Active Transportation and Demand Management (ATDM) Introduction

Name of Workshop

FHWA Office of Operations

Date

Presentation Topics

- Defining Active Management and the ATDM Concept
- Types of Active Management Deployments
- FHWA's ATDM Program

SECTION 1: DEFINING ACTIVE MANAGEMENT AND THE ATDM CONCEPT

Characteristics of an Actively Managed Operations Culture

- Focuses on now rather than the future
- Recognizes conditions vary and may not be "typical"
- Orients toward customers and their service needs
- Focuses on performance outcomes not outputs
- Emphasizes managing rather than development
- Exists as a 24/7 service, not a 9-5 office
- Scales to trip – not just a jurisdiction

What is Active Management?

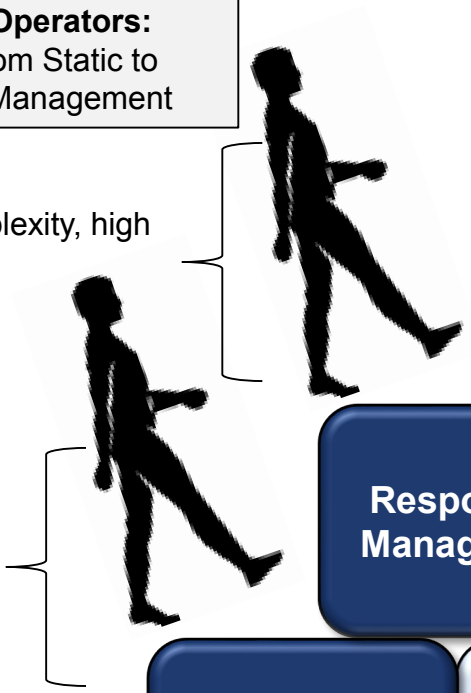
The fundamental concept of taking a dynamic approach to a performance based process

Moving Towards Active Management

Transportation Agency Operators:
Moving from Static to Proactive Management

- High complexity, high reward
- Emerging

- Low risk
- Proven



Proactive Management

- Respond to predicted changes in supply & demand
- Ability to delay or eliminate breakdowns

Responsive Management

- Respond to current conditions
- Account for traffic impacts due to conditions
- Reduce time of degraded operation

Static Management

- Time of day
- Set-it and forget it
- Will work when there is limited variability

Actively Managing Operations

Moving Towards Active Management: Shoulder Use Example

Manage Flow by time of day

Monitor and Manage Existing Lanes (No shoulder use as a lane)

↓

Adjust supply by time of day

Temporary shoulder use during peak periods

↓

Adjust supply based on demand

Responsive shoulder use based on demand

↓

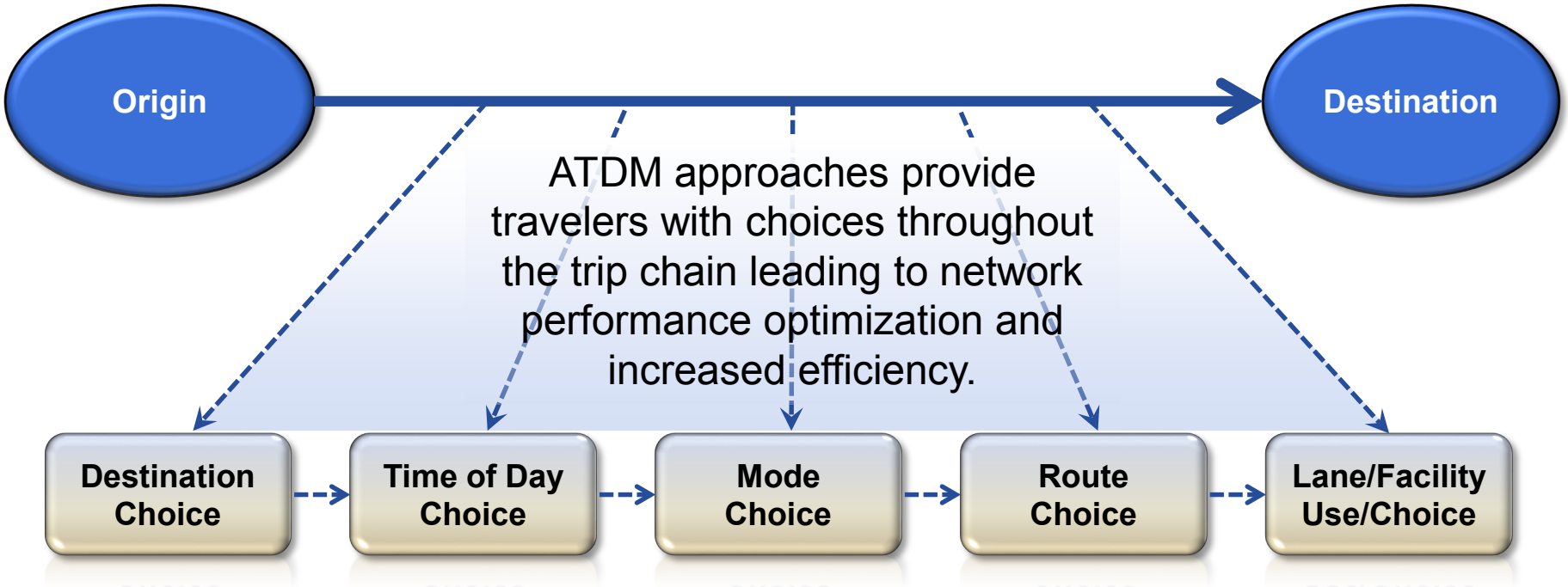
Fully dynamic operations

24/7 current / predicted levels of traffic and incidents

Goal of ATDM Concept

- Attain the capability to dynamically 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



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

What does ATDM include?

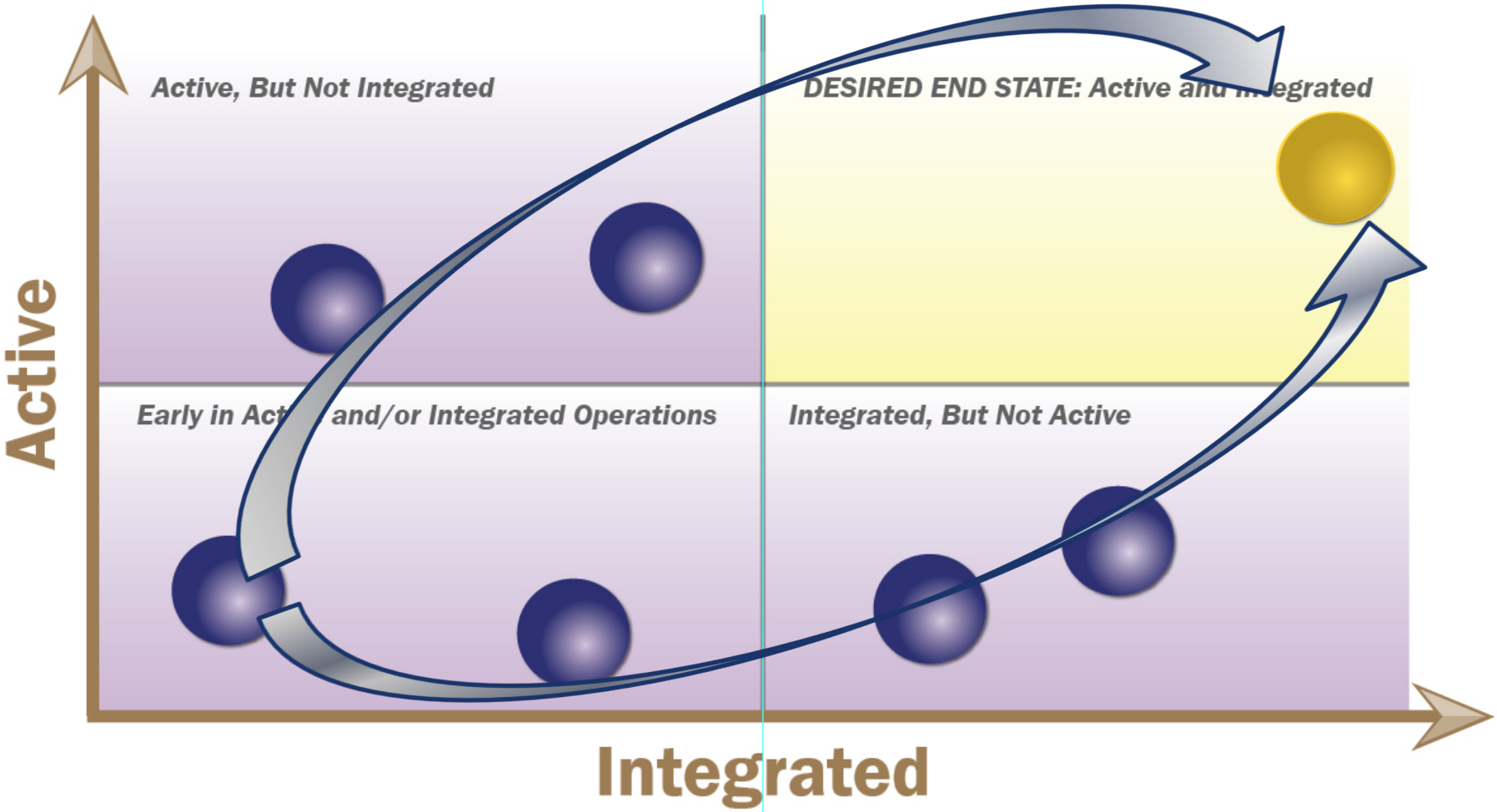
Active Demand Management (ADM): A suite of strategies intended to reduce or redistribute travel demand to alternate modes or routes Incentivizes drivers by providing rewards for travelling during off peak hours with less traffic congestion.

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.

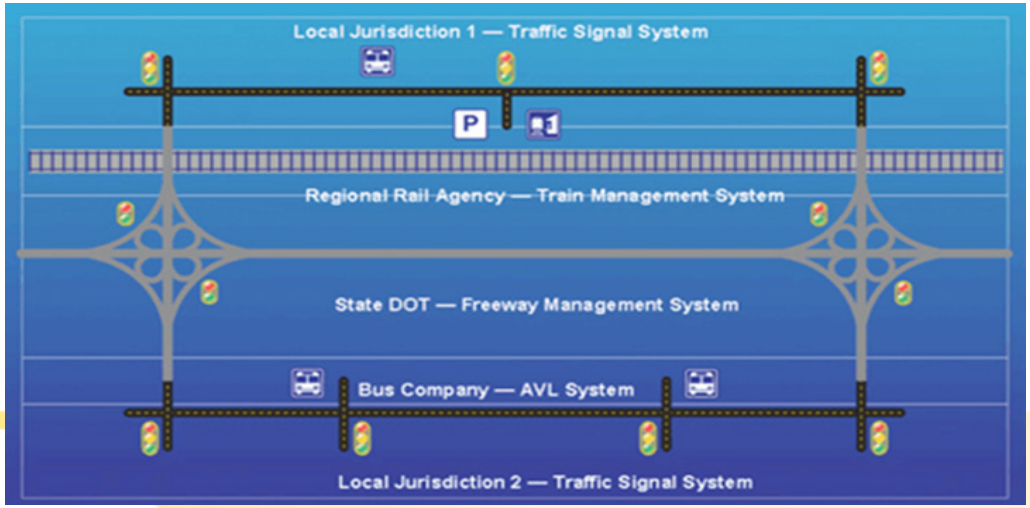
Examples of ATDM Implementation Strategies	
ADM	Comparative multi-modal travel times, dynamic ride-sharing, pricing, and incentive approaches.
ATM	Variable speed limits, dynamic shoulder use, queue warning, lane control.
APM	Parking pricing, real-time parking availability and reservation systems.

The ACTIVE and INTEGRATED Continuum



Integrated Corridor Management (ICM)

- ICM is the joint management of a transportation corridor as a complete system
  - Load balancing
- Corridor operates at optimal performance, given the available capacity of each network
  - ATDM needed to realize vision



ATDM Relationship to ICM

- ICM is built on the fundamental concepts of load balancing.
- ATDM approaches need to be applied to realize the vision of ICM

Active Management in a Corridor

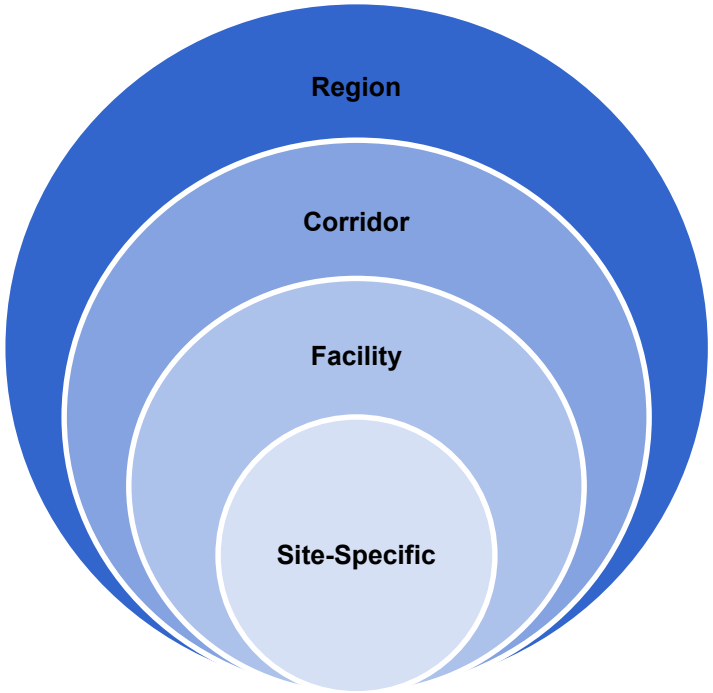
Agency Type	Mode/Facilities	*Individually optimized through ATDM approaches*
Transit Agencies		
Freeway Agencies		
Arterial Agencies		

ICM: Corridor Level Optimization and Operations

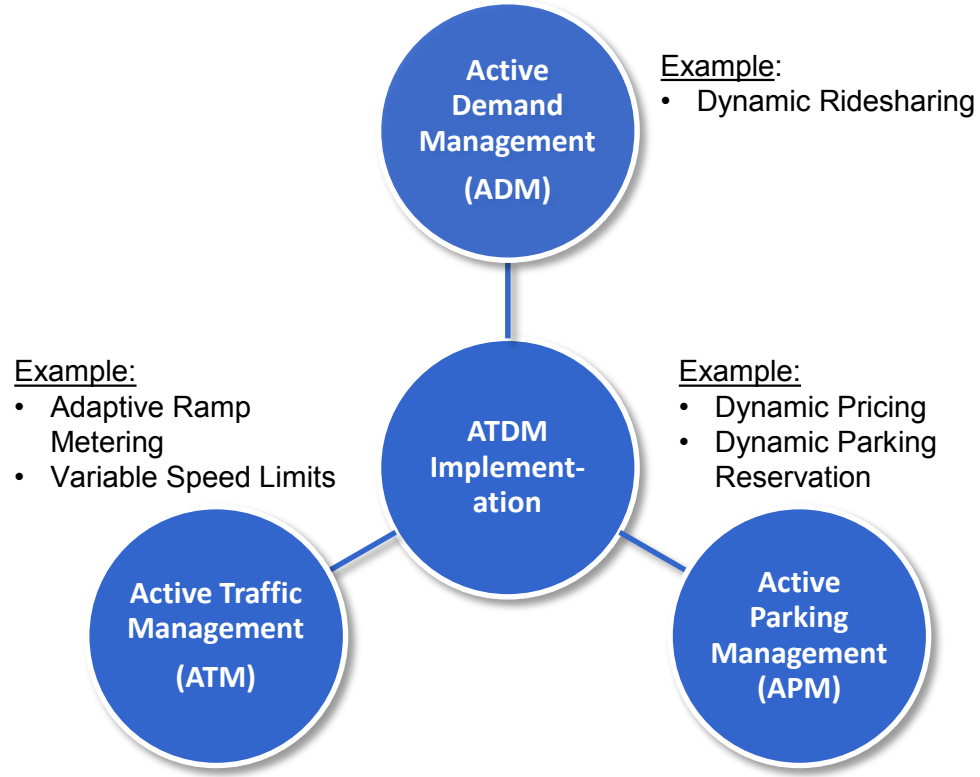
SECTION 2: TYPES OF ACTIVE MANAGEMENT DEPLOYMENTS

Scope Varies by Agency

Scale of implementation
(site-specific to regional)

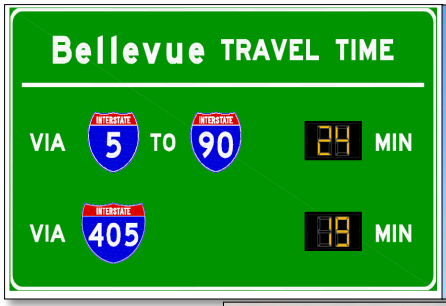


Types of Implementation
(ADM, ATM, APM or a combination)



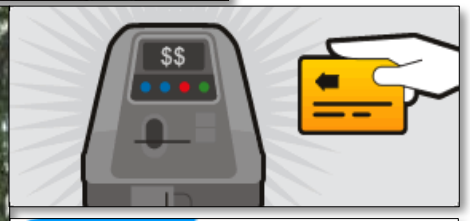
Examples of Active Management Strategies

Active Demand Management



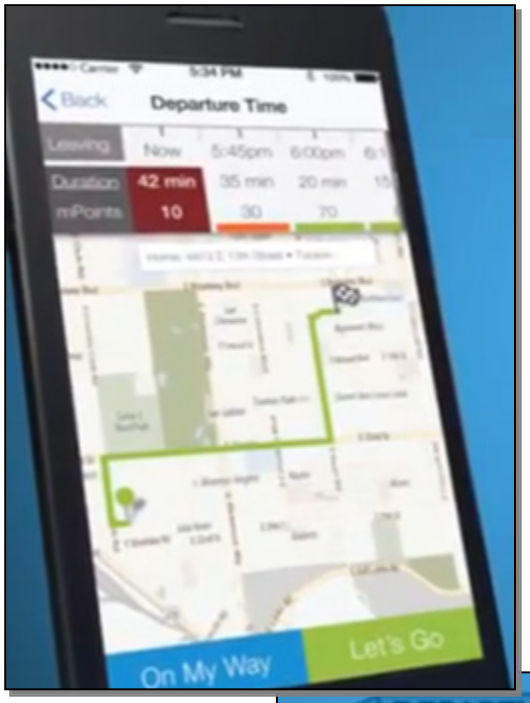
Active Traffic Management

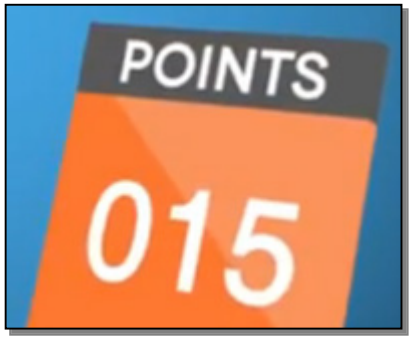
Active Parking Management

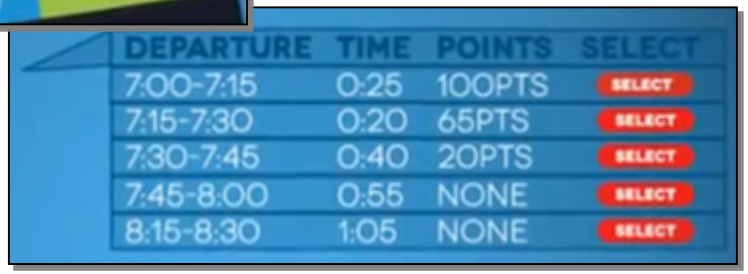


SFpark

Active Demand Management Example: Mobile Applications







DEPARTURE	TIME	POINTS	SELECT
7:00-7:15	0:25	100PTS	SELECT
7:15-7:30	0:20	65PTS	SELECT
7:30-7:45	0:40	20PTS	SELECT
7:45-8:00	0:55	NONE	SELECT
8:15-8:30	1:05	NONE	SELECT

Innovative Mobile Traffic Apps:

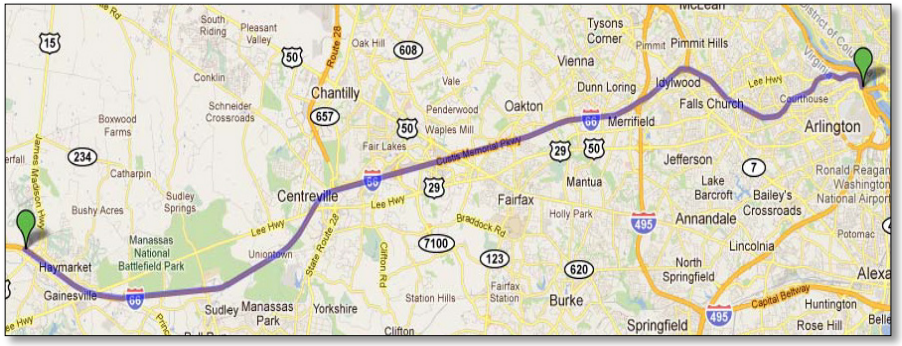
- Goal: manage demand by influencing driver choice over a longer period of time
- How: Encourage behavior change through incentives (e.g., bigger rewards during off-peak travel)
- What: Real-time trip predictions, route mapping, voice navigation and pre-trip alerts

Source: http://www.metropia.com/commuters

Other ADM Deployments Include:

Project	Location(s)	ADM Strategy(ies)	Active Technologies
I-10 Katy Expressway	Houston, TX	Dynamic pricing	Dynamic pricing of HOT lanes and incentives for transit and HOV usage
I-35W HOT Lanes	Minneapolis, MN	Dynamic pricing	Dynamic pricing of HOT lanes and incentives for transit and HOV usage
Congestion and Parking Relief Incentives (CAPRI)	Palo Alto, CA	Dynamic Parking Pricing	Award credits for avoiding peak parking hours. Credits used for random cash drawings of $2.00 – $50.00. Transponders used to detect when cars park.
Messaging Infrastructure for Travel Time Estimates to a Network of Signs (MITTENS)	San Francisco, CA	Predictive Traveler Information	Real-time highway and scheduled transit travel time displayed to induce in-route mode shift.
Predict-a-Trip	San Francisco, CA	Predictive Traveler Information	Predictive travel times using historical data to inform pre-trip travel decisions
I-55 Bus-on-Shoulder Demonstration	Chicago, IL	Hard shoulder running, temporary shoulder use	Roadway sensors, dynamic message signs

Active Traffic Management Example: VA I-66's Active Traffic Management System



NOVA's I-66 Active Traffic Management System:

- Intended to improve safety and incident management.
- Includes new sign gantries, shoulder and lane control signs, speed displays, incident and queue detection, and increased traffic camera coverage.

http://www.virginiadot.org/projects/northernvirginia/i-66_atms.asp

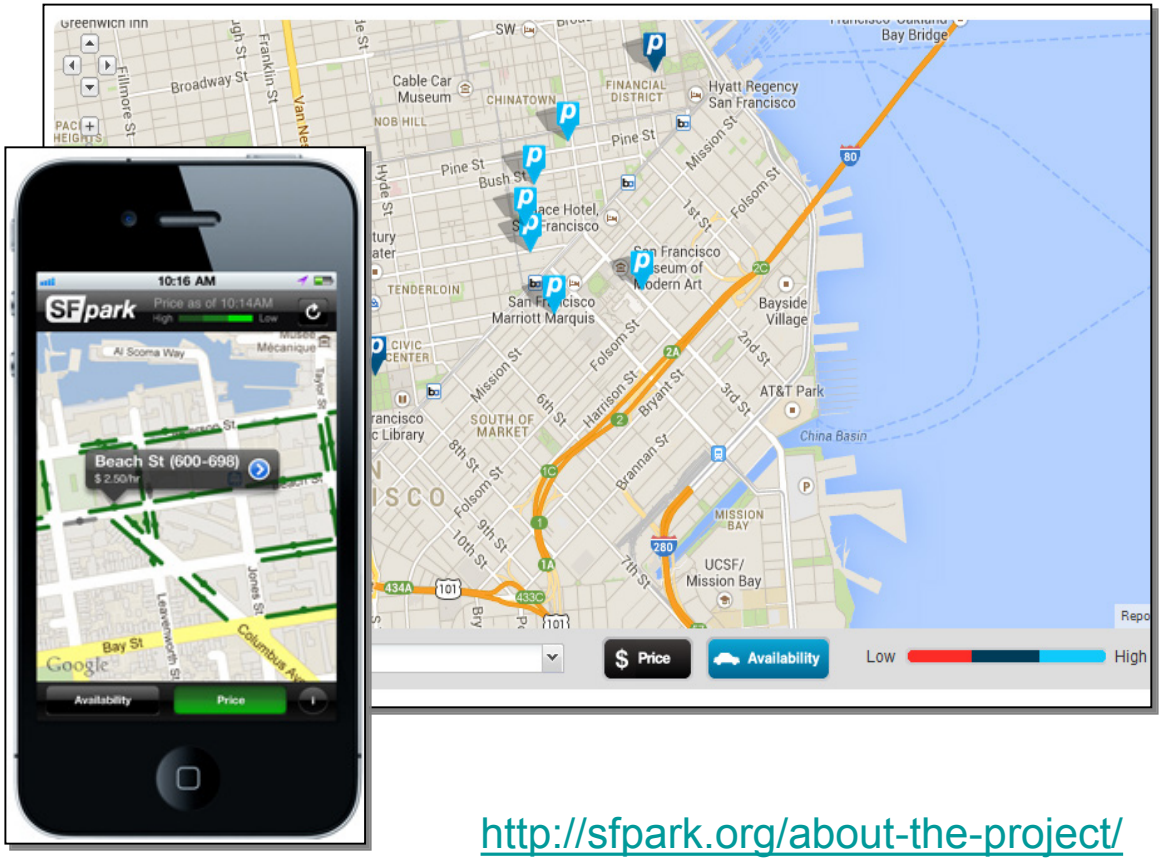
Other ATM Deployments Include:

Project	Location(s)	ADM Strategy(ies)	Active Technologies
Adaptive ramp metering	Los Angeles, CA / Minneapolis, MN / Portland, OR / Houston, TX	Adaptive ramp metering	Roadway sensors, ramp meter signals, TMC algorithms, TMC control
Weather Responsive Speed Limits	Mobile County, AL / Flagstaff, AZ / Portland, ME / Truckee River, NV / Pittsburgh, PA / Knoxville, TN / Cheyenne, WY	Dynamic Speed Limits	Traffic management center (TMC) control, variable speed limit signs, atmospheric sensors, visibility sensors, pavement conditions sensors, dynamic message signs
I-5 Active Traffic Management	Seattle, WA	Dynamic lane use control, dynamic speed limits, queue warning, adaptive ramp metering	Roadway sensors, lane control/dynamic speed limit signals, dynamic message signs, TMC algorithms and control
I-70 West Rolling Speed Harmonization	Silverthorne, CO	Dynamic speed limits	Roadway sensors, ramp meters, law enforcement control
Variable Speed Limits on I-285	Atlanta, GA	Dynamic speed limits	Roadway sensors, dynamic message signs, dynamic speed limit signals, TMC algorithms and control
Midtown in Motion	Manhattan, NY	Adaptive Traffic Signal Control	Roadway sensors, dynamic message signs, TMC algorithms and control

Active Parking Management Example: San Francisco's SF*park* System

SF*park*:

- Periodically adjusts meter and garage pricing to match demand.
- Reduces demand in overused areas by encouraging drivers to park in underused areas and garages.
- Readjusts parking patterns throughout San Francisco to make parking easier to find.



http://sfpark.org/about-the-project/

Other APM Deployments Include:

Project	Location(s)	ADM Strategy(ies)	Active Technologies
PARK Smart	New York, NY	Dynamically priced parking	Demand-responsive pricing, upgraded smart meters
Congestion and Parking Relief Incentives (CAPRI)	Palo Alto, CA	Dynamically priced parking	RFID tags for system users, behavioral based pricing schemes
QuickPark	San Diego, CA	Dynamically priced parking, dynamic parking reservations	Parking space sensors, parking lots sensors, real-time parking availability information

SECTION 3: FHWA'S ATDM PROGRAM

ATDM Program Goal

- Enable agencies to improve trip reliability, safety, and throughput of the surface transportation systems by dynamically managing and controlling travel and traffic demand, and available capacity, based on prevailing and anticipated conditions, using one or a combination of real-time operational strategies.

ATDM Program Objectives

- 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.
- Provide guidance to FHWA Division Offices.

Genesis of the ATDM Program (2009 – 2011)

- 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

Initiation Phase (2011 – 2013)

1 Program Goals

- Define and promote the program
- Encourage early adopters through focused technical assistance and peer exchanges
- Identify research needs and establish a roadmap

2 Program Tracks and Activities

Program Management

Stakeholder Engagement

Research
- ATDM HCM Research
- ATDM Analysis, Modeling, and Simulation (AMS)
- Shoulder Lane Usage

Tools Development and Guidance
- Guidebooks (e.g., ATM, Freeway Management and Operations)
- Info. Briefs (e.g., ADM, APM, ATM)
- Primers (e.g., Dynamic Pricing)

Outreach and Education
- Workshops (KTT, ICM, HCM)
- Peer Exchange
- Webinars
- Outreach Toolkits

3 Program Accomplishments

- **Broad outreach to DOTs (Over 400 professionals included in ATDM workshops)**
- **Several agencies are considering implementation – VA, OR, NY, NV**
- **Creation of the ATDM Website**
- **Research and other foundational elements initiated**

ATDM Program Components: Research Completed

- ATDM Foundational Research
  - ATDM Operational Concept and Program Development Workshops
  - Analysis, Modeling, and Simulation (AMS) Concept of Operations, Capabilities Assessment, and Analysis Plan
- AMS Testbed Planning for ATDM and Dynamic Mobility Applications (DMA)
- ATDM HCM Analysis Methodology
  - Guidance for Highway Capacity and Operational Analysis of ATDM
- Shoulder Lane Usage Analysis (Phase 1)
- HOV Managed Use Lane Pooled Fund Study
  - Design and Operational Elements of Dynamic Shoulder Use
  - Evaluation of ATM Lane Control Signage
- NCHRP Synthesis 447, ATM for Arterials

ATDM Program Components: Research Underway

- ATDM AMS Testbed Project
- Shoulder Research Projects
- ATM Traffic Control Devices Study
- ATDM Tools for Tactical and Strategic Decision Making for Operations
- Tools for Predicting Performance
- Tools for Tactical and Strategic Decision Making for Operations
- Traffic Management Capability Maturity
  - Developing several maturity frameworks to enable advancing capabilities in Operations
- Trajectory Level Validation
  - Collecting data and developing a methodology to enable Simulation tools to be validated based on detailed vehicle trajectory level data
- NCHRP 3-114, ATM Planning and Evaluation
  - Developing a guide to planning and evaluating ATM for recurrent and non-recurrent conditions

ATDM Program Components: Guidance and References Available

Guidance, Primers, and Case Studies

- ATM: The Next Step in Congestion Management (FHWA-PL-07-012)
- Synthesis of ATM Experiences in Europe and the United States (FHWA-HOP-10-031)
- Operations Benefit/Cost Analysis Desk Reference (FHWA-HOP-12-028)
- Designing for Transportation Management and Operations: A Primer (FHWA-HOP-13-013)
- Guide for Highway Capacity and Operations Analysis of ATDM Strategies (FHWA-HOP-13-042)
- The ATDM Program: Lessons Learned (FHWA-HOP-13-018)
- Dynamic Parking Pricing Primer (FHWA-HOP-12-026)
- Ramp Metering Primer (FHWA-HOP-14-020)
- Integrating Demand Management into the Transportation Planning Process: A Desk Reference (FHWA-HOP-12-035)

ATDM Program Components: Guidance and References Underway

- Freeway Management & Operations Handbook update
- Shoulder Guidance
- ATM Screening and Feasibility
- Active Demand Management Primer
- Traffic Management Capability Maturity Framework
- Capability Maturity Frameworks for Managing Non-Recurrent Congestion
- Dynamic Pricing Primer

ATDM Program Components: Outreach and Training

- **Knowledge and Technology Transfer (KTT) Tools**
  - Informational Briefs
  - Public Relations Resources Guide
  - Regional Workshops/Peer Exchanges (19 total from 2011-present)
  - NHI ATDM Webinar Series
  - ATDM Executive Video
    - https://www.youtube.com/watch?v=qd8xy0ozSXI

Active Transportation and Demand Management

U.S. Department of Transportation Federal Highway Administration

ATDM Program Brief: An Introduction to Active Transportation and Demand Management

What is Active Transportation and Demand Management (ATDM)?

ATDM is the dynamic management, control, and influence of travel demand, traffic demand, and traffic flow of transportation facilities. Through the use of available tools and assets, traffic flow is managed and traveler behavior is influenced in real-time to achieve operational objectives, such as preventing or delaying breakdown conditions, improving safety, reducing emissions, or maximizing system efficiency.

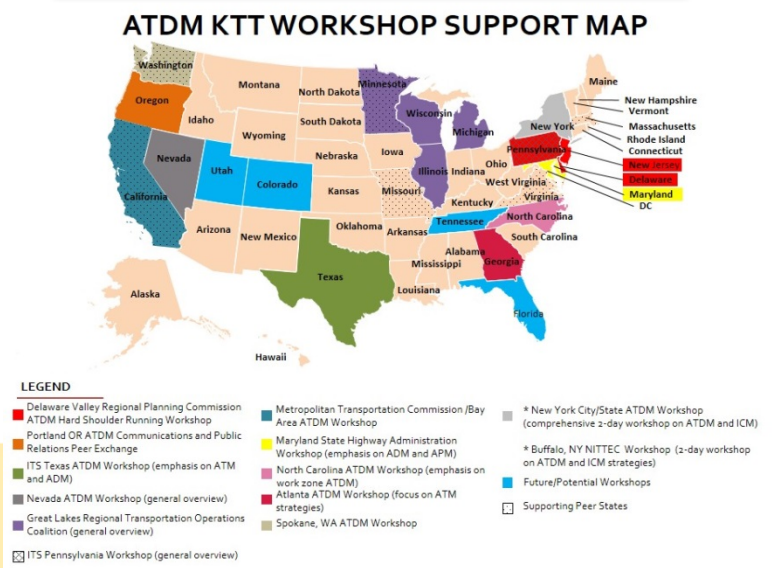
Under an ATDM approach the transportation system is continuously monitored. Using archived data and or/predictive methods, actions are performed in real-time to achieve or maintain system performance.

What are some examples of ATDM Approaches?

Active management of transportation and demand can include multiple approaches spanning demand management, traffic management, parking management, and efficient utilization of other transportation modes and assets.

An agency can deploy a single ATDM approach in order to capitalize on a specific benefit or can deploy multiple active strategies to gain additional benefits across the entire transportation system. Some example approaches include:

Seattle I-5 Northbound Active Traffic Management – Source: Texas Transportation Institute

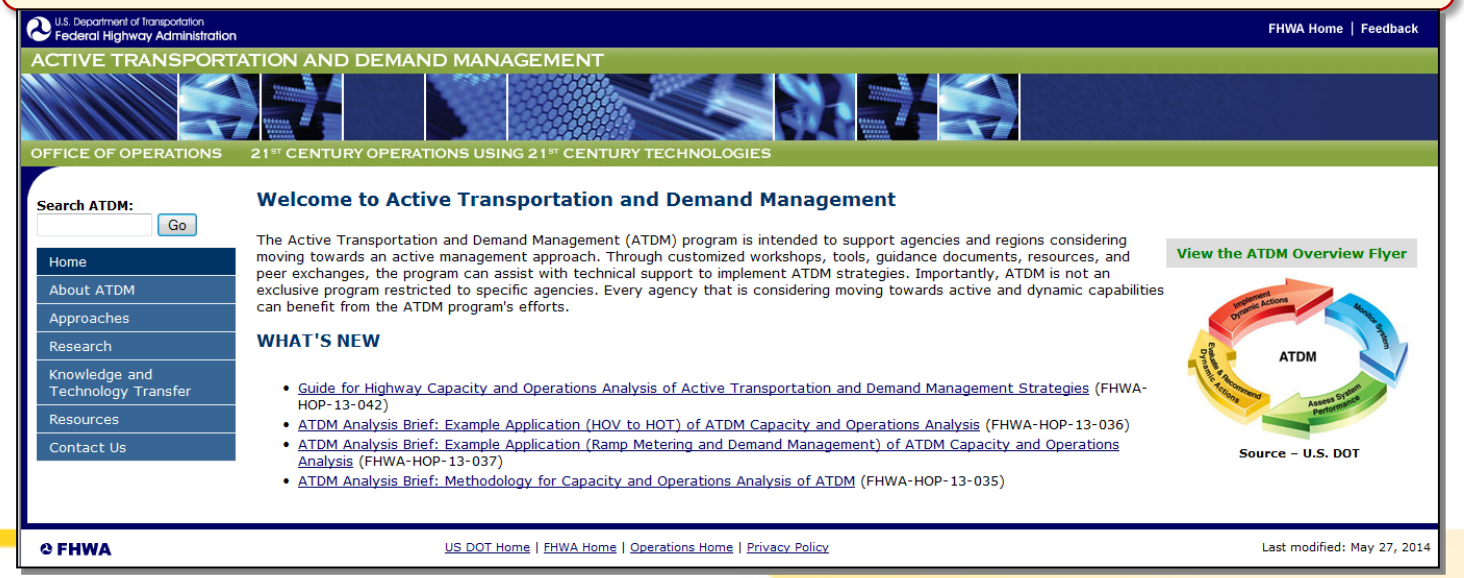


ATDM KTT WORKSHOP SUPPORT MAP

FHWA ATDM Website

- Clearinghouse for ATDM Knowledge and Technology Transfer
- Publications, Briefs, Videos, Webinars, Lessons Learned, External Resources, etc.

http://ops.fhwa.dot.gov/atdm/about/program.htm



Summary

- ATDM represents next evolutionary step in Transportation Systems Management & Operations (TSM&O).
- Based on real time and predicted information and dynamic actions.
- Performance driven.
- Demand management much more prominent than historically in Operations.
- Several FHWA ATDM Program activities underway.

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