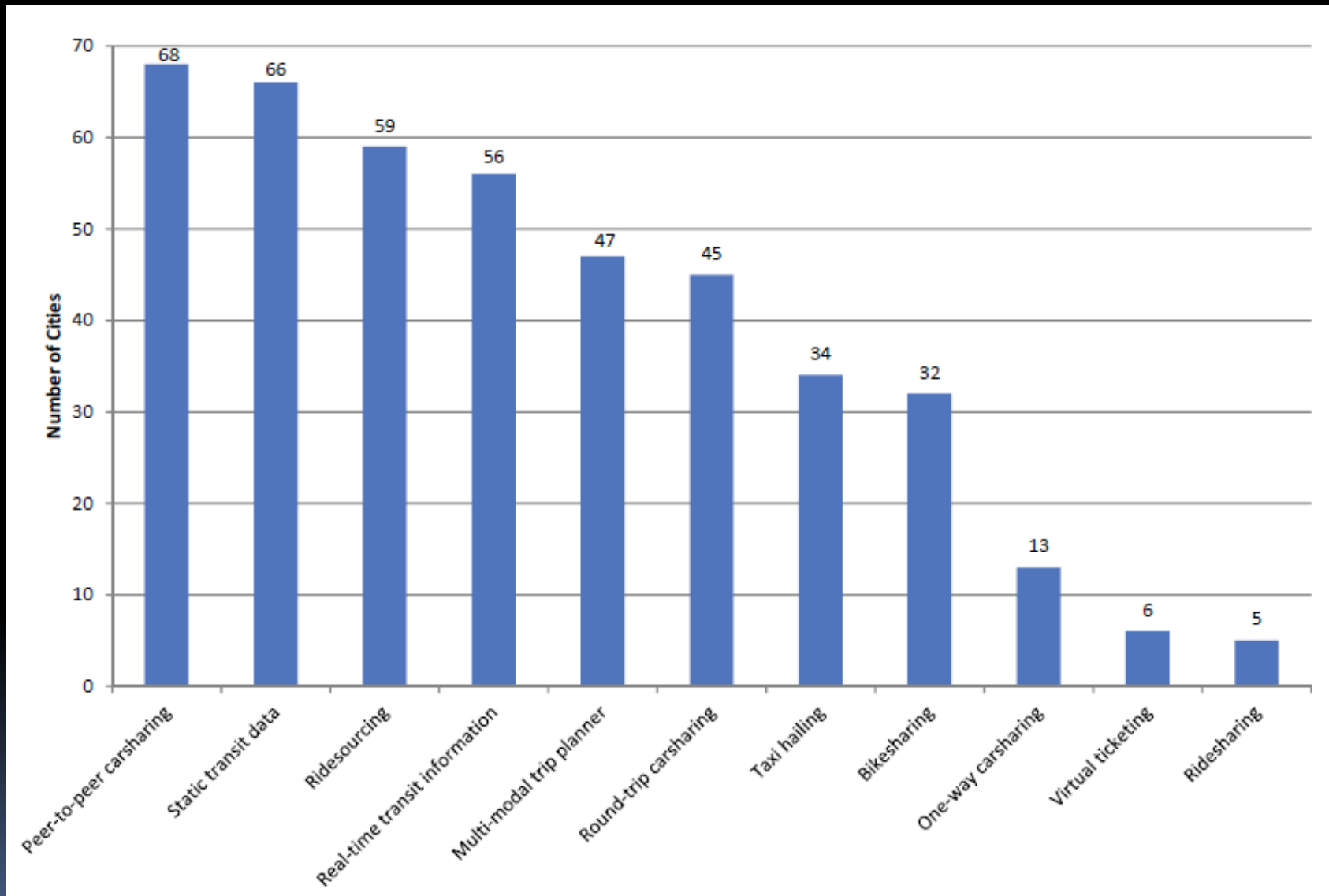
Trends over the next 5-10 years:

- Synchronizing and connecting every network
- Performance-based public–private partnerships becoming the norm rather than the exception
- Diversification and consolidation of transport manufacturers and providers
- Modular, combined shared e-mobility systems to scale in urban areas
- Commercial deliveries and phased introduction of drones
- Driverless vehicles and their potential
- MaaS, with routing, booking, payment, unlocking, gamification and trading

Source: Timothy Papandreou, Director, Office of Innovation at San Francisco Municipal Transportation Agency, “The (Likely) future of Urban Mobility: Key trends, issues and opportunities for cities,” LinkedIn post, August 25, 2015, <http://www.racfoundation.org/research/mobility/380610>



# Extent of Service Availability in U.S.



Source: Lindsey Hallock and Jeff Inglis, "The Innovative Transportation Index: The Cities Where New Technologies and Tools Can Reduce Your Need to Own a Car," February 2015



# Opportunities

- **Redefine “public transportation”**
- Change travel modeling to account for:
  - New mode choice behavior
  - Incorporating incentives or rewards
  - Integrating technology-enabled transportation tools
  - Incorporating effects of new transportation tools – both individually and in combination
- Implement integrated payment systems (see next slide)
- Explore potential of new tools to meet mobility needs of those currently poorly served

# Integrated Payment=Improved Mobility

- Use of mobile devices driving this
  - US mobile market: 77% are smartphone owners, 75% said electronic ticketing would make travel easier and 78% expect to buy tickets via mobile device in coming year
- Mobile payment can be deployed much faster than ticketing systems
- Banks competing with other payment players
- Contactless NFC technology standard feature in mobile devices:
  - Public transport payment
  - Toll payment, allowing hands-free and payment without having to stop
  - Open payment system advantages - lower ticket issuance and distribution costs, and achieve interoperability
- Creation of mobile ticketing ecosystem in which no single entity or stakeholder group controls value chain



# Opportunities (continued)

- Provide public access to transit data (see next slide)
- Expand data available to the public
- Adopt open data and open source software policies
- Data sharing to:
  - Better understand goods and people movements
  - Predict how those movements will change in the future
- Continue development of open protocols

# Data is the New Oil!

- Big, small and open data – oh my!
- Data sharing not prevalent among all transport operators, but that is changing!
- More and more open data does not mean that we understand the data
- Data often free but not always easy to find
- Insight to transport operators from:
  - Data collected from apps to understand people movement (rather than vehicles) fused with
  - Other data sources (e.g., public transport payment data)

# Opportunities (concluded)

- Clarify regulations on new services, such as Transportation Network Companies (TNC)
- Encourage complementary public transportation and new mobility tools
- Make better use of existing technology and infrastructure: Rethink – Optimize – Rebuild – Build new
- People-aware not vehicle-aware systems and infrastructure (see next slide)
- Expand access to cellular networks, Wi-Fi, and electric outlets in transit stations, and aboard transit vehicles

# Vehicle-aware to People-aware Systems

- Should be:
  - Mapping people movements onto available options
  - Providing people with actionable information then use simulation and better demand modelling
- Examples:
  - Where pedestrians travel using pedestrian counting
  - Bicycle awareness/counting employed to better time bicycle lights
- San Francisco Metropolitan Transportation Authority - “level of traffic stress” based on several factors

# Vehicle-aware to People-aware Systems (continued)

- Still struggling with traveler information – whether:
  - Crowdsourced (e.g., Moovit)
  - Integrated system for multiple regional operators (e.g., Triplinx in Toronto)
- Do not always monitor information provided to the public
- Focus on personalized mobility (one person's way of traveling will not be the same as the next person's)





# Challenges: Institutional

- Existing institutional environment key factor:
  - Have institutions worked together or coordinated before?
  - Do application vendors provide open solutions and share information with their competitors?
  - Changes may be necessary within participating organizations
- Participating organizations may conduct business in a different way:
  - Reorganization or change in way service is operated and dispatched, and way that customer service is structured
  - New tools for operations and customer service staff, meaning individual roles and responsibilities may change
- From a traveler perspective:
  - Access to more information to make more informed choices
  - Help travelers make trips that they may not have made
  - Implications of decline in/ demise of taxi companies in places where low-income, disabled, and older persons rely on taxis, including wheelchair-accessible taxis, for lifeline services

# Challenges: Institutional (continued)

- Financing necessary for technology procurement, implementation, and on-going operations and maintenance
- Changes required to existing institutional environment in the location(s)/region(s)
- Coordination with other providers/agencies in order to jointly procure systems and/or exchange data and information
- Lacking ITS technical experience - human or computer resources
- Changes needed in technology vendor community to successfully develop/implement new systems



# Challenges: Operational

- Many transit agencies operate independently and do not coordinate their services
- Changes in way agencies schedule and operate their services
- Provide transit services under array of policies and objectives from different governmental and regulatory agencies, while trying to satisfy the needs of the traveling public simultaneously
- Interface(s) among existing and proposed technology
- Role of each agency and their operations in both the entire transportation system and in MaaS ecosystem
- Changes caused by deployment of MaaS



# Challenges: Technical

- Old/unintelligent infrastructure – how to incorporate this into MaaS physical and logical architecture
- If technology fails, how to manually perform MaaS functions
- Travelers without credit accounts
- Travelers without mobile device capable of functions needed to interact with MaaS applications - “information equity”
- Automation of functions – could alienate staff and customers
- Nature of existing ITS/technologies and ability to use or integrate these with new technologies
- Lack of technical guidance and information for agency staff
- Lack of ITS infrastructure, especially in rural areas

# USDOT's Mobility on Demand (MOD)

- Long term strategic vision for a multimodal, integrated and connected transportation system
- Concept which imagines ***mobility as a commodity and a service***
- Conceptual notions of MOD:
  - Promotes choice in personal mobility
  - Leverages emerging and existing technologies, and big data capabilities
  - Encourages multimodal connectivity and system interoperability
  - Promotes new business models that improve service quality

Source: Jamie Pfister, Federal Transit Administration, "FTA Mobility on Demand (MOD) Program," presentation at American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Public Transportation (SCOPT)/Multi-State Transit Technical Assistance Program (MTAP), Winter Meeting, December 3, 2015



# Guiding Principles of MOD Vision

- **System Integration** of existing MOD products and services; development of new will be considered
- **Partnership Driven** - evidence of commitment to support MOD both technically and institutionally
- **Innovative Business Model** where individually proven products can partner to collectively deliver better service to travelers
- **Equity of Service Delivery** - Demonstrate and promote unique role transit holds in providing equitable service for all potential travelers

# MOD Enablers





# MOD Focus Areas



# MOD Challenges and Opportunities

- First/Last Mile Solutions
- Paratransit/Demand Response Services
- Integrated Fare Payment
- Trip planning
- Open Data/Data Sharing
- Land Use and/or Service Planning
- Equity and accessibility
- Evolving definition of Public Transportation?
- Performance Metrics (e.g., Ridership)
- “The 3 Rs” – Rules, Requirements and Regulations

# MaaS in the U.S.: Joint Venture in Silicon Valley

- Reduce private auto usage
- “Mobility Aggregator” gathers all services into unified smartphone app with
  - Easy fare payment
  - One-stop billing
  - Integrated employer subsidies
- Dissolve boundaries between modes
- Provide more customer-centered experience while improving efficiency of entire transport system
- Aspire to accelerate software integration between mobility apps and employer programs

# Joint Venture Goals and Action Plan

- Goals:
  - Make it more convenient for anyone, anywhere, at any time (competitive option to driving alone)
  - Measurably increase mobility, convenience and productivity
  - Reduce stress, congestion and GHG emissions
  - Make mobility service software more interoperable and better integrated
  - Break down barriers that reduce user convenience
- Action Plan:
  - Pursue entrepreneurial, lean startup approach with series of pilots, technology accelerations and hackathons
  - Explore ways to provide faster, more reliable employee commutes
  - Maintain and expand regional MaaS partnership with selected cities, agencies and major employers

# Silicon Valley Context: auto-centric

Versus Finland's MaaS effort:

	Auto-centered Silicon Valley	Transit-centered Helsinki	Difference
SOV rate	76%	38%	1/2
Transit rate	3.3%	40%	12X
Bike/Walk	3.8%	18%	4X
Cars/capita	0.84	0.55	2/3
Parking cost/hr	Free	\$2.25	∞
Gas price/gal	\$3.50	\$8.00	2X
New car fees	10%	85%	8X
Pop per sq mi	5,000	45,000	9X
Avg Commute	13 mi	8 mi	1/2



“Silicon Valley is insane. We charged for parking in New York, so we should charge here.”

– VTA Genl Mgr Nuria Fernandez (ex NY MTA COO)

# Comprehensive Commute Trip Reduction

Enterprise CTR software + smartphone Mobility Aggregation

Employer pilots: Incentives and/or parking charge → shift mode

Gap filling (electric scooter/bike, Lyft Driver Destination, etc)

Pricing public policy: City Councils, SVLG/BAC 101/Caltrain, MTC, etc

Seamless public transit – cross county lines, fare structure


Infrastructure – HOV4 freeway lane? HOV4 El Camino lane?

Innovative business model /

6 way “win” for main stakeholders




# Enterprise CTR: Commute Benefits Integration


































Commute Tools  
powered by lum.

Me  
My Dashboard

 Jamie











HomeCommute OptionsResourcesShuttlesCommute Calendar

Today<>February 2015

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2 	3 	4 	5 	6 	7
8	9 	10 	11 	12 	13 	14
15	16 	17 	18 	19 	20 	21
22	23 	24 	25 	26 	27 	28 
1	2 	3 	4 	5 	6 	7
8	9 	10 	11 	12 	13 	14

Modes

Distance (one-way): 1.4 mi



Wednesday, March 18, 2015

No trips for this day.

Pay Period Summary: Mar 16 - Mar 29

CHARGE

BONUS

(\$3.00)

\$8.00

[Donate a percentage of your commute bonus](#)

## Automate calendar-filling

- Hard: SOV v. HOV v. bike
- “Well-solved in 2017.”

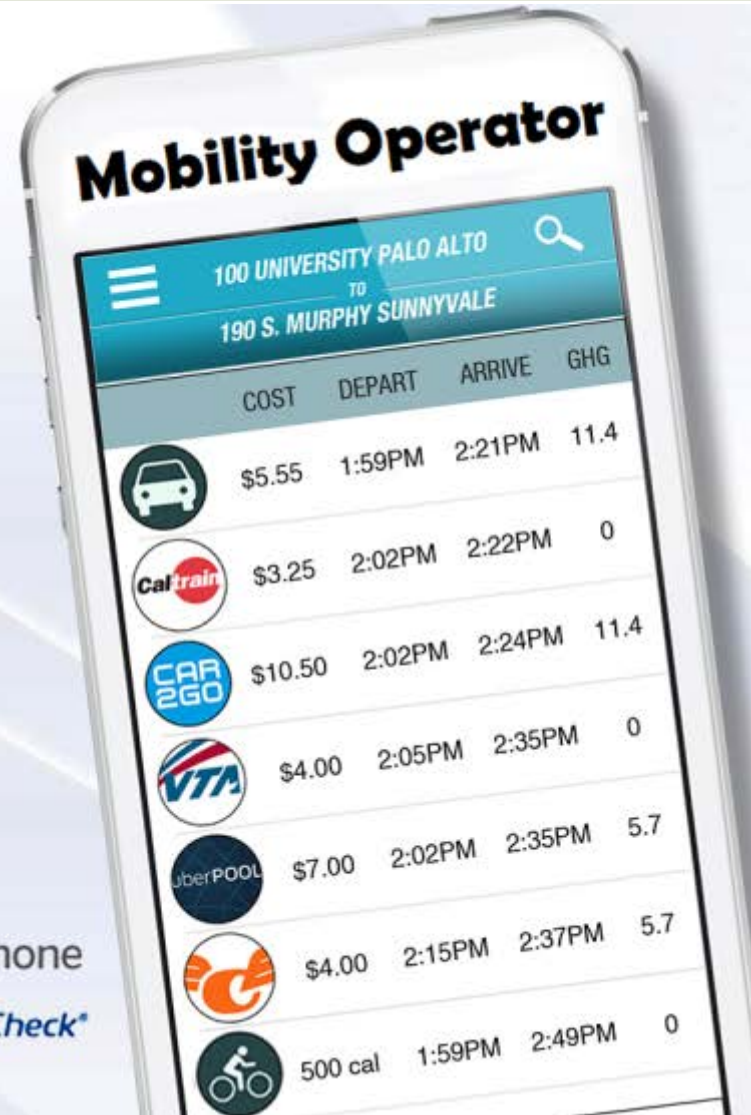


# Mobility Aggregation

RideScout, Moovit, Transit App, Urban Engines, Xerox (GoLA), etc

## One Seamless App

Multimodal trip planning.  
Customer-centered. Pay like Clipper.



# San Francisco Municipal Transportation Agency: Access Over Ownership

Traditional

I own and use  
my own  
transportation

Suburban  
Rural

Trending

I own my  
transportation  
and/or access  
shared mobility  
options

Urban Core

Near Future

I access a menu  
of mobility  
options to meet  
my needs

Urban Core  
Suburban  
Rural

Source: Timothy Papandreou, Director, Office of Innovation at San Francisco Municipal Transportation Agency (SFMTA), @tpap\_

Transportation Policy

Shifting of transportation norms

# Multiple modes, little or no integration; multiple payments, multiple bookings, etc.

Privately-Owned Vehicles



Public Transit, Rail, Bus, Ferry



Regional & Intercity

Services: Rail, High-Speed Rail, Air



Shared Fleet Vehicles



Employer Shuttles, Jitneys  
Commercial Deliveries



Taxi, Limousine & Transportation  
Network Companies



Source: Timothy Papandreou, Director, Office of Innovation at San Francisco Municipal Transportation Agency (SFMTA), @tpap\_



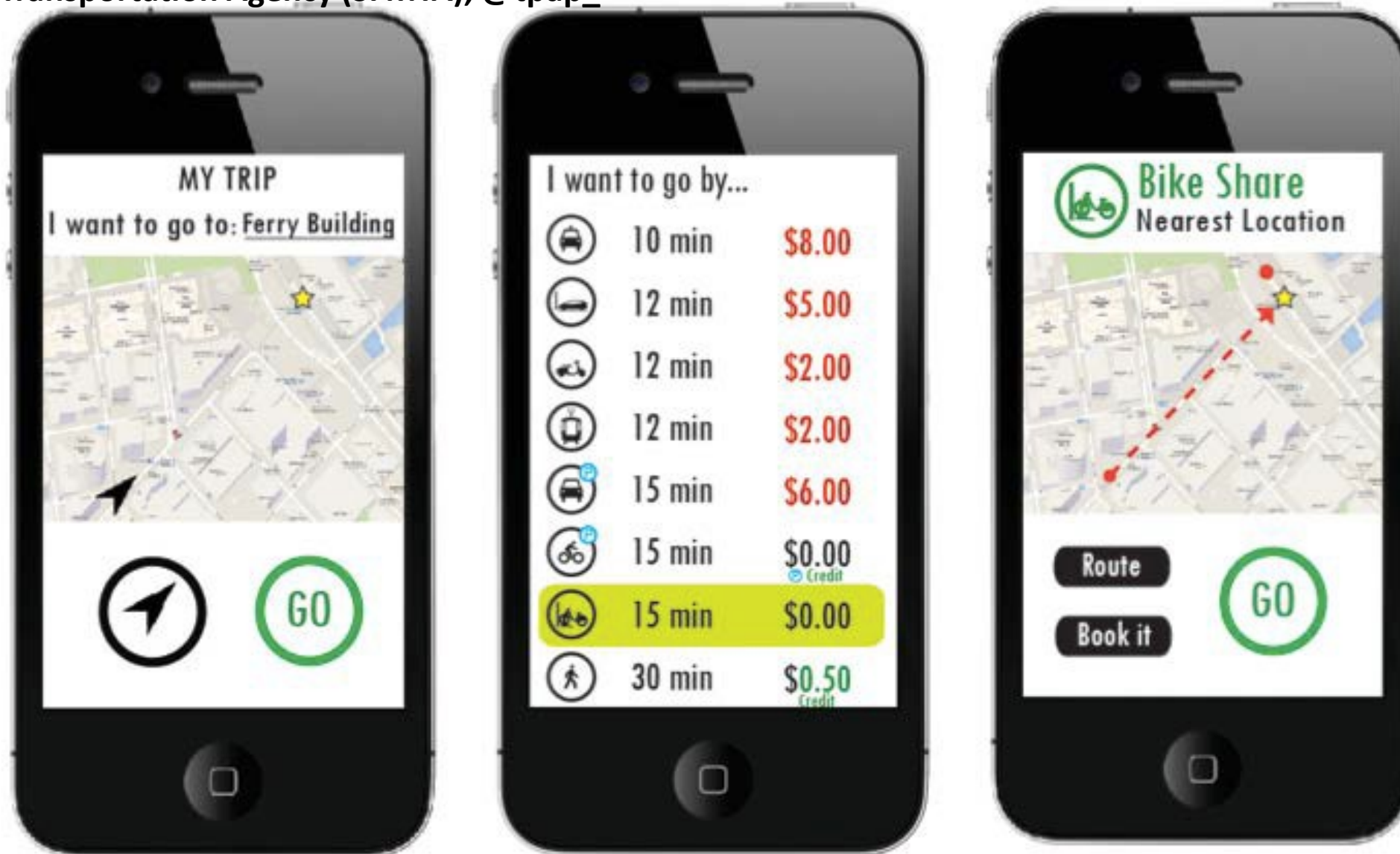


Source: Timothy Papandreou, Director, Office of Innovation at San Francisco Municipal Transportation Agency (SFMTA), @tpap\_





Source: Timothy Papandreou, Director, Office of Innovation at San Francisco Municipal Transportation Agency (SFMTA), @tpap\_



Mobility Minutes for a Mobility Menu

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A complete customer focused experience

1.0  
Public  
Operators &  
Information

1.2 Diversification  
Private Operators &  
Info providers

2.0 Consolidation of  
Providers, Operators &  
Data Aggregators

3.0 Mobility  
Minutes for  
local, regional,  
international  
travel

\$150 My City Plan  
1000 city minutes

100 Rideshare min  
100 Carshare min  
400 Transit min  
400 Bikeshare min  
Walking Credits  
Share Minutes

\$500 My Travel Plan  
300 Flying minutes  
700 City minutes

**Concept:  
Timothy  
Papandreou**

**Source: Timothy Papandreou, Director, Office of Innovation at San Francisco Municipal Transportation Agency (SFMTA), @tpap\_**

Is Mobility minutes the next big trend....



# References

- “A Field Guide to the Future of Mobility,” World Economic Forum, January 2016
- Lindsey Hallock and Jeff Inglis, “The Innovative Transportation Index: The Cities Where New Technologies and Tools Can Reduce Your Need to Own a Car,” February 2015
- TRB Special Report 319, “Between Public and Private Mobility Examining the Rise of Technology-Enabled Transportation Services,” Committee for Review of Innovative Urban Mobility Services, 2015



# Thank You!

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