USDOT Mobility on Demand Program: Webinar 4 – Incentive Based Approaches

Tuesday, January 30, 2018
Today’s Agenda

- Purpose of this Webinar
  - To present Mobility on Demand and examples of innovative approaches and technologies

- Webinar Content
  - Incentive based approaches

- Webinar Protocol
  - Please mute your phone during the entire webinar
  - You are welcome to ask questions via chatbox at the Q&A Section
  - Questions will be answered in the order in which they were received
Mobility on Demand Overview

Robert Sheehan, PE, PTOE
Program Manager, Multimodal ITS
ITS Joint Program Office
U.S. Department of Transportation
Trends/Setting the Stage
Societal Trends Driving MOD

• Redefining Longevity
  • By 2045, the number of Americans over age 65 will increase by 77%

• Population Growth & Urbanization
  • In 30 years, our population is expected to grow by about 70 million
Technological Trends Driving MOD

• Big Data & Analytics
  • Transportation increasingly relying on data to drive decisions and to enable innovative travel options

• Real-Time Travelers
  • 72% of Americans own a smartphone, with access to up-to-the minute traveler information

Image Source: Thinkstock/USDOT
Mobility & Environmental Trends Driving MOD

- **Increasing Congestion**
  - On average, Americans spend over 40 hours stuck in traffic each year, costing $121 billion

- **Mobility Choices**
  - There is growing popularity of shared mobility and shared modes, such as bikesharing, carsharing, and ridesourcing

Image Source: Thinkstock/USDOT
Public or Private?
Public or Private?

Image Source: Thinkstock/USDOT
## Rebranding as Mobility Companies

Interest in MOD by the automotive sector has taken a variety of forms including acquisitions, investments, partnerships, and internal development of technologies and services that were previously not on the radar of automotive OEMs.

<table>
<thead>
<tr>
<th>Automotive Company</th>
<th>Activity</th>
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| **Ford**           | Acquisitions: Chariot (microtransit)  
                     Investments: Lyft (ridesourcing/TNC)  
                     Internal Developments: Ford Smart Mobility LLC; a Ford subsidiary working to design and invest in emerging mobility services |
| **General Motors** | Acquisitions: Sidecar (ridesourcing/TNC)  
                     Investments: Lyft (ridesourcing/TNC)  
                     Partnerships: Lyft; leases electric Bolt cars to Lyft drivers  
                     Internal Developments: Maven (carsharing) |
| **Fiat Chrysler**   | Partnerships: Google/Waymo (shared automated vehicles); provides Chrysler vans to Waymo as test vehicles |
| **Daimler**        | Acquisitions: car2go (one-way carsharing), Moovel (multimodal trip payment), Hailo (e-Hail taxi app)  
                     Partnerships: Matternet (drones) |
| **Volvo**          | Partnerships: Uber (ridesourcing/TNC); joint venture to develop fully autonomous vehicles  
                     Partnership: Volvo with its new digital key app paired with Urb-it, a shopping and delivery startup, to deliver goods. |
| **Toyota**         | Investments: Uber (ridesourcing/TNC)  
                     Partnerships: Uber; lease vehicles to Uber drivers |
Whether it is a startup (e.g., Instacart, Uber Eats, Postmates, Doordash), an Internet-based retailer (e.g., Amazon), or a supply chain and logistics firm, advancements in courier services (both technologies and service models) are transforming how consumers access goods and services. FedEx, UPS, and DHL are all developing faster delivery services using automation and robotics for both ground-based and aerial vehicles. Innovative technologies and business models to deliver goods and services have the potential for MOD to reimagine goods movement.

MOD Activity in the Goods Movement and Logistics Sector

<table>
<thead>
<tr>
<th>Supply Chain Company</th>
<th>Activity</th>
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<tbody>
<tr>
<td>FedEx</td>
<td>Internal Developments: Developing AV delivery vans and robots</td>
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<td></td>
<td>Partnerships: Volvo, Freightliner, and Daimler; developing hybrid AV van and drone delivery system</td>
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<tr>
<td>UPS</td>
<td>Internal Developments: Piloting a drone system that launches from the top of a truck</td>
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<tr>
<td>DHL</td>
<td>Internal Developments: Pilot program testing automated parcel station and aerial delivery drones</td>
</tr>
<tr>
<td>Amazon</td>
<td>Internal Developments: Amazon Prime Air drone delivery patent filed for the U.S.</td>
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USDOT MOD Program
What is Mobility on Demand (MOD)?

An integrated and connected multi-modal network of safe, affordable, and reliable transportation options that are available to all.

- User-focused options to improve personal mobility and access to more destinations
- Promotes choice in personal mobility & optimizes the transportation system through Intelligent Transportation Systems
- Advances connected vehicles & automation applications
- Utilizes emerging technologies & data exchange to enable personal mobility
- Encourages multimodal connectivity & system interoperability
Guiding Principles of MOD

- **Traveler Centric/Consumer Driven**
  - MOD is defined by quality and carefree personal mobility choice for individuals

- **Data Connected/Platform Independent**
  - MOD (the end state) drives the technology.
  - Technology doesn’t change the MOD vision, it provides the capability to realize in an interoperable fashion

- **Mode Agnostic/Multimodal**
  - MOD embraces all modes and resources to support personal mobility choice in an integrated, connected and multimodal manner
User-centric Travel Options

- **Carsharing**: Provides members with access to a car for short-term use.
- **Bikesharing**: Provides members with access to a bike for short-term use.
- **Ridesharing**: Carpooling, vanpooling, and real-time ridesharing services.
- **TNCs and Taxis**: Transportation Network Companies (TNCs) and Taxi Services.
- **Car Rental**: Conventional Rental Car Services.
- **Public Transportation**: Public Bus, Light Rail, Heavy Rail, and other Public Transport Services.
- **Integrated Payment**: Allows users to pay for services using a smartphone app.
- **Incentives**: Rewards and incentivizes users for good travel choices.
- **Smart Parking**: Allows users to reserve and pay for parking using a mobile app.
- **Trip Planning & Navigation Services**: Real-Time Travel & Operations Data: Includes public agency and private sector traffic data.
Holistic View and Enablers

- Multimodal Transportation & Mobility Management
- Operational Responses
- Marketplace Demand
- User Objectives
  - Delivery Request
  - Time of ride request
  - Origin-destination request
  - Goods
  - Travelers
- Market Supply
  - TSMO
  - System Availability
  - Public Transit
  - Non-public transit
  - Shared Use
  - Goods Service Delivery
  - Dynamic Capacity
- User Needs/preferences
  - Occupancy/vehicle type
  - User Needs/preferences
Not just city center
MOD Research Areas

- Mobile Devices
- Energy and Environmental Impacts
- Travel Behavior Impacts
- Economics Impacts
- Policy and Regulations
- Transportation Planning
- Multimodal Mobility Management
- Data Management, Sharing, and Standardization
- Social Equity and Environmental Justice
- Future of Mobility
- Transportation Planning
Traveler Behavior

- Applications have a strong influence on the travel choices people make.
- Influence is economic and social psychological in nature.
- Smartphone apps often deploy psychological, cognitive, emotional, and social mechanisms to influence our economic and non-economic decision making.
- Transportation apps are no exception.
Types of Applications

- Transportation Applications
  - Mobility Apps
  - Vehicle Connectivity Apps
  - Smart Parking Apps
  - Courier Network Services Apps
- Non-transportation Applications
  - Health Apps
  - Environment/Energy Consumption Apps
  - Insurance Apps
Scoop’s Carpool to BART Program

MOD Integrated Platforms and Services Webinar
January 2018
What is Scoop?

Scoop is the largest carpooling app in the country. It’s the convenient and enjoyable way to carpool with coworkers and neighbors.
Parking at BART stations is a challenge

- 48,000+ parking spaces at capacity
- 38,000+ people on waitlist for monthly permits
- Most facilities fill by 7:45 a.m., governing when people arrive
  - Inconvenient for riders
  - Bad for peak-hour commute capacity
- Inefficient use of parking spaces
  - Mostly filled with SOV
  - Little turnover
The solution: Scoop

Convenient and enjoyable carpooling

Dramatically improve your commute

Schedule with ease

Trusted connections

Smart routes
Program goals

Expand carpool program at all relevant BART stations

Address first/last mile access in affordable way

Address core capacity restraints @ key times

Reduce VMT, highway congestion, & GHG emissions
Carpool to BART program overview

1. BART stations are pre-populated destinations.
2. Commuters request their trips as Rider or Driver.
3. Carpoolers are matched. Placard for easy parking.
Outcomes to date – and we’re just getting started

Over 1,000 Carpoolers on board

1,000+ trips/week to date, saving hundreds of parking spots

7 stations open with more to come
Expansion and next steps

Piloted similar programs with Foster City, San Mateo, and South San Francisco

Led to historic $1M partnership with the City/County Association of Governments of San Mateo

In active discussions to expand across all Bay Area counties at scale
Thank you

Robert Sadow
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Scoop Technologies, Inc.

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User Behavioral Economics, Travel Choices, and Mobility on Demand: A Framework for Success

Yi-Chang Chiu, PhD
Metropia, Inc.
The University of Arizona
Metropia optimizes transportation systems by using behavioral economics to influence drivers to shift departure times, routes and modes.
Ask doing harder tasks

High Motivation (incentive) Needed

Low Motivation (incentive) Needed

Easy to Do

Hard to Do

Increase motivation
Heterogeneity
Single product results in only mixed success
Product Design Questions

• How the product can reduce the level of motivation needed
• How the product will make task easier
• How the product accommodates tasks with varying degree of difficulty such as when and how
- Leaving car in garage
- Not buying a car
- Use all possible modes (MOD/MaaS)

- Take a bike
- Carpooling/UberPool

- Adjust departure time
- Adjust route

High Motivation (incentive) Needed

Low Motivation (incentive) Needed

Hard to Do

Easy to Do
Task Level 1

• Adjust departure time
• Adjust route
• Take taxi/e-hailing
Departure Time and Route

Reserve

Validate
Incentives and Rewards

- **Ivan Lives**: Exclusive song download... 100 Points
- **Christian Ward**: Exclusive song download... 100 Points
- **American Forests**: Plant a Tree Donation 300 Points
- **Starbucks**: $5 Gift Card 1000 Points

**Christian Ward Exclusive song download**
Austin's own Christian Ward, member of one of the fastest rising groups on the Austin music scene - the Lost Pines, wrote the music and lyrics for "Metropia" to inspire Central Texans to make better commuting decisions using the Metropia App. This song is now available exclusively through Metropia. For more info... 1000 Points

**Fed by Threads $5 Gift Card**
Fed by Threads is the American-made sustainable clothing brand that feeds 12 people in need for every piece sold. For more info... 1000 Points
Task Level 2

• Social Carpool
• UberPool/Lyft Line
Social Carpooling with DUO (Drive up Occupancy with Random Rewards)
UberPool Integration and Random Incentives
Task Level 3

• Mobility on Demand
• Mobility as a Service
Pima County MOD Project

- Fixed Route Public Transit
- Carpooling (UberPooling)
- Transit-Hailing
- eBike
The Rationale behind Mobility of Demand

• No single alternative mode alone can complete with drive-alone
• The only winning chance is an integrated and behavior-focused service that exhibits a high level of accessibility, convenience, and trustworthiness.
• Before a complete MOD service system is build, how to ramp up the behavior change?
Early Behavioral Insights

Effects of incentives
On Departure Time
On Mode Change
Effects of Incentive on Departure Time
El Paso – Point Profile vs Behavior

- Goal: to understand the impact of different point profiles
- Baseline case: flat Point Cap Profile (PCP)
- Earned point = PCP/TTI
El Paso – Point Profile vs Behavior

- Test case: time-varying Point Cap Profile
- Higher points assigned to the peak period shoulder; lower points to peak hours
- No advance notification, passive observation
El Paso – Point Profile vs Behavior

• Less departure in peak hours and more in shoulders
• Deferred departure is more prominent than early departure
Austin Don’t Rush Day

Biggest impact was observed among users shifting departure times, particularly in PM peak when they have more flexibility to do so.
AUSTIN DON’T RUSH—using Incentives to Encourage Drivers to Flex Their Commutes

Comparison of Moving Average over 3 Periods

Travel Time Index (TT/FFTT)

An earlier AM peak on 5/11 compared to 5/4.

5/4 AM Peak: 1.40
5/11 AM Peak: 1.36
(10% reduction in delay)
5/5 AM Peak: 1.375
5/12 AM Peak: 1.35
(6.7% reduction in delay)

5/4 PM Peak: 1.49
5/11 PM Peak: 1.46
(6% reduction in delay)
5/5 PM Peak: 1.55
5/12 PM Peak: 1.56
(2% increase in delay)
Diurnal Trip Distribution by Quarter (Weekday Only, 2016)

[Graph showing diurnal trip distribution by quarter for January, April, July, and October.]
Effects of Incentive on Carpooling
Free Flow Fridays (January 2017)

Observed elevated trips on Fridays in January and the trend was sustained following the campaign.
Austin DUO Social Carpooling Trips

METROPIA DUO SOCIAL CARPOOL TRIPS
January 3, 2016 – February 12, 2017

Free Flow Fridays Campaign
Point Distribution Restructure
Austin Don’t Rush Campaign

NUMBER OF TRIPS

Jan 2016
Apr 2016
Jul 2016
Oct 2016
Jan 2017

DUO Launch
Testing Different Incentive Strategies
Conclusions

• An enhanced MOD service needs a coupled behavior change strategy and framework.
• Incentive + various persuasion techniques show promises.
• Incentive as a behavior trigger, not a retention strategy. Retention should come from service’s value/utility.