Overview

• Every Day Counts & ATSPMs

• Transforming the Approach to Traffic Signal Management and Operations

• Implementation of ATSPMs
What is “Every Day Counts” (EDC)?

**State-based** model to identify and rapidly deploy proven but underutilized innovations to:

- shorten the project delivery process
- enhance roadway safety
- reduce congestion
- improve environmental sustainability

- EDC Rounds: two year cycles
- Initiating 4th Round (2017-2018) - 11 innovations
- To date: 3 Rounds, 35 innovations

*FAST Act, Sec.1444*
State Transportation Innovation Council

**Tennessee Co-Chairs**
John Schroer, TN DOT Commissioner
Pamela Kordenbrock, FHWA Division Administrator

**Coordinator**
Pamela Heimsness, FHWA-TN

**Role**
- Identify Innovations of Interest
- Develop Action Plan
- Lead Implementation Activities
- Track Implementation

https://www.fhwa.dot.gov/innovation/stic/
Adaptive Signal Control Technology

- Research Problem: Static signal timing may induce congestion when traffic demand deviates from design conditions resulting in increased fuel consumption, delays, harmful emissions and reduced safety; a dynamic approach is needed.
- 1991-2004 Turner-Fairbank developed and demonstrated four ASCT approaches for dynamically updating signal timing.
- 2010–2012 dramatic increase in deployment of ASCT, multiple products now available in the marketplace; 192% increase in deployment.
State of the Practice

Program Management
- Ad-hoc Business Practices
- Resource Constrained
- Outdated Equipment

Performance Assessment
- Complaint Driven
- Reactive Operations & Maintenance
- Project Oriented Before & After

Coming Soon 2017

Source: FHWA
Traffic Signal Program – Organizational Model

Formal Policies & Processes

Performance Measures

Traffic Signal System
- Control Hardware
- Communications
- Detection

Goal: Good Basic Service

People
Traditional Operations - Model a Lot......Measure a little

All of our metrics are based on outputs not Objectives

Source: INDOT
An Opportunity to Transform the Practice

**Trigger**
- Complaints
- 3-5 Year Retiming

**Design**
- Collect Data
- Design

**Implement**
- Install
- Fine Tune
- Evaluate

**Agency Goals**

**Tactics**

**Context**

**Objectives**

**Recommended**

Traditional

Source: FHWA
Traffic Signal Program

**Agency Goals**

**Tactics**

**Strategies**

**Context**

**Objectives**

Capability Maturity Assessment

- **Formal Policies & Processes**
- **Performance Measures**
- **People**
  - Traffic Signal System
    - Control Hardware
    - Communications
    - Detection
  - Goal: Good Basic Service

**Performance Measures**
Efficient Coordination

Efficient Local Control

Detector Health

Communications

Preempt, Transit Priority, Dynamic Maximum, Responsive, Adaptive, Etc.

System Timing

Local Timing

Detection

Communications

EDC
Systems & Technology

Business Processes / Workforce / Culture

Performance Measurement
ATSPM Background

NCHRP 3-79 / 3-66
FHWA ASCT Research

Academic Research

Transportation Pooled Fund Study - TPF 5(258)
AASHTO Aii
EDC4


Today
Pooled Fund Study

PFS States using SPMs (as of Jan. 2016)
Other PFS States
PFS Local Agencies
States at Workshop
Local Agencies using SPMs
Local at Workshop
Private Sector Workshop Participant

SPM Workshop, Salt Lake City, Jan. 2016
PERFORMANCE MEASURES FOR TRAFFIC SIGNAL SYSTEMS

An Outcome-Oriented Approach

Automated Traffic Signal Performance Measures

AASHTO Innovation Initiative (formally TIG)

2013 Focus Technology

Lead States Team
http://udottraffic.utah.gov/atspm/

1694 traffic signals
UDOT Asset Management Tiers

- Asset Management Tiers range from 1 to 3
- Tier 1 assets:
  - Highest value combined with highest risk of negative financial impact for poor management.
  - Very important to UDOT.
  - Receive separate funding source.
  - Targets and measures are set and tracked.

<table>
<thead>
<tr>
<th>Tier 1 Assets</th>
<th>Tier 2 Assets</th>
<th>Tier 3 Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement</td>
<td>Pipe Culverts</td>
<td>Cattle Guards</td>
</tr>
<tr>
<td>Bridges</td>
<td>Signs</td>
<td>Interstate Lighting</td>
</tr>
<tr>
<td>ATMS / Signal Devices</td>
<td>Barriers &amp; Walls</td>
<td>Fences</td>
</tr>
<tr>
<td></td>
<td>Rumble Strips</td>
<td>Curb &amp; Gutter</td>
</tr>
<tr>
<td></td>
<td>Pavement Markings</td>
<td>Rest Areas</td>
</tr>
</tbody>
</table>

FHWA Open Source Application Development Portal

Explore Applications

Automated Traffic Signal Performance Measures (ATSPM) 4.0.1

Overview

Automated traffic signal performance measures (ATSPM) are a series of visual aids that display the high-resolution data from signal controllers. They are a valuable asset management tool, allowing stakeholders in the design or enhancement of signal operations and strategies to review the performance. Three weeks of data can be viewed 24 hours a day, 7 days a week, enabling the evaluation, verification, and enhancement of traffic signal efficiency, and performance of traffic equipment and the system as a whole. ATSPM are used to enhance mobility, manage traffic signal timing and maintenance, reduce congestion, save fuel costs, and improve safety.
What is it?

A suite of performance measures, High Resolution Data collection tools, and data analysis tools to support an objectives and performance based approach to managing a traffic signal program.
Suite of Measures (Sample)

- Yellow and Red Actuations
- Arrivals on Red
- Ped/Bike Delay
- Purdue Coordination Diagram
- Split Failure
- Queue length
- Split Monitoring
- Travel Time
- Turning Movement Counts

Operations

Maintenance

- False Calls
- Preemption Details
- Communication Failures
- Alarms
Multiple Data Collection & Analysis Tools

Data Analysis and Performance Report Tools

High Resolution Data Collection

+ Other solutions....

Source: FHWA
<table>
<thead>
<tr>
<th>Goal</th>
<th>Context</th>
<th>Objective and Strategy</th>
<th>Performance Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>Traffic demand: Light, moderate, heavy, congested</td>
<td>Smooth flow, Queue management</td>
<td>Purdue Coordination Diagram, Arrivals on Red, Travel Time,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good State of Repair</td>
<td>Network: CBD, Urban, Suburban (Linear Arterial, Grid, Interchange)</td>
<td>• Equitable distribution of green time, • Frequent service of peds and bikes</td>
<td>Approach Volume, Split Failure, pedestrian / bicycle delay</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>vehicle delay</td>
</tr>
<tr>
<td>Mobility</td>
<td>User mix: peds, bike, transit, vehicle, freight</td>
<td><strong>Throughput:</strong> high density at stop bar</td>
<td>Tuning Movement Counts, Split Monitor, Preemption Details</td>
</tr>
<tr>
<td>Quality Customer Service</td>
<td>Organizational capability</td>
<td>Safety Transfer Right of Way</td>
<td>Yellow and Red Actuations, Queue length</td>
</tr>
</tbody>
</table>
Yellow and Red Actuation

**Goal:** Improve Safety, **Context:** All, **Objective:** Safely Transfer ROW

**Yellow Red Time (Seconds)**

*Source: Utah DOT*
Benefits

Transforms Maintenance and Operations Activity from Reactive to Proactive

- Lower Costs
- Higher Quality of Service to Customers
- Improved Safety and Efficiency

Supports Connection of Day-to-Day Activities with Agency Goals

- Objectives & Performance Based Approach
- Support for funding needs
- Regular Performance Reporting

Supports Asset Management

- Life Cycle Analysis
Challenges

Organizational Capability
- Ad-hoc Management
  - Business Processes not well Documented
  - Workforce
  - Systems & Technology

Reaching Local Agencies

State of Infrastructure

Access to Resources
Deployment Options - Product Neutral

**High Capability / Low Cost**
- Established Business Processes
- High Workforce Capability
- High Systems & Technology Capability
  - HRD capable controller / Communication / Detection

**Moderate Capability / Moderate Cost**
- Developing Business Processes
- Moderate Workforce Capability
- Moderate Systems and Technology

**Low Capability / Higher Cost**
- Ad-Hoc Business Processes
- Limited Workforce Capability
- Limited capability Systems & Technology
EDC-4 Funding Opportunities:

- **Accelerated Innovation Deployment (AID) Demonstration**
  - *New* Notice of Funding Opportunity (NOFO) under FAST Act > GOAL: $10 million per year [23 U.S.C. 503(c)(2)(B)]

- **State Transportation Innovation Council (STIC) Incentive**
  - Up to $100,000 per STIC per year [under AID]

- **Increased Federal-share for Project-level Innovation**
  - Increase federal share of the total project cost [23 U.S.C. 120(c)(3)]

- **Advanced Transportation and Congestion Management Technologies**
  - FAST Act § 6004; 23 U.S.C. 503(c)(4)

- **Federal Aid Program**
  - Surface Transportation Program / Congestion Mitigation and Air Quality

*FAST Act, Sec.1444 & 6003*
Implementation Resources

START BY CONTACTING YOUR LOCAL FHWA DIVISION OFFICE

Workshops
- In Depth Technical Discussion
- Agency Experience
- CMM

Peer 2 Peer Support
- Implementation Sites
- Transportation Pooled Fund Study 5-528

Technical Assistance
- OSADP / Configuration
- National Operations Center of Excellence
- Consultants
The unexamined traffic signal is not worth operating.

~ Curtis
Photo and clip art sources
Furlong, Melissa (FHWA), 9/14/2016