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)
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)
Today’s Speakers

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

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

Eric Schreffler
Independent Transportation Consultant based out of San Diego, CA

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 approaches provide travelers with choices throughout the trip chain leading to network performance optimization and increased efficiency.

**Key Takeaway:** Active management occurs before, during, and at the end of 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

<table>
<thead>
<tr>
<th></th>
<th>ADM</th>
<th>ATM</th>
<th>APM</th>
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<tbody>
<tr>
<td><strong>ADM</strong></td>
<td>Comparative multi-modal travel times, dynamic ride-sharing, pricing, and incentive approaches.</td>
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<tr>
<td><strong>ATM</strong></td>
<td>Variable speed limits, dynamic shoulder use, queue warning, lane control.</td>
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<tr>
<td><strong>APM</strong></td>
<td>Parking pricing, real-time parking availability and reservation systems.</td>
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</tbody>
</table>
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”**

I-405: Countdown to the Closure
Plan ahead, avoid the area, or stay home July 16-17.

- 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

Active, But Not Integrated

Early in Active and/or Integrated Operations

Integrating, But Not Active

DESIRED END STATE: Active and Integrated
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.
TRANSITIONING FROM TRADITIONAL DEMAND MANAGEMENT TO ADM

Eric Schreffler
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

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.

Source: fastrak511sd.com
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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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

Source: streetsblog.org
Active Demand Management - Strategies

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Predictive Travel Times

Federal Highway Administration
Office of Operations – Transportation Management
# Traditional TDM vs. ADM

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

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Shaheen and Cohen, 2014
Carsharing Vehicle Growth Americas: January 2014

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

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

Shaheen and Cohen, 2014
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
- 20,100 bikes
- 2,000 stations

Source: Russell Meddin, 2014
## Bikesharing Member Survey: 2013

<table>
<thead>
<tr>
<th>Operator</th>
<th>City</th>
<th>Responses</th>
<th>Members (annual/seasonal)</th>
<th>Bikes</th>
<th>Stations</th>
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<tbody>
<tr>
<td>BIXI Montreal</td>
<td>Montreal</td>
<td>1102</td>
<td>49217</td>
<td>5000</td>
<td>400</td>
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<tr>
<td>BIXI Toronto</td>
<td>Toronto</td>
<td>1015</td>
<td>4185</td>
<td>1000</td>
<td>400</td>
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<tr>
<td>Nice Ride</td>
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<td>630</td>
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<td>145</td>
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<td>Minnesota</td>
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<td>GreenBIKE SLC</td>
<td>Salt Lake City</td>
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<td>65</td>
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<tr>
<td>EcoBici</td>
<td>Mexico City</td>
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<td>70100</td>
<td>3530</td>
<td>261</td>
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<tr>
<td>Total</td>
<td></td>
<td>6168</td>
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</tbody>
</table>

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

Routing
Booking
Payments
Credits/Offsets
Games/Value add

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
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

Credit history

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Credits</th>
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<tbody>
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<td>9:00</td>
<td>3</td>
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<tr>
<td>16th June 2010</td>
<td>8:10</td>
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</tr>
<tr>
<td>16th June 2010</td>
<td>16:00</td>
<td>5</td>
</tr>
<tr>
<td>18th June 2010</td>
<td>9:15</td>
<td>1</td>
</tr>
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</table>
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

- **Rose Bowl Challenge**: Users who invited their friends were entered into a drawing to win Rose Bowl tickets.

- **Capri launch**: Apr 2, 2012
- **My Beats launch**: May 14, 2013
- **Invite-a-friend Magic Box**
Shift in automobile commute times

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

All Stanford commuters, Spring / Fall 2013

Capri Participants, Apr 2 2012 – Nov 1 2013
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

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<th>Density</th>
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<tbody>
<tr>
<td>7</td>
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<tr>
<td>19</td>
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Shifted users commuted in peak hours before joining Capri; shifted to times just before/after peak hour

<table>
<thead>
<tr>
<th>Hour</th>
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<tbody>
<tr>
<td>7</td>
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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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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](http://ops.fhwa.dot.gov/atdm/about/program.htm)