

Active Transportation And Demand Management



U.S. Department of Transportation
Federal Highway Administration

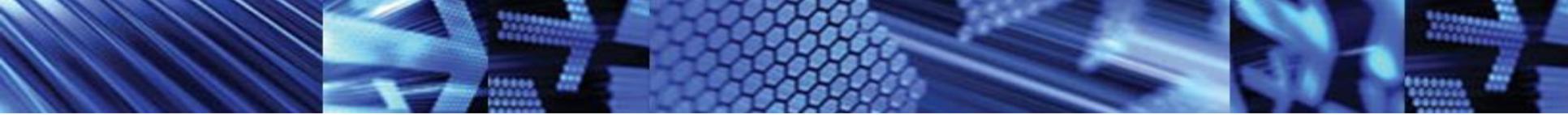
ACTIVE TRANSPORTATION AND DEMAND MANAGEMENT WEBINAR SERIES

Webinar #1: Active Demand Management (Part I)

October 22, 2014



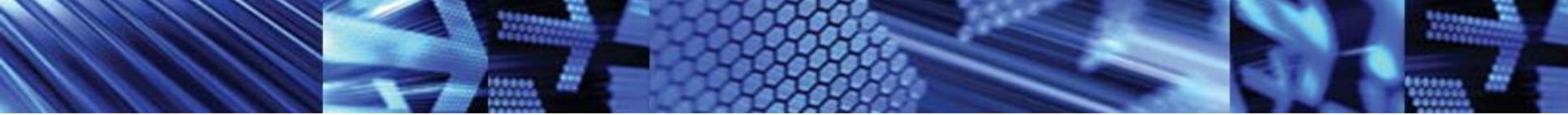
Federal Highway Administration
Office of Operations – Transportation Management



Agenda

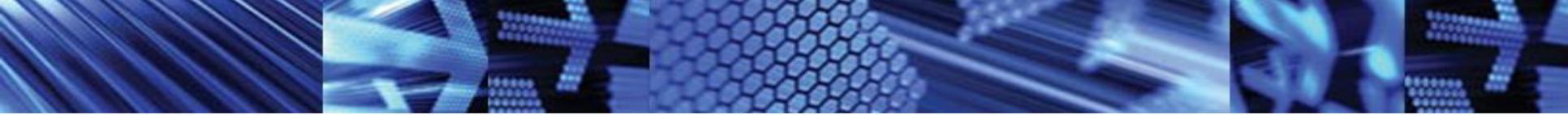
- Housekeeping
- Introduction
- Overview of Active Transportation and Demand Management (ATDM)
- Transitioning from TDM to ADM
- Shared-Use Mobility
- Capri: Congestion and Parking Relief Incentives





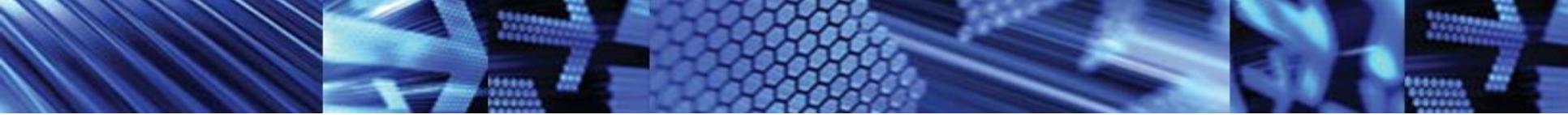
HOUSEKEEPING





INTRODUCTION



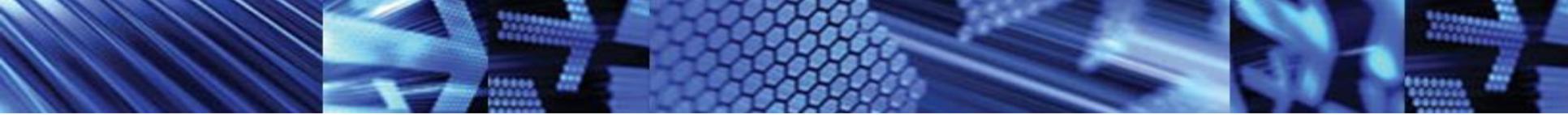


Purpose of Today's Webinar

Provide an overview of Active Demand Management (ADM) along with associated strategies and deployments. Topics include:

- Connection between ADM and the larger ATDM concept
- Transitioning traditional demand management thinking towards ADM strategies
- Role of shared-use mobility in ADM
- Incentives for reducing congestion and parking (Capri)





ATDM Webinar Series

- This is the first in a series of ATDM webinars
- Topics based on **what matters most to you!**
- Upcoming ATDM webinars:
 - Active Traffic Management Feasibility Screening (Nov 2014)
 - Ramp Metering (Dec 2014)
 - Traffic Management Capability Maturity Framework (Jan 2015)
 - ADM Part II (Feb 2015)



*Improving the
Performance of
the Transportation
Industry Through
Training*



Today's Speakers



Jim Hunt

*Transportation Specialist, FHWA
Office of Operations Congestion
Management and Pricing Team*



Eric Schreffler

*Independent Transportation
Consultant based out of San
Diego, CA*



Susan Shaheen, PhD

*Director, Innovative Mobility
Research; Co-Director,
Transportation Sustainability
Research Center (TSRC)
University of California, Berkeley*



Balaji Prabhakar, PhD

*Professor, Electrical Engineering
and Computer Science, Stanford
University*





OVERVIEW OF ATDM



Genesis of the ATDM Program



International Scan on Demand Mgmt



Managing Demand Workshops



Emerging Active Demand Management practices



International Scans on ATM, Managed Lanes



Early adopters in Seattle, Minnesota



ICM



Spot-specific innovations like VSL for weather



UPA/CRD Demonstrations

Seattle Peer Exchange



- Stakeholder feedback and needs
- ATDM Program formulation

ATDM Program Initiation and Definition



Key points:

- Break silos
- Encourage an *operating philosophy* not just strategy
- Focus on both supply and demand

What is Active Management?

The fundamental concept of taking a dynamic approach to a performance based process



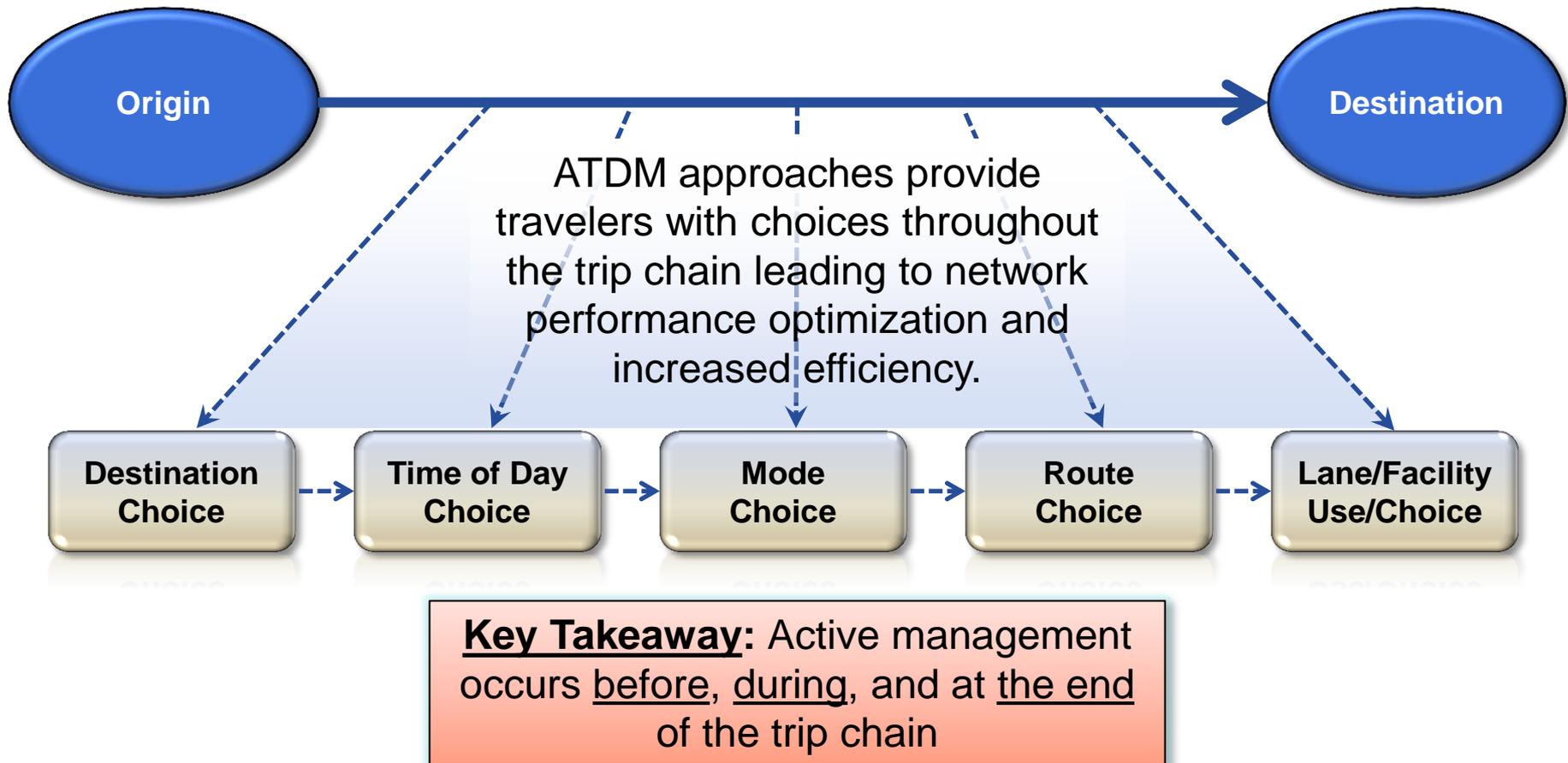


Goal of ATDM Concept

- Attain the capability to monitor, control, and influence travel, traffic, and facility demand of the entire transportation system and over a traveler's entire trip chain.



ATDM Throughout the Trip Chain



What does ATDM include?



Active Demand Management (ADM): A suite of strategies intended to reduce or redistribute travel demand to alternate modes or routes. Incentivizes drivers by providing rewards for travelling during off peak hours with less traffic congestion.



Active Traffic Management (ATM): A suite of strategies that actively manage traffic on a facility.



Active Parking Management (APM): A suite of strategies designed to affect the demand on parking capacity.

Examples of ATDM Implementation Strategies

| | |
|------------|--|
| ADM | Comparative multi-modal travel times, dynamic ride-sharing, pricing, and incentive approaches. |
| ATM | Variable speed limits, dynamic shoulder use, queue warning, lane control. |
| APM | Parking pricing, real-time parking availability and reservation systems. |



Examples of Active Management Strategies

Active Demand Management



Active Traffic Management



Active Parking Management



Consider this...

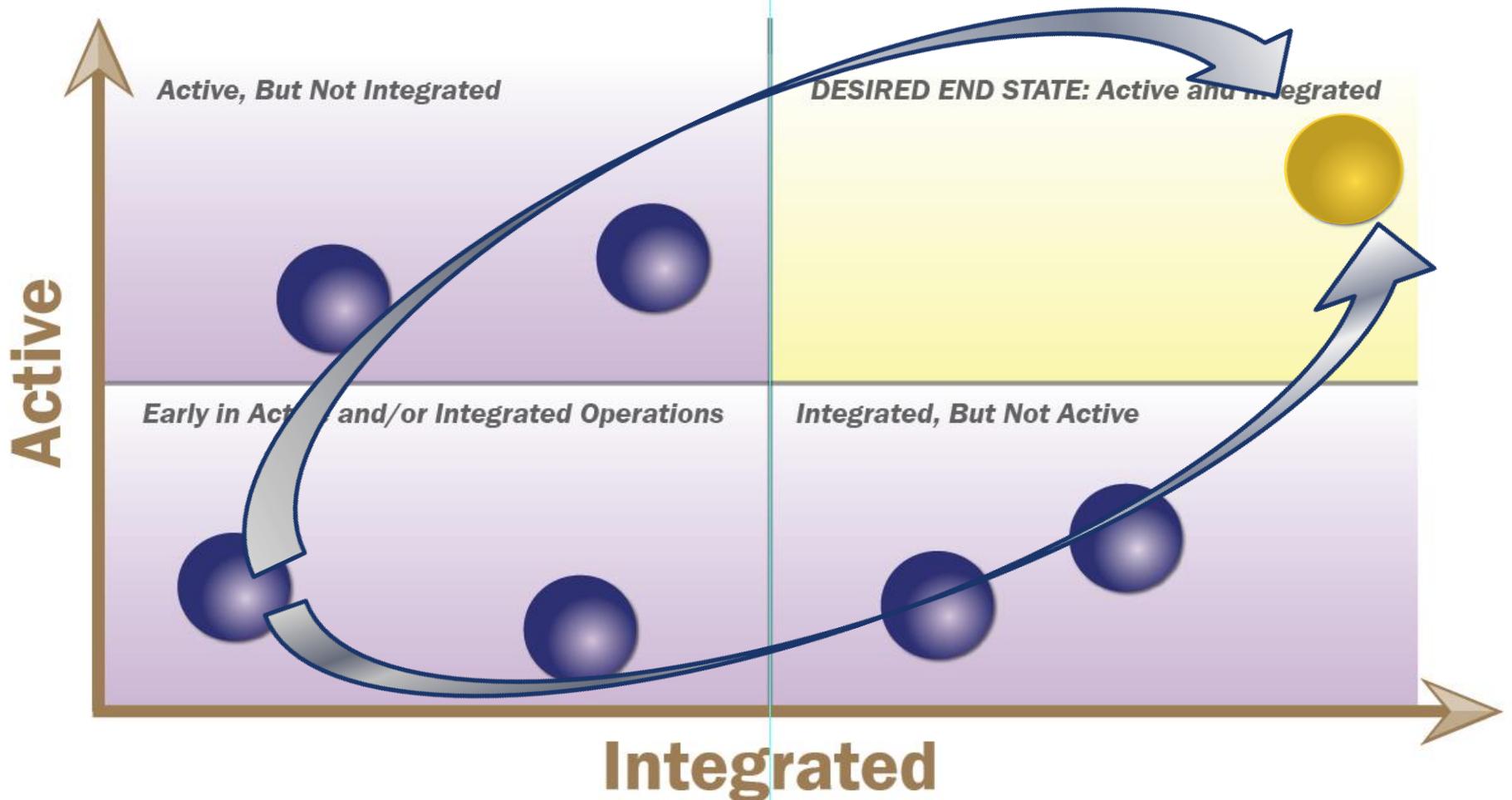
- Technology can only do so much to manage supply
- Agencies must also manage demand
 - Marketing
 - Incentives

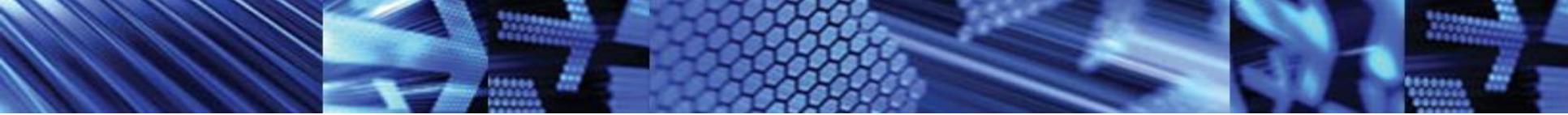
Example: “Carmageddon”



- Full highway closure for full weekend resulted in major impact.
- Massive publicity campaign was successful and traffic volumes were down overall.

The ACTIVE and INTEGRATED Continuum

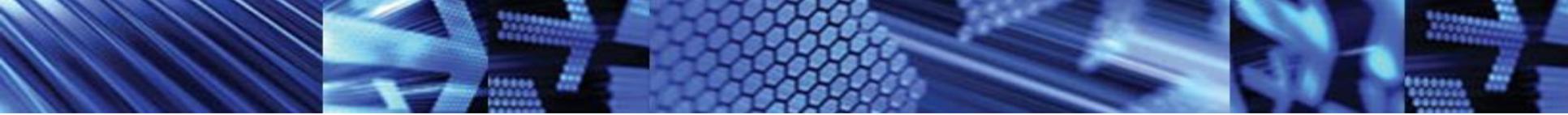




FHWA's ATDM Program

- Increase awareness and understanding of ATDM.
- Develop, test, and evaluate strategies.
- Provide tools and methods for performance analyses.
- Provide tools and methods for benefit/cost analyses.
- Train agencies to deploy effective ATDM systems.





Summary

- ATDM represents next evolutionary step in TSM&O in operations.
- Based on real time and predicted information and dynamic actions.
- Performance driven.
- Demand management much more prominent than historical ITS and Operations.
- Several National program activities underway.

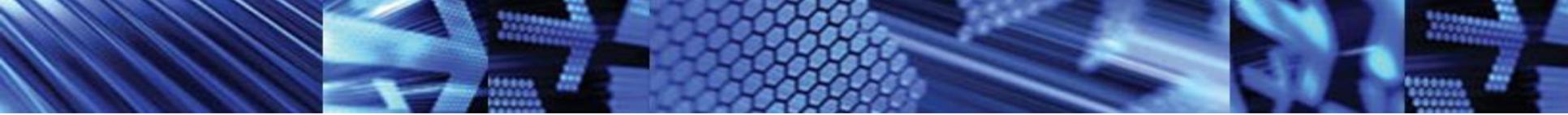




Eric Schreffler

TRANSITIONING FROM TRADITIONAL DEMAND MANAGEMENT TO ADM





Topics

- What is Active Demand Management?
- What are some ADM strategies?
- What are some examples of ADM?
- How does it differ from TDM?
- What is needed to transition TDM to ADM?
- What is role of share use mobility in ADM?



Active Demand Management - Definition

Complement to:

- Active Traffic Management
- Active Parking Management



Source: fastrak511sd.com

FHWA:

Active Demand Management (ADM) uses information and technology to dynamically manage demand, which could include *redistributing* travel to less congested times of day or routes, or *reducing* overall vehicle trips by influencing a mode choice. Focus is on system performance.



Active Demand Management - Strategies

- Dynamically Managed Lanes (occupancy, price, time, etc.)
- Shared use mobility (e.g., carshare, bikeshare)
- Dynamic ridesharing (carpooling and vanpooling)
- Dynamic routing
- Dynamic transit capacity assignment
- On-demand transit, dynamic fare reduction
- Transit connection protection
- Predictive traveler information



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Ted Mitchell
Rating: ★★★★★ (3)
Credit: €9.80

Ride? **Take a Drive**

Information - all time

| | |
|------------------------|---------|
| No. of rides taken: | 1 |
| No. of rides given: | 4 |
| Distance Saved: | 4 km |
| \$ Saved: | €3.75 |
| CO ₂ Saved: | 0.84 kg |



Dynamic Ridesharing

Source for dynamic
carpool matching
information after
Hurricane Sandy:

Craigslist

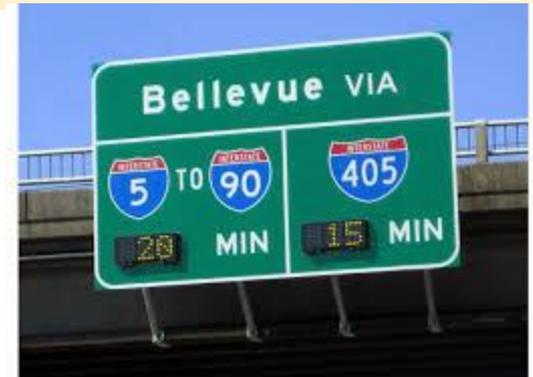


Source: streetsblog.org



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- Predictive traveler information



Real-time Transit Information

Nextbus



Use our Next Bus ad on your website

Source: streetsblog.org



Active Demand Management - Strategies

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- Transit connection protection
- **Predictive traveler information**

The image shows a screenshot of the ClearFlow application interface. The main window is titled "ClearFlow" and contains the following elements:

- Start:** 1 Microsoft Way, Redmond, Washington, United States
- Destination:** 100 Mercer St, Seattle, Washington, United States
- View [current traffic](#)**
- Options:**
 - Commute lane

A "Departing:" dropdown menu is open, showing the following options:

- Now
- In 15 minutes
- In 30 minutes** (highlighted)
- In 45 minutes
- Select later time or day

Predictive Travel Times

The screenshot displays the 511 SF Bay website interface. At the top, there are navigation tabs for TRAFFIC, RIDESHARE, BICYCLING, and PARKING. A '511 SF Bay' logo is on the left, and 'MY 511 Login | Register' is on the right. Below the navigation is a 'Traffic Home' section with links to 'Latest News & Traffic Info', 'Driver Resources', 'Smart Driving', 'FeeTrak® and Tolls', and 'About 511 Traffic'. A 'BREAKING NEWS' banner highlights an accident on the Bay Bridge. The main content area is titled 'Trip Results: Foster City to San Francisco - Monday 7:15 AM'. It features a map of the San Francisco Bay Area with a highlighted route from Foster City to San Francisco. The route is color-coded by traffic conditions: green for clear, yellow for moderate, and red for heavy. A 'PREDICTED Traffic' button is visible on the map. To the left of the map, there is a '511 Driving Times' section with a form to input trip details. The form shows a trip from Foster City to San Francisco on Monday at 7:15 AM. Below the form is a table of route options:

| Route | Typical | Miles |
|-------|---------|-------|
| 1 | 29 min. | 29.8 |
| 2 | 33 min. | 25.7 |
| 3 | 37 min. | 28.6 |
| 4 | 38 min. | 30.4 |

Below the table, there is a 'Route 1' section with a table of typical speeds for different road segments:

| Route 1 | Typical |
|----------------------|---------|
| CA-92 W | 55 mph |
| US-101 N | 65 mph |
| I-205 N | 65 mph |
| I-205 N-King St Ramp | 55 mph |

A 'Please Note' section states: 'Predictions are based on historical driving times. Drivers should check current conditions before beginning their trip.'

At the bottom of the page, there are social media icons for Facebook, Twitter, and YouTube, and a 'More' button. The footer contains the text 'In This Section', '511.org', '511 Tools', 'Languages', 'About This Site', and social media icons for Facebook, Twitter, and YouTube.



Traditional TDM vs. ADM

| Traditional TDM | Active Demand Management |
|---|---|
| Static and responsive | Dynamic |
| Requires user to “apply” | Uses real-time info, pushed to users |
| Matching was “batched” | Instant matching |
| Influenced thru information | Influenced by price and facility use policies |
| Implemented through employers | Works directly with travelers |
| Objective was mode shift | Also route, time and location shift |
| Sought permanent shift | Also elicits temporary shift |
| Vehicles owned by users – “sharing rides” | Vehicles could be owned by third-party |
| HOV lane offered time incentive | Financial incentives → gamification |
| Focus was trip and VMT reduction | Focus is system performance |



TDM Already Moving Toward ADM

- Instant ridematching
- Dynamic ridematching
- Dynamic vanpooling
- Pushing real-time info
- TDM integrated into 511
- Real-time transit info
- **Gamification: f5t4**
- Comparative travel times



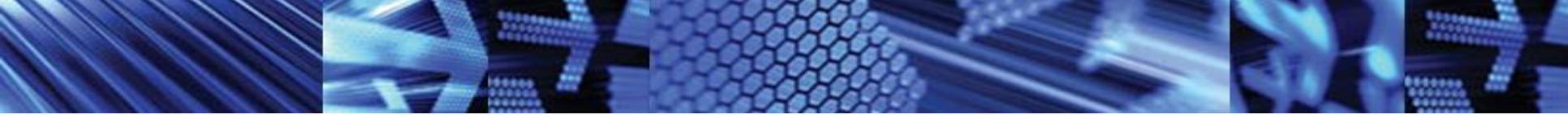
<http://f5t4.co.uk/game>



TDM Already Moving Toward ADM

- Instant ridematching
- Dynamic ridematching
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- TDM integrated into 511
- Real-time transit info
- Gamification
- **Comparative travel times**





Making TDM More “Dynamic”

Breaking Down Perceptual Barriers

- TDM community needs to not be afraid of new mobility options and “organic” development of technology
- Traffic management community needs to acknowledge that TDM is already highly dependent on information and technology
- Information technology already exists and is in use in TDM
- Need to include all stakeholders: Traffic Managers (TMCs), TDM Program Managers, Transit Operators, Shared Use Mobility Companies, Employers/Developers, Regional and Local Planners, Regulators, Regional and Local Planners

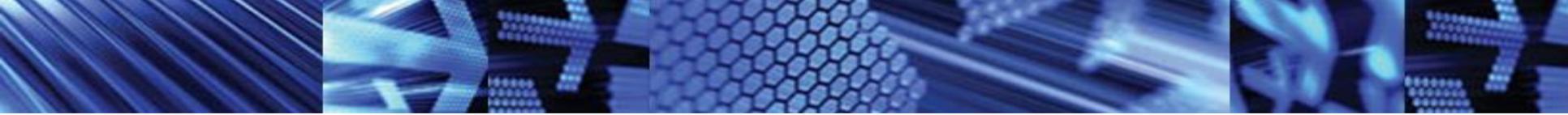


Role of Share Use Mobility

- Often seen as “first/last” mile option
- Needs to be integrated into family of options
- Integrate into travel planners
- Could be incentive (e.g., KPBS vehicle donation)



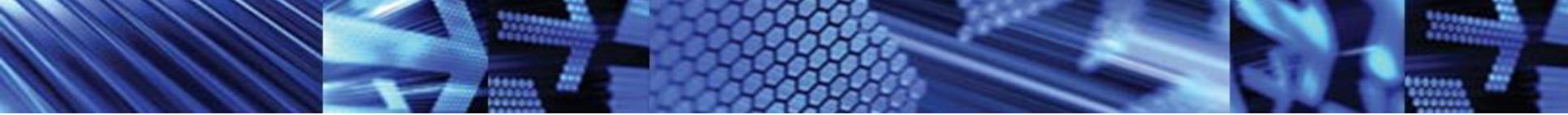
Source: houstontomorrow.org



Dr. Susan Shaheen

SHARED-USE MOBILITY





Overview

- Defining shared-use mobility
- Behavioral impacts
- Increased travel choices: multi-modal integration
- Shared-use mobility summit outcomes





Definitions & Impacts



Shared-use mobility: Mobility services that are shared among users including:



Traditional public transportation services, such as buses and trains;



Vanpools, carpools, shuttles, on-demand ride services/TNCs;

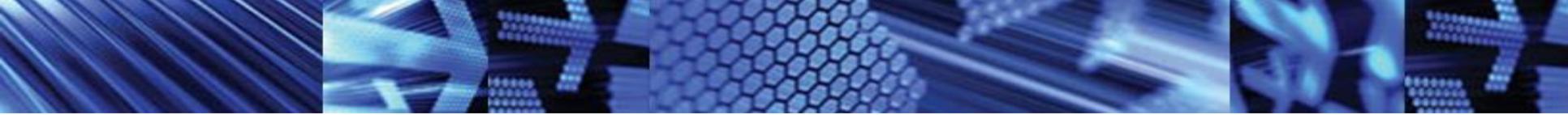


Carsharing, bikesharing, scooter sharing in all its forms; and



Flexible goods movement

Can be b2c and p2p



Carpooling:

Grouping of travelers into a privately owned vehicle, typically for commuting



Vanpooling:

Commuters traveling to/from a job center sharing a ride in a van



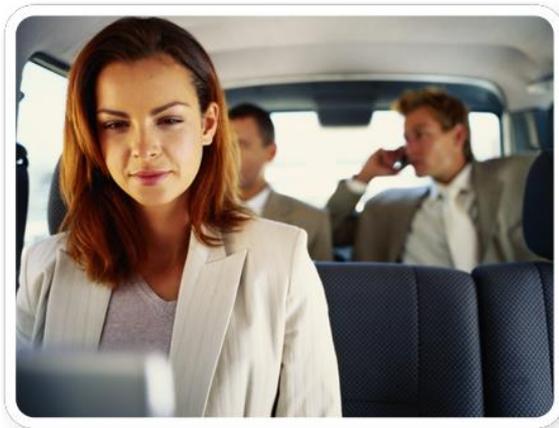
Real-time ridesharing services:

Match drivers and passengers, based on destination, through app before the trip starts



Ridesharing in North America: A Snapshot (July 2011)

- 612 carpooling services
- 153 vanpooling services
- 127 services offer both carpooling & vanpooling
- Includes both online and off-line programs



Chan and Shaheen, 2011



Roundtrip Carsharing:

A fleet of autos used for round trips that require users to pay by hour or mile.



Peer-to-Peer Carsharing:

Shared use of private vehicle typically managed by third party



One-Way Carsharing:

A fleet of autos used for point-to-point trips, facilitated by parking agreements



Fractional Ownership Carsharing:

Individuals sublease or subscribe to a vehicle owned by a third party



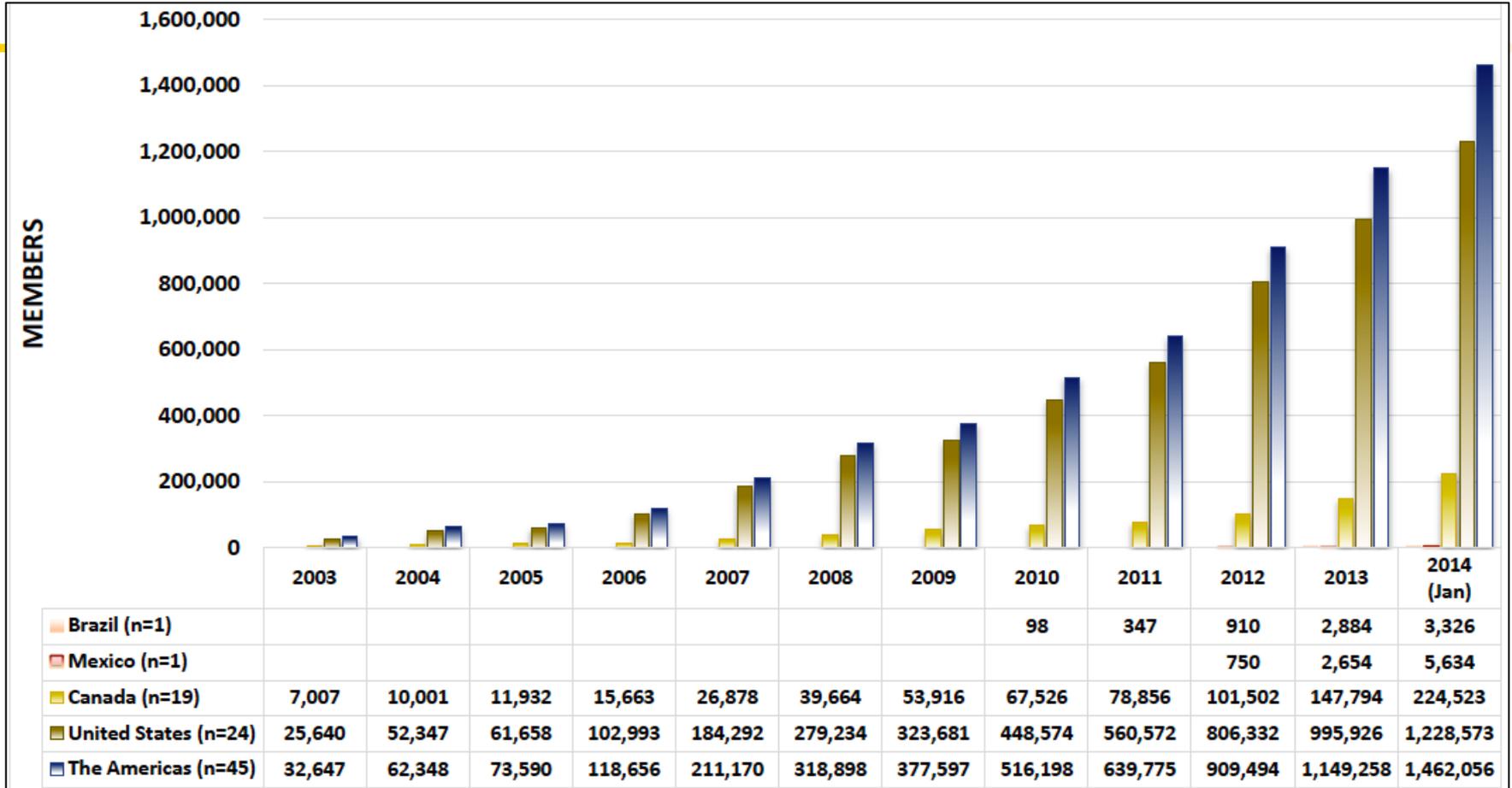


Scooter Sharing:

An operator-owned fleet of motorized scooters made available to users by the hour or minute



Carsharing Member Growth Americas: January 2014

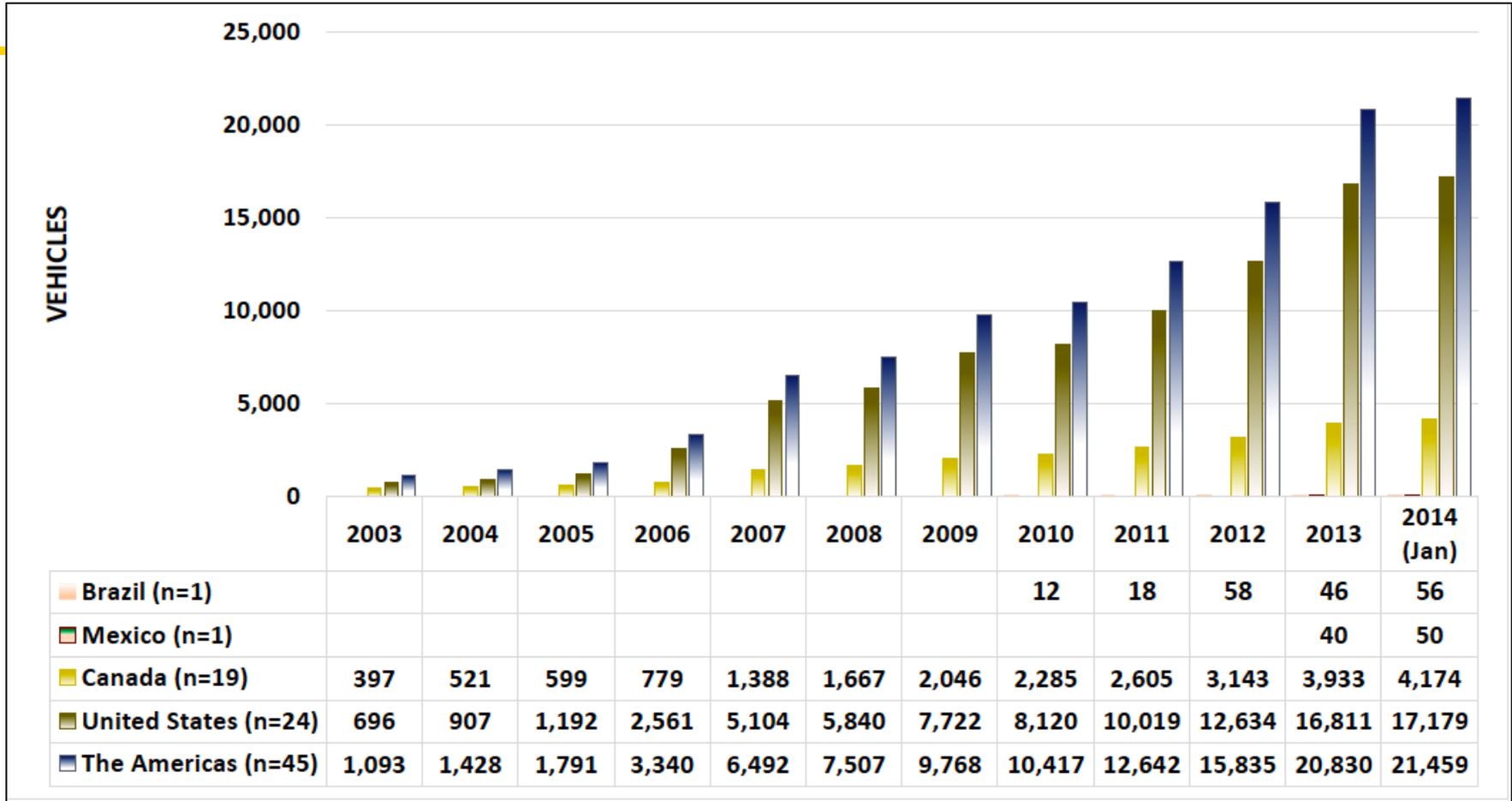


*Numbers include station-based roundtrip and one-way carsharing; do not include p2p carsharing.

Data depicted for July of each year, except for Jan. 2014



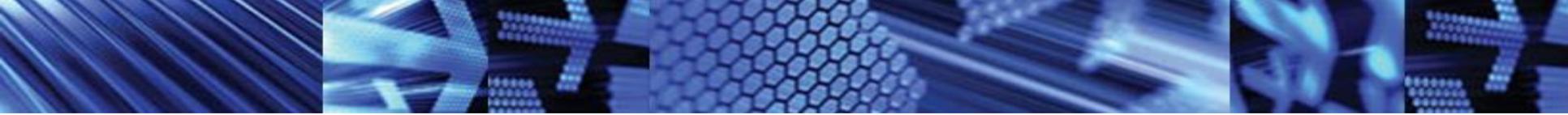
Carsharing Vehicle Growth Americas: January 2014



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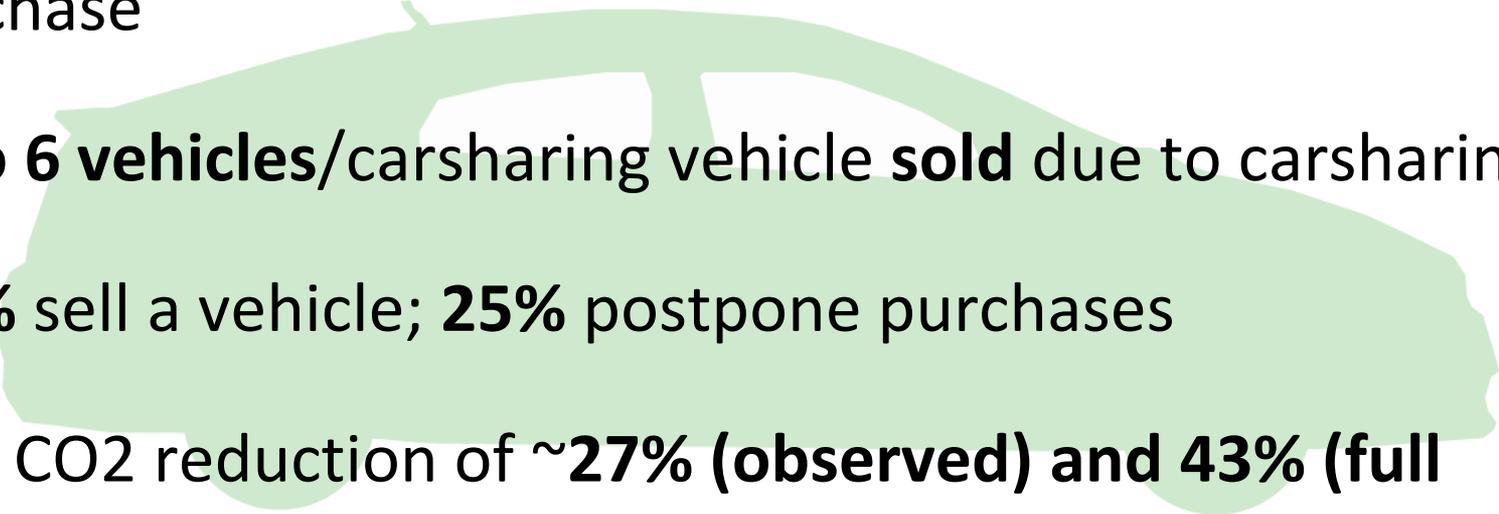
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2008 N. American Carsharing Survey

Key Findings

- Between **9 to 13 vehicles removed**, including postponed purchase
 - 4 to 6 vehicles/carsharing vehicle sold** due to carsharing
 - 25%** sell a vehicle; **25%** postpone purchases
 - Net CO2 reduction of **~27% (observed) and 43% (full impact) average**
- 

Martin, Shaheen, Lidicker, 2010





Public Bikesharing:

Fleet of bicycles for short, point-to-point trips usually found at stations



Closed Community Bikesharing:

Campuses and closed membership, mainly roundtrip



Peer-to-Peer Bikesharing:

Rent or borrow hourly or daily from individuals or bike rental shops



Worldwide & US Bikesharing: June 2014

- **712 cities** with IT-based operating systems
 - **806,200 bikes**
 - **37,500 stations**
- **47 new city programs** since January 2014
- **US: 56 cities** with IT-based systems
 - **& 2 universities**
 - **20,100 bikes**
 - **2,000 stations**

Source: Russell Meddin, 2014



Bikesharing Member Survey: 2013

| Operator | City | Responses | Members (annual/seasonal) | Bikes | Stations |
|------------------------|-------------------------|-----------|------------------------------|-------|----------|
| BIXI Montreal | Montreal | 1102 | 49217 | 5000 | 400 |
| BIXI Toronto | Toronto | 1015 | 4185 | 1000 | 400 |
| Nice Ride Minnesota | Minneapolis- St Paul | 630 | 3500 | 1325 | 145 |
| GreenBIKE SLC | Salt Lake City | 72 | N/A | 65 | 12 |
| EcoBici | Mexico City | 3349 | 70100 | 3530 | 261 |
| Total | | 6168 | | | |

Shaheen et al., 2014



2013 Member Survey: Demographics

Compared to general population bikesharing users tend to be...

- Wealthier
- More educated
- Younger
- Caucasian
- Male



Shaheen et al., 2014



Ridesourcing:

A service that allows passengers to connect with and pay drivers who use their personal vehicles for trips facilitated through a mobile application



Ridesourcing: Some Early Understanding

- Between May and June 2014, surveyed 380 users at three “hot spots” in San Francisco: Mission, Marina, and North Beach districts
- Of all trip responses, 67% were social/leisure (bar, restaurant, concert, visit friends/family); 16% were work; 4% were to or from the airport; and 10% were other (e.g., doctor’s appointment, volunteer)
- Appears to substitute for longer public transit trips but otherwise complements transit
- Ridesourcing users tend to be younger, own fewer vehicles, and more frequently travel with companions than taxi users

Rayle et al, 2014



Some Early Understanding (cont'd)

- 39% of users would otherwise have used a taxi for the same trip, and trips covered similar areas and trip lengths
- Ridesourcing response times were much shorter overall and markedly more consistent across day, time, and location
- Users indicated short wait time was a top reason for using ridesourcing
- 60% would otherwise have used a mode other than taxi, including public transit, walking, biking, or driving, indicating that ridesourcing is more than just a taxi replacement
- 20% used to avoid drinking and driving
- More research needed

Rayle et al, 2014



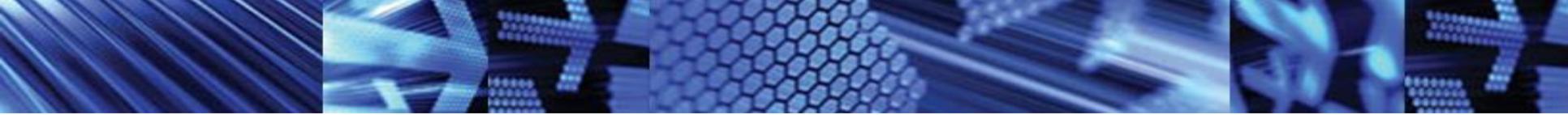


Corporate Regional Shuttles:
Employer-funded regional transit, closed systems,
limited stops



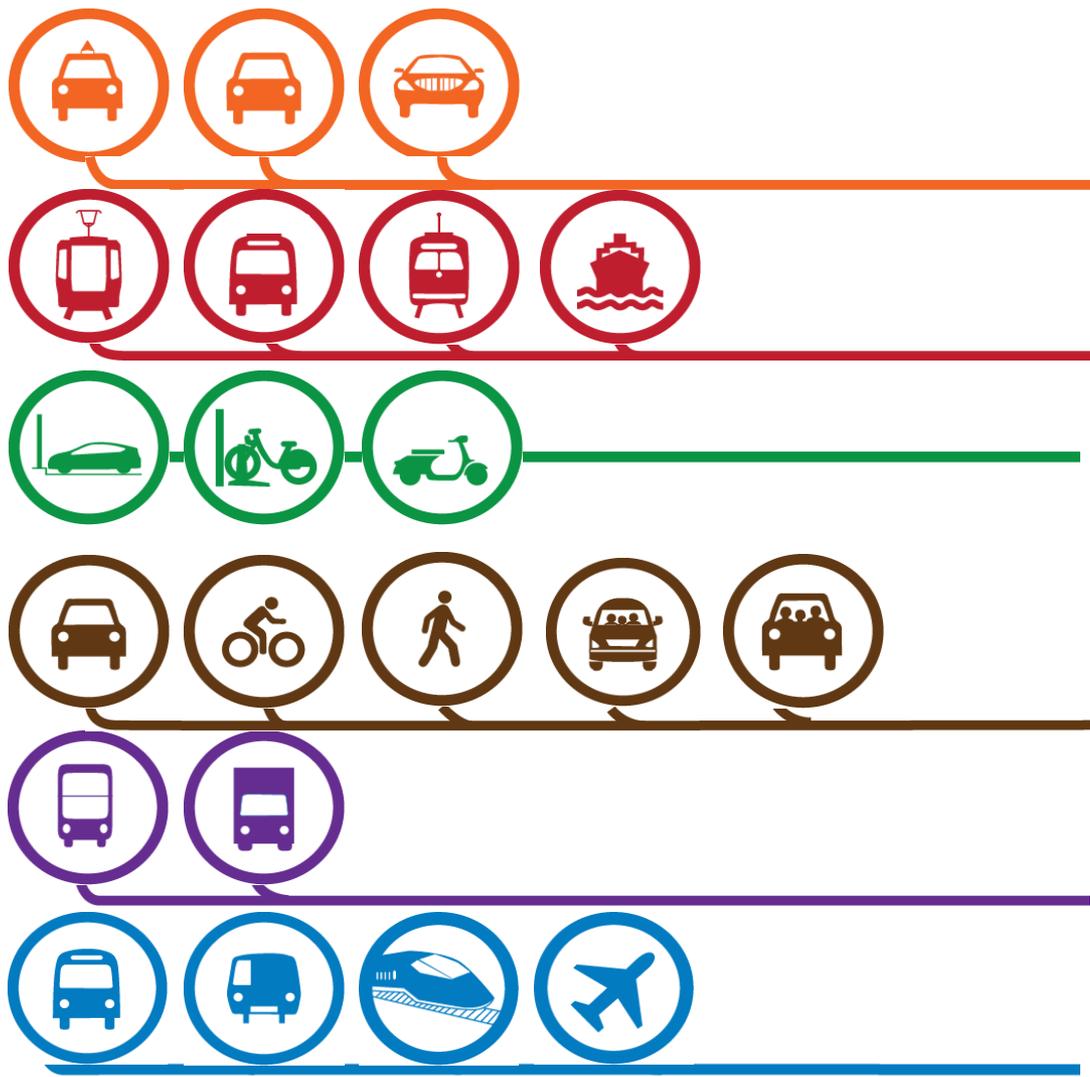
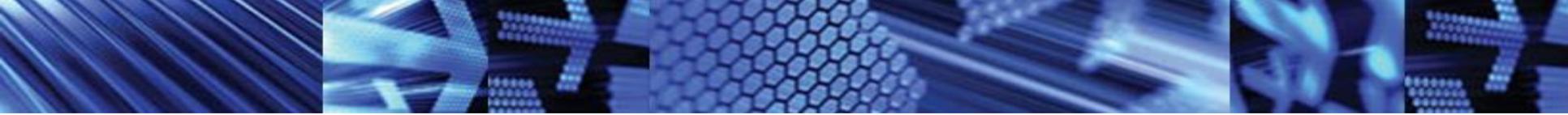
Local Shuttles:
Employer or development agreement service,
door-to-door, closed systems, workplace to
transit hub



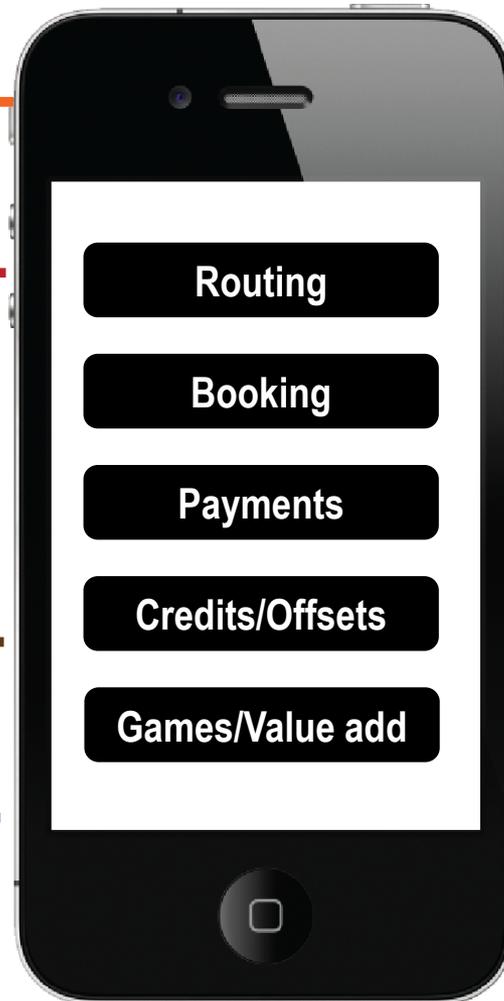


Multi-modal integration





User Experience



Timothy Papandreou, 2013





Muni+



Muni+



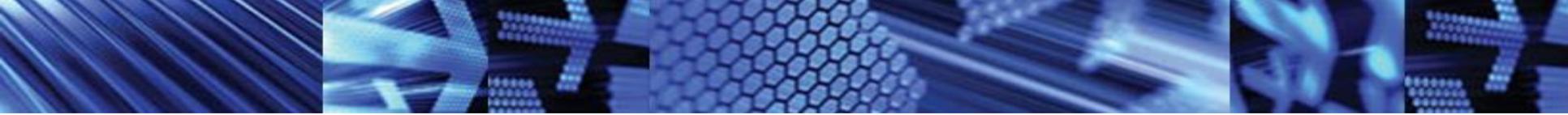
Timothy Papandreou, 2013

What the user needs physically



Highlights from Shared-Use Mobility Summit



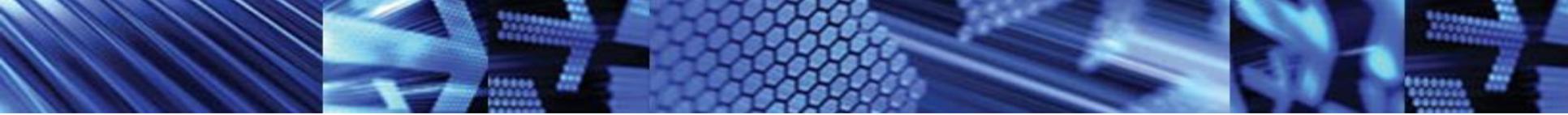


Key Policy Takeaways: Summit

- Consistent shared-use definitions and standards**
 - Confusion
 - Lack of a consistent policy framework
 - Further social & environmental benefits understanding needed

- Public funding for shared-use mobility**
 - Dollars likely to continue to decrease before they increase
 - Other means to generate capital and ongoing revenue
 - Dialogue should shift from politically-charged discussion toward: *job creation, increased efficiency, and economic growth*





Key Policy Takeaways (cont'd)

Public transit integration

- Better linkages through multi-modal connections & technology
- Commuter tax break for shared-use modes
- Create *more flexible* platforms for integrated mobility
- Hurdles: equity, competition, data privacy, logistics (splitting revenues)
- Need: joint-fare payment, updated policy framework, and improved relationships with elected officials



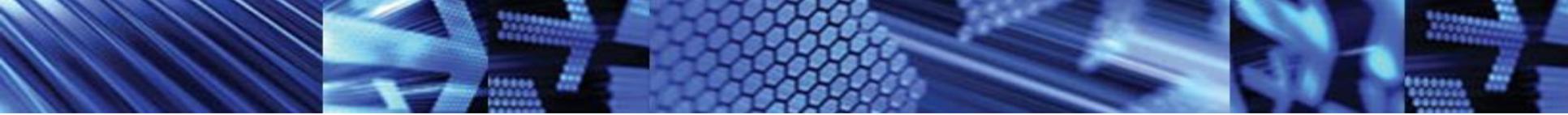
Other Key Issues Identified

- Social equity—system planning and business model development
- “Scaling” —Challenges exist to mainstreaming
- Parking and insurance remain obstacles
- Must balance open data sharing with privacy (individual and industry levels)
- Preparing for the future (e.g., autonomous vehicle, data aggregation, models, etc.)



Source: Google, 2014

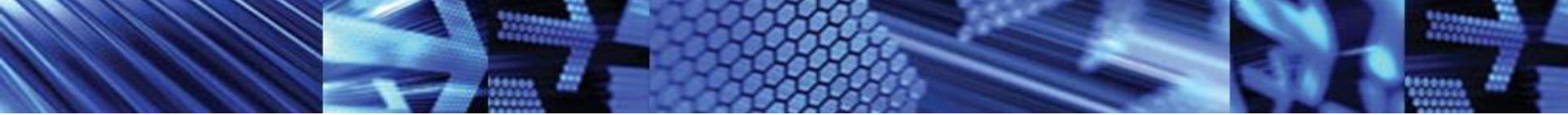




Acknowledgements

- Shared-use mobility providers from across the Americas
- Mineta Transportation Institute (MTI), Caltrans, and US DOT
- Adam Cohen, Nelson Chan, Matthew Christensen, Rachel Finson, and Elliot Martin, TSRC
- Timothy Papandreou, SFMTA
- Sharon Feigon, SUMC
- Russell Meddin, Philadelphia Bike Share





www.tsrc.berkeley.edu



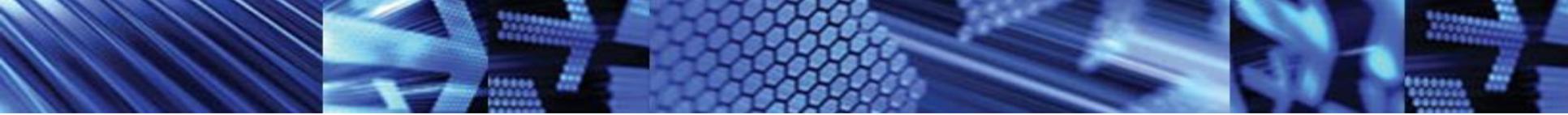
*Federal Highway Administration
Office of Operations – Transportation Management*



Dr. Balaji Prabhakar

CAPRI: CONGESTION AND PARKING RELIEF INCENTIVES





Incentives for ADM

- Incentives: users are given rewards for slightly modifying behavior
 - Small reductions in peak traffic volume □ large reduction in congestion
- Benefits of incentive programs
 - Recognize and reward good behavior
 - Users encouraged to exhibit good behavior rather than hide bad behavior
 - Can start with a small group of users and scale up
 - Positive PR
 - Can complement charge-based programs

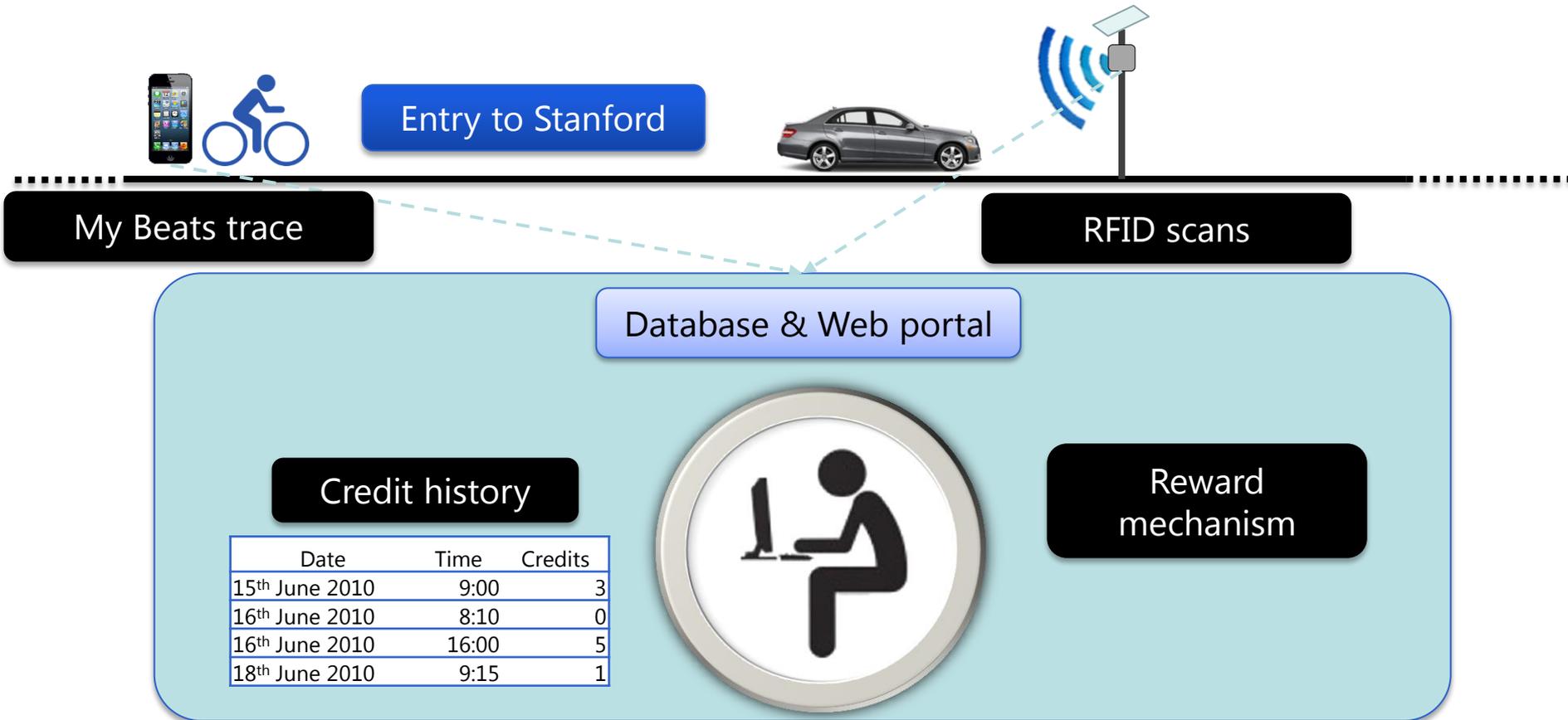


Congestion at Stanford

- Agreement with County of Santa Clara:
 - “General Use Permit” signed in 2000
 - Limit peak inbound and outbound traffic
 - Morning peak-hour limit: 3,319 vehicles
 - Evening peak-hour limit: 3,446 vehicles
- Current solutions:
 - Commute Club: cash rewards for not driving
 - Carpooling assistance; reserved parking
 - Discount transit passes
- Our goal: Directly address peak-hour load and parking congestion
 - CAPRI: funded by FHWA



Mechanism of Capri



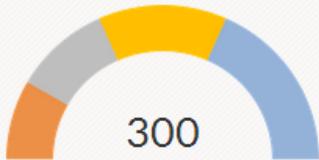
 **HOME**
 Platinum status
 2978 points

 **FRIENDS**
 Invite friends,
 earn points!

 **SPIN TO WIN**
 Win cash prizes!

 **MAGIC BOX**
 You have 1 box to open!

 **Mickey Mouse**
 2978 points | platinum | won \$4.43



You have maintained your status!

Your last 1 trip on Monday 24 Mar earned 30 points

[Detailed records...](#)

[Fuel](#)

Leaderboard [more...](#)

| | | | |
|--|---------------------------------|----------------------------------|------------|
|  | P Donald Duck | <div style="width: 100%;"></div> | 700 points |
|  | P Mickey Mouse You | <div style="width: 95%;"></div> | 555 points |
|  | P Minnie Mouse | <div style="width: 90%;"></div> | 500 points |
|  | G Goofy | <div style="width: 80%;"></div> | 330 points |
|  | S Daisy Duck | <div style="width: 40%;"></div> | 120 points |



Introducing My Beats!

Capri now incentivizes walking and biking to work in addition to driving in off-peak hours.

[More information on My Beats](#)

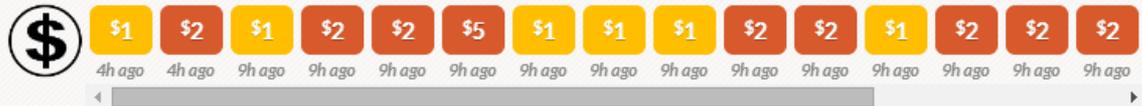


You have a magic box to open!

[Open me!](#)

This offer expires 2 days, 5 hours from now

Rewards Updated 3/25/2014 6:53pm



Recent updates

 P Donald Duck

 Donald Duck won \$0.29. 4 months, 1 week ago

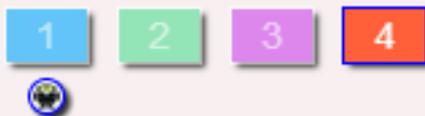
 P Mickey Mouse

 Won \$0.43. Congratulations on winning and on helping make Stanford eco-friendly! 4 months, 2 weeks ago

 G Goofy

 P Minnie Mouse

Board



Platinum



15 points

\$50
\$2

\$50
\$5

\$2
\$1

\$1

5 points

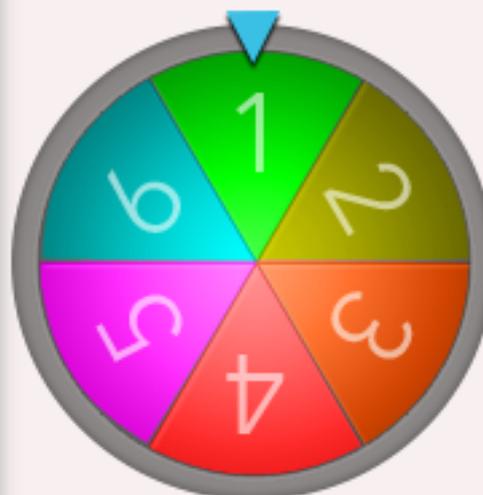
\$5
5 points

\$10
5 points

4
START

Balance

4148 Points



1 spin 1pt

5 spins 5pt

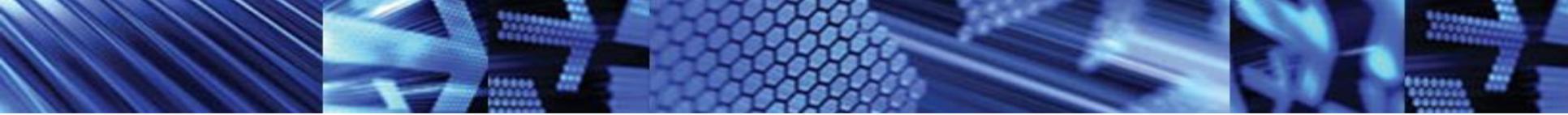
25 spins 25pt

All my points!

Key behavior nudge mechanisms

- Rewards
 - Raffle-like redemption mechanism
 - Instituted through a fun, engaging game
- Friends
 - Social influence is powerful
- Magic Box
 - Personalized recommendations and nudges





CAPRI results

Apr 2, 2012—Jan 9, 2014

Total potential participants: any one with a valid parking permit

~ 8000

Registered / activated users

4486 / 3798

RFID scans

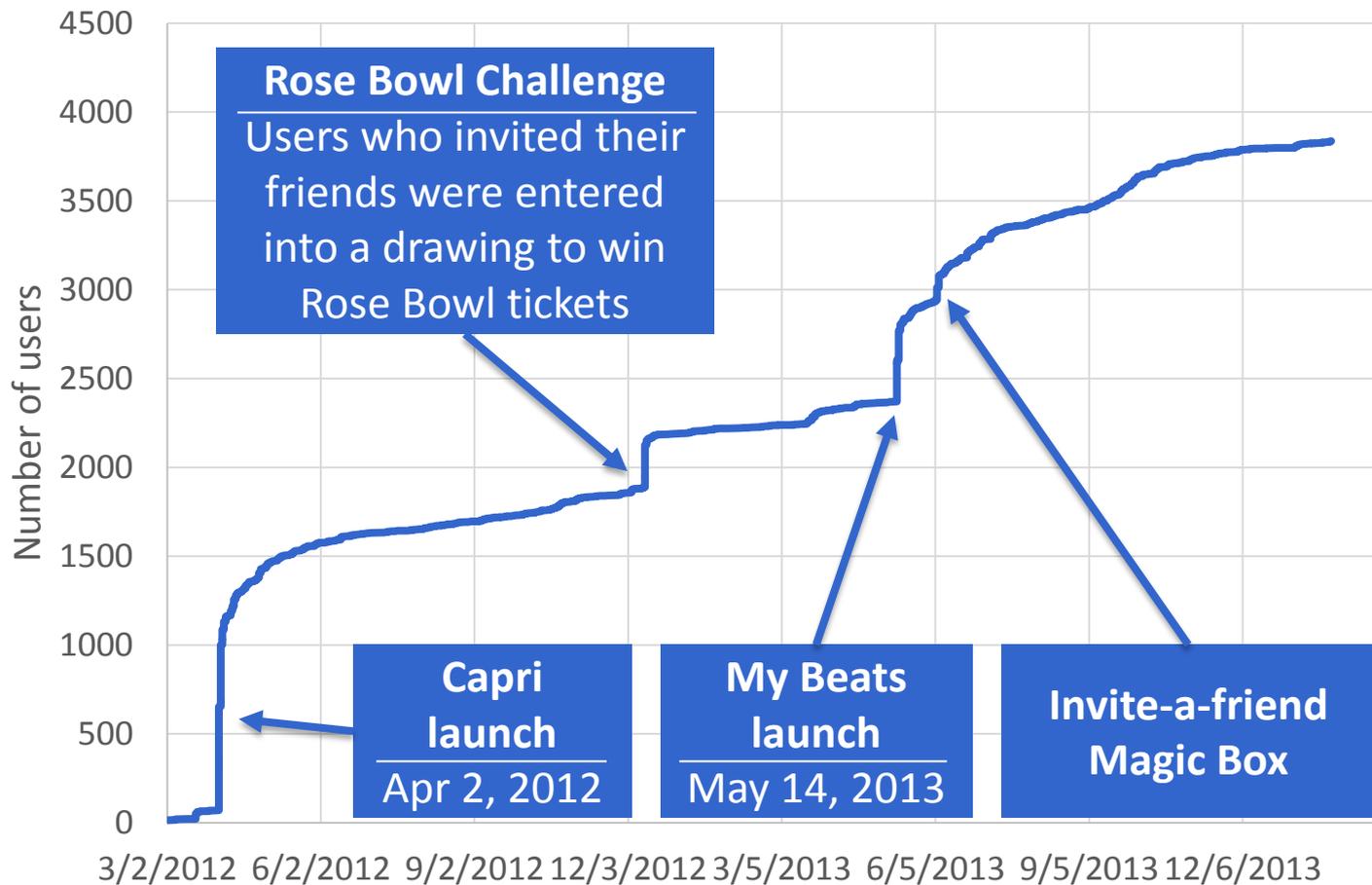
Taken during 7—10am and 4—7pm

Total rewards paid

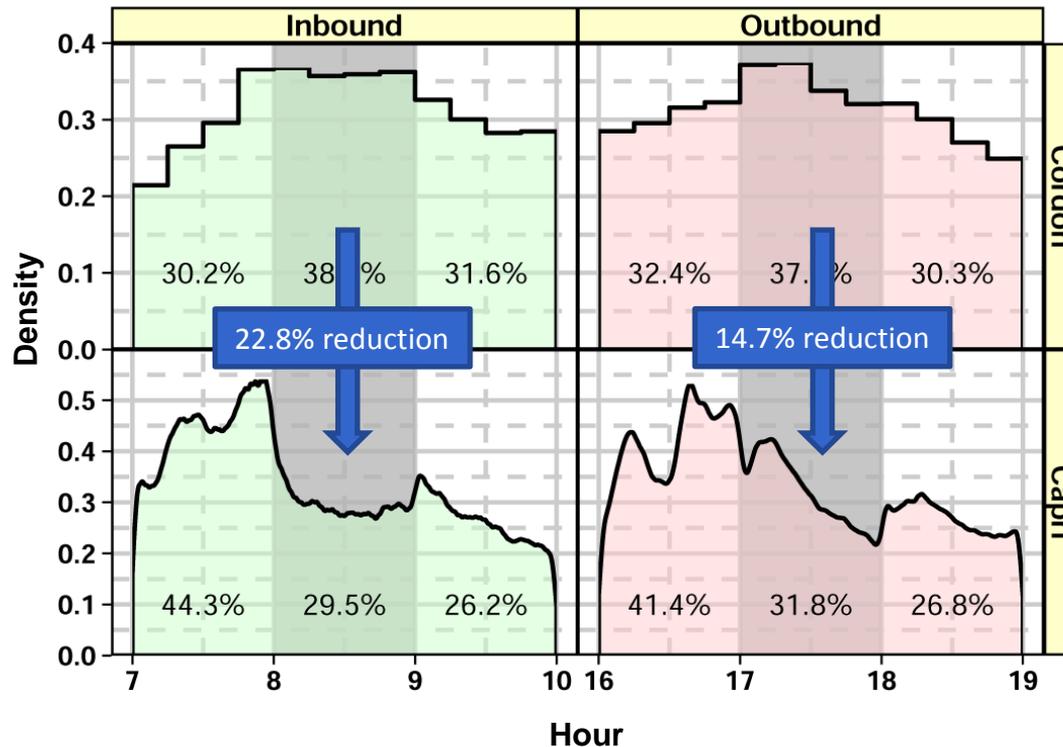
\$133,000



Registrations



Shift in automobile commute times



All Stanford commuters, Spring / Fall 2013

Capri Participants, Apr 2 2012 – Nov 1 2013

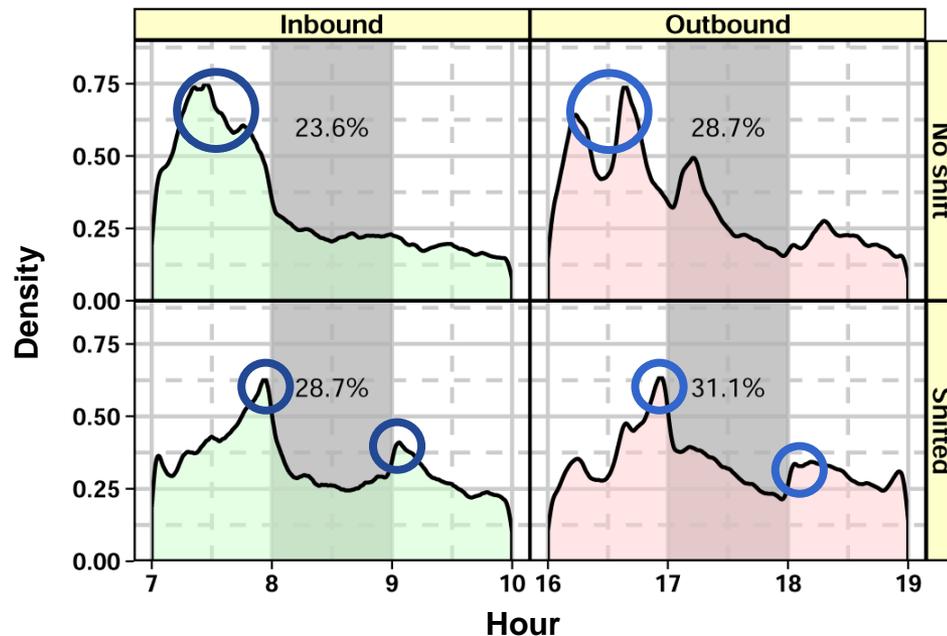
- Capri commuters shifted from peak hours (grey) to shoulder hours (adjacent)



Capri survey

- In May 2013, sent Capri survey to 2295 participants; received 1010 responses
- Users were asked if they shifted commute times since joining Capri
- 594 users said they shifted commute times

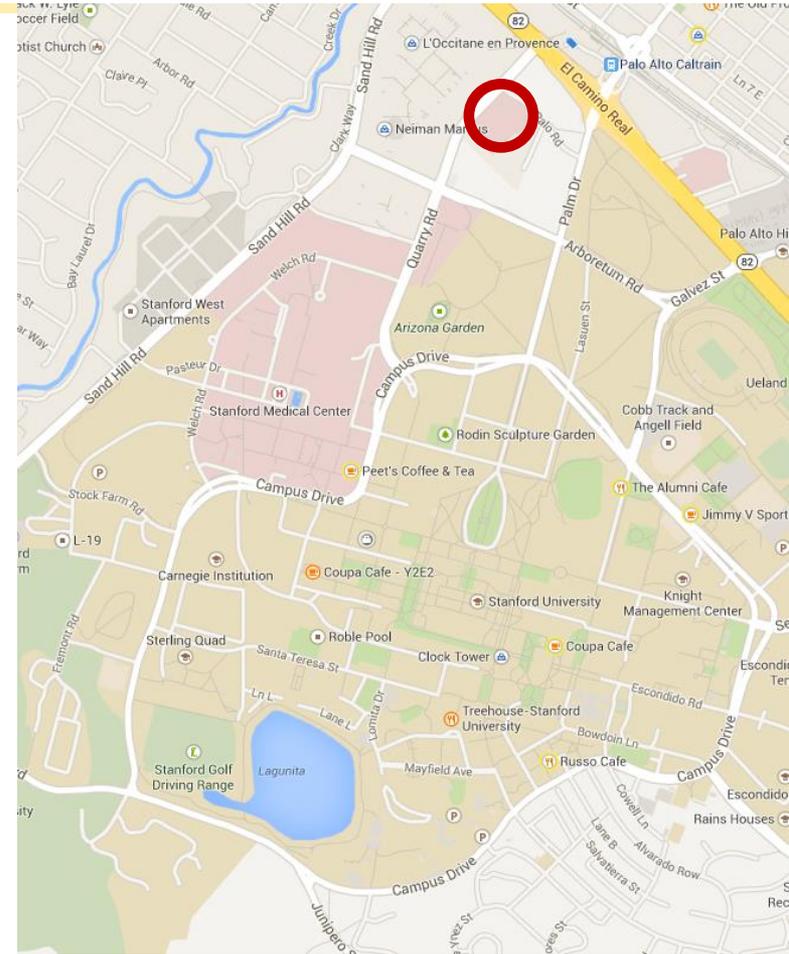
Non-shifted users commuted in **off-peak** hours before joining Capri; commutes took place well before start of peak hour

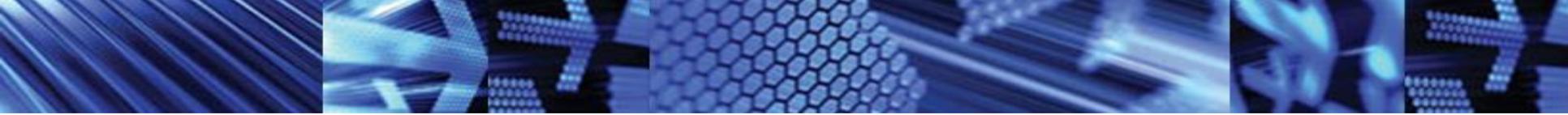


Shifted users commuted in **peak** hours before joining Capri; shifted to times just before/after peak hour

Parking incentives

- My Beats was slated to be used for parking incentives
- Unreliable cellular/GPS connections in parking structure made tracking difficult
- Alternative parking structure / tracking method necessary at Stanford locations

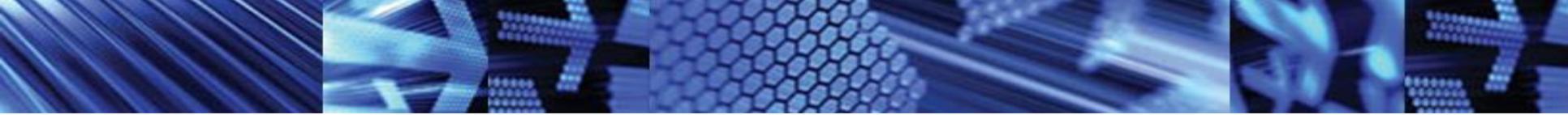




Conclusions

- Capri is an incentive program for peak hour commute reduction
 - Time shifting: peak to non-peak hours
 - Mode shifting: encourage walking, biking commutes
 - Effective in reducing peak hour commutes
- Future work
 - Parking incentive program





CONCLUDING DISCUSSION



Question and Answer Session



Points of Contact



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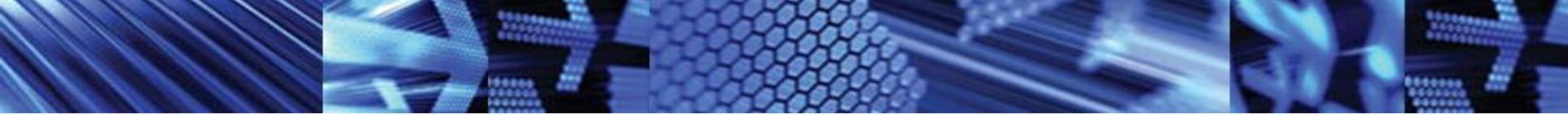


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Thanks for joining us!

- We hope to see you at our next ATDM Webinar in November!



Knowledge and Technology Transfer

- Lessons Learned
- Engagement with professional associations

■ Website <http://ops.fhwa.dot.gov/atdm/about/program.htm>

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Welcome to Active Transportation and Demand Management

The Active Transportation and Demand Management (ATDM) program is intended to support agencies and regions considering moving towards an active management approach. Through customized workshops, tools, guidance documents, resources, and peer exchanges, the program can assist with technical support to implement ATDM strategies. Importantly, ATDM is not an exclusive program restricted to specific agencies. Every agency that is considering moving towards active and dynamic capabilities can benefit from the ATDM program's efforts.

WHAT'S NEW

- [Guide for Highway Capacity and Operations Analysis of Active Transportation and Demand Management Strategies](#) (FHWA-HOP-13-042)
- [ATDM Analysis Brief: Example Application \(HOV to HOT\) of ATDM Capacity and Operations Analysis](#) (FHWA-HOP-13-036)
- [ATDM Analysis Brief: Example Application \(Ramp Metering and Demand Management\) of ATDM Capacity and Operations Analysis](#) (FHWA-HOP-13-037)
- [ATDM Analysis Brief: Methodology for Capacity and Operations Analysis of ATDM](#) (FHWA-HOP-13-035)

View the ATDM Overview Flyer

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