UPDATING THE ITS BENEFITS, COSTS, AND LESSONS LEARNED DATABASES TO BETTER ANALYZE, PLAN, AND EVALUATE YOUR ITS PROJECTS

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PURPOSE OF TODAY’S WEBINAR

• Provide background on the ITS JPO’s Benefits, Costs, and Lessons Learned Databases
• Show how to use the databases to plan and implement a future project using Adaptive Signal Control technologies
• Show how to use the data to analyze ITS technology deployment trends
• Get your feedback on how we can improve the databases to better meet your needs
• Q&A
WHO IS PARTICIPATING TODAY?

457 Registered Participants
ITS DEPLOYMENT EVALUATION PROGRAM
OVERVIEW
ITS DEPLOYMENT EVALUATION PROGRAM OVERVIEW

• Provide information to decision makers to help them plan, procure, and assess effectiveness of ITS investments

• Support future deployment by:
  - Tracking extent of ITS deployment
  - Disseminating data on benefits, costs and best practices of deployed ITS
  - Analyzing data for deployment trends and enablers of adoption
ITS DEPLOYMENT EVALUATION PROGRAM

BACKGROUND

• **1996**: Authorized by Congress

• **1997**: First *ITS Deployment Tracking Survey* conducted

• **2000**: *ITS Benefits, Costs and Lessons Learned Databases* online

• **2003**: First *ITS Benefit and Cost Report* published

• **2018**: Revamp Deployment Tracking Survey and ITS Benefits, Costs and Lessons Learned databases to reflect new technologies and improve user experience
ITS DEPLOYMENT EVALUATION PROGRAM – PORTFOLIO OF PRODUCTS
ITS DEPLOYMENT EVALUATION PROGRAM – PARTNERING
ITS DEPLOYMENT EVALUATION PROGRAM NEAR-TERM FOCUS: NEW TECHNOLOGIES
NEW ITS TECHNOLOGIES ARE CREATING NEW INFORMATION NEEDS: CHANGE IS IMPORTANT

• People need information about new technologies in order to support deployment decision-making
• Update the ITS Deployment Survey and informational databases to reflect new technologies (such as AV, C-AV, and Mobility on Demand (MOD), etc.)
• Need interim results faster
• New audiences are hungry for CV data in any form, especially cost data
• Reorganize how information is presented so audiences can find what they need faster and easier
• New audiences and “new” IT hardware/software encourage new ways of viewing, consuming and searching for digital content
ITS BENEFITS, COSTS, LESSONS LEARNED DATABASES OVERVIEW
BACKGROUND: ITS BENEFITS, COSTS, AND LESSONS LEARNED DATABASES

• The ITS databases support ITS planning, procurement, and deployment, by collecting and verifying 20 years of benefits, costs and lessons learned/best practices from deployed ITS.

• Over 2,100 summaries:
  - 1,100 benefits
  - 371 system costs
  - 4,748 unit costs entries
  - 663 lessons learned narratives

• Recent findings summarized in short fact sheets available on the website and published as an update report.

• Results are widely used by academic and evaluation community:
  - Data used by sketch planning and modeling tools
  - ITS/Transportation courses use databases as a resource
UPDATING THE ITS BENEFITS, COSTS AND LESSONS LEARNED DATABASES

www.itskrs.its.dot.gov
ISSUES WITH CURRENT DATABASES

• Homepage looks cluttered, dated
• Data on benefits, costs and lessons learned/best practices should be findable through a Google search
• Need more interim results – to address delay between project demonstrating results and evaluation report
• Summaries are too lengthy for some and could be more visually appealing for most
• Website is difficult to use on a tablet or mobile device

But...
• Important that the data are still vetted and verified
• Keeping the source for the summary is very important for authenticating the information
REDESIGNING THE DATABASES TO BETTER SERVE YOU

- We are researching strategies to make the information in the databases more:
  - **Findable** – through Google searches and on the homepage
  - **Up-to-date** – with interim results from projects
  - **Comprehensive** – with the latest on emerging technologies in CV, AV, smart cities, shared use mobility
  - **Cleaner and Clearer** – with a redesigned home page, summary pages and better use of graphics and white space
  - **Mobile and Tablet Friendly** – through responsive design
LISTENING TO STAKEHOLDERS TO SURFACE USER NEEDS

- Surface users’ ITS information needs
- Engage users in interactive sessions to describe their user experience.
- Verify and review the user needs and include them in the options assessments.
- Provide stakeholders the opportunity for shape the future ITS Knowledge Resource database design
WHAT STAKEHOLDERS ARE TELLING US

• **If you’re not in Google, you don’t exist.**
  o Making the ITS data and databases more findable is really, really important.

• **We all love clean, modern design and expect searches to be like Google.**
  o The current interface is busy and hard to search.
  o The database structure is difficult to understand even for people who know ITS.

• **Content is king.**
  o The data in the databases is generally useful once you get to it.
  o More visuals would be helpful
  o Reuse and repurpose content to keep websites relevant and fresh.
  o Crowd-sourcing content is appealing to some, but quality control is a concern.

• **Show us the money - users love their cost data.**
  o Frequent questions about costs of new and existing ITS
  o Most popular search is “cost of fiber optic cable.”
  o Users would like more synthesized data and trends for decision makers.
WHAT STAKEHOLDERS ARE TELLING US

• We live in a 24/7 world. Timeliness of data is important.
  o Users tell us that data in the ITS databases should be more up-to-date with info on AV, CV, C-AV and MOD, for example.
  o Evaluation reports can take a long time to complete – the time delay between a project’s start and its evaluation can be three years or more!

• I’ll take that data to go.
  o Mobile and tablet use is increasing. We need to become more mobile/tablet friendly.

• Who you know can be as important as what you know.
  o Personal contacts are second biggest source of decision making info, after Google search.
  o Users would like to know who is active in the field.

• ICYMI - keep reminding us of what ITS Benefit, Cost and Lessons Learned databases have to offer.
  o We are all super busy dealing with the day to day.
  o Promotion of new content is critical to keep users coming back.
POLLING QUESTIONS

Q1. Have you used the ITS Benefits, Costs and Lessons Learned databases within the past year?
   A. Yes
   B. No
Q2. What do you typically use the ITS Benefits, Costs, Lessons Learned databases for? *(select all that apply)*
   - A. Looking for information about ITS benefits
   - B. Looking for ITS cost data
   - C. Looking for lessons learned or best practices
   - D. Seeking any available data on an ITS topic
   - E. Other, please type in chat box
   - F. I don’t use the databases
CASE STUDY: FINDING INFORMATION ON THE ITS KNOWLEDGE RESOURCES
WHAT WOULD YOU LIKE TO KNOW ABOUT ADAPTIVE SIGNAL CONTROL?

• Your agency is interested in making adaptive signal control upgrades at a number of intersections to improve congestion on select corridors.
  - **Benefits** could describe the amount of congestion improvement to expect.
  - **Costs** could provide capital as well as operations and maintenance costs of upgrading traffic signal control systems.
  - **Lessons Learned/Best Practices** may provide considerations for deployment of this technology.

Source: USDOT
UPDATING THE ITS BENEFITS, COSTS AND LESSONS LEARNED DATABASES

www.itskrs.its.dot.gov
ADAPTIVE SIGNAL CONTROL SEARCH RESULTS

83 Benefits
74 Costs
11 Lessons Learned
The ITS Taxonomy is a classification system for ITS applications
- Divided into 16 application areas
- Moves from the broad to the specific

Adaptive signal control is within the Arterial Management application area
SEARCHING FOR ADAPTIVE SIGNAL CONTROL WITH THE ITS TAXONOMY

- There are 217 benefits in this application area
- The application area is divided into 6 categories
- Click the category corresponding to your interest to see those entries

**Arterial Management**

**Surveillance**

- In Monroe County, New York, the closed-circuit television (CCTV) camera provided traffic operators the availability of visual information so they can examine real-time incident conditions and provide a higher and more responsive quality of service to the traveling public. (August 2006)

- ICM diversion route strategies can reduce average delay up to 26 percent, reduce average number of stops up to 42 percent, and increase average speeds up to 9 percent on arterials with traffic signal control. (07/01/2013)

- In Española, New Mexico the implementation of a traffic management system on NM 68 provided a decrease in total crashes of 27.5 percent and a reduction in vehicle delay of 87.5 percent. (September 2, 2008)
COST EXAMPLE

Cost

The capital cost to implement adaptive signal control at 45 intersections was estimated at $3 million. Experience implementing adaptive signal control across multiple townships.

Source

Improving stop-and-go traffic would cost Chambersburg $34,000 a year
Author: Hook, Jim
Published By: Chambersburg Public Opinion
Source Date: 11/19/2014

Summary Information

The information in this source report was derived from interviews with transportation professionals and agencies responsible for planning and operations in Franklin County, Pennsylvania. In District 8 a plan was developed by the Pennsylvania Department of Transportation (PennDOT) to implement adaptive signal control upgrades at 45 intersections. The overall goal was to improve traffic conditions on the US-30 corridor and a commercial area off I-81 at Exit 17 along Norland Avenue and Walker Road. InSync was selected as a traffic management system to automatically adjust signal timing and optimize traffic flow between intersections. Traffic control boxes at equipped intersections were connected using copper wire and fiber optic cable.

- Start-up costs including initial coordination at 45 intersections was estimated to cost about $3 million. This number includes $55,000 per intersection based on PennDOT’s experience with recent smart traffic projects and an additional $500,000 required to establish communication links between intersections.
- Subsequent O&M costs were estimated at $750 per year per signalized intersection.

System Cost

Adaptive signal control: $55K per intersection.
O&M costs: $750 per year per intersection
Communication links (45 intersections): $500K.
COST EXAMPLE - CLASSIFICATIONS

Application Areas

Intelligent Transportation Systems > Arterial Management > Traffic Control > Adaptive Signal Control

Related Unit Cost Subsystems

Roadside Telecommunications (RS-TC)
Roadside Control (RS-C)

Keywords

traffic signals, adaptive signals
MORE RESULTS FROM THE ARTERIAL MANAGEMENT: TRAFFIC CONTROL FACT SHEET
ARTERIAL MANAGEMENT: TRAFFIC CONTROL

Arterial Management: Traffic Control

Introduction

This fact sheet is based on past evaluation data contained in the ITS Knowledge Resources database at www.its.dot.gov. The database is maintained by the U.S. DOT’s ITS JPO Evaluation Program to support informed decision making regarding ITS investments by tracking the effectiveness of deployed ITS. The fact sheet presents benefits, costs, and lessons learned from past evaluations of ITS projects.

Traffic signal control systems are the primary tools used to manage the flow of traffic on arterial street systems. The primary objectives of these systems are to improve traffic flow, reduce traffic delays, and increase safety. Adaptive signal control systems coordinate control of traffic signals along arterial corridors, adjusting the lengths of signal phases based on prevailing traffic conditions. Advanced signal systems allow proactive traffic management by allowing traffic conditions to be actively monitored and archived, and may include some necessary technologies for the later development of adaptive signal control. Coordinated signal operations across neighboring jurisdictions may be facilitated by these advanced systems. Other related systems can be used to improve the safety of all road users at signalized intersections, including pedestrian detection, specialized countdown signal heads, and bicycle-activated signals.

Connected vehicle technologies are facilitating research in new advanced signal systems. The Intelligent Transportation System (ITS) ITS Joint Program Office’s (JPO) Dynamic Mobility Applications (DMA) program is researching advanced signal operations under the Multi-Modal Intelligent Traffic Signal System (MMITSS) research bundle. One significant outcome from this research area is the Intelligent Traffic Signal System (ISIG) application. This application uses high-fidelity data collected from vehicles through vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) wireless communications as well as from pedestrian and non-motorized travelers. The ISIG application seeks to control signals and maximize flows in real time. The ISIG application also plays the role of an overarching system optimization application, accommodating transit or freight signal priority, emergency vehicle preemption, and pedestrian movements to maximize overall network performance.

Collecting data from vehicles in a connected vehicle environment has the potential to help agencies optimize their signal systems according to the locally determined objectives, whether they are focused more on safety, mobility, or the environment. Other area of connected vehicle and traffic signal research is with signal phase and timing (SPaT) data. Several connected vehicle programs are researching the potential of broadcasting SPaT data at intersections, allowing approaching (equipped) vehicles to know the current state of the signal, and then to determine if they will be able to proceed safely through the green light. This data has the potential to increase safety and mobility, and reduce environmental impacts at traffic signals.

The ITS JPO’s Applications for the Environment Real-time Information Synthesis (AERIS) program is also researching advanced signal systems to better understand and optimize for environmental goals. The AERIS Eco-Traffic Signal Timing
### Table 1: Benefit-Cost Ratios for selected Traffic Control Systems

<table>
<thead>
<tr>
<th>Selected Findings</th>
<th>Benefit/Cost Ratio</th>
</tr>
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<tbody>
<tr>
<td>In Oakland County, Michigan a two-phase project to retimze 640 traffic signals resulted in a benefit-cost ratio of 175:1 for the first phase and 55:1 for the second. <em>(2007-00313)</em></td>
<td>175:1 Phase 1 55:1 Phase 2</td>
</tr>
<tr>
<td>The Traffic Light Synchronization program in Texas demonstrated a benefit-to-cost ratio of 62:1. <em>(2008-00507)</em></td>
<td>62:1</td>
</tr>
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<td>Integrated Corridor Management (ICM) strategies that promote integration among freeways, arterials, and transit systems can help balance traffic flow and enhance corridor performance; simulation models indicate benefit-to-cost ratios for combined strategies range from 7:1 to 25:1. <em>(2009-00614)</em></td>
<td>7:1 to 25:1</td>
</tr>
<tr>
<td>Adaptive signal control, transit signal priority, and intersection improvements implemented during the Atlanta Smart Corridor project produced a benefit-to-cost ratio ranging from 23.2:1 to 28.2:1. <em>(2011-00758)</em></td>
<td>23.2:1 to 28.2:1</td>
</tr>
<tr>
<td>Installation of adaptive signal control systems in two corridors in Colorado had benefit-cost ratios ranging from 1.58 to 6.10. <em>(2012-00807)</em></td>
<td>1.58:1 to 6.1:1</td>
</tr>
<tr>
<td>A decentralized adaptive signal control system has an expected benefit-cost ratio of almost 20:1 after five years of operation, if deployed city-wide in Pittsburgh. <em>(2013-00822)</em></td>
<td>20:1</td>
</tr>
</tbody>
</table>
ARTERIAL MANAGEMENT: TRAFFIC CONTROL FACT SHEET

Adaptive signal control benefits found in the knowledge resources from 2003 to 2016:

- Colorado DOT's comparison of two adaptive signal deployments: 14%
- Smart Corridor experience in Atlanta, Georgia: 40%

Bar chart showing:
- Travel Time Reduction (6)
- Increase in Average Speed (2)
- Fuel Consumption Reduction
- Emissions Reduction (2)
- Stop Reduction (4)
- Delay Reduction (3)
- Crash Reduction

Percentage values displayed in the chart.
A user came to us asking for data about the capital costs of advanced signal systems around the country.

The Sample Unit Costs answered the call.

About 15 different sample unit costs for adaptive signal controllers from four states.
NOW IT’S YOUR TURN
Q3. What three things do you think would most improve the ITS benefit, cost and lessons learned databases? (choose top 3)
   A. Shorter summaries
   B. Easier to use search function
   C. More data on emerging ITS
   D. More engaging content on lessons learned/best practices
   E. More frequent updates of the fact sheets and Benefits, Costs, Lessons Learned Report
   F. Other, please type in chat box
Q4. What three things would you like to see in the redesigned ITS benefit, cost and lessons learned databases? (choose top 3)
   A. Interactive charts or visualizations
   B. Sample cost build ups
   C. In-depth case studies on ITS deployments
   D. Benefit-cost data across multiple projects
   E. Data provided directly by user/contributors on current projects (crowdsourced data)
   F. Other, please type in chat box
Q5. Which statement best describes how you feel about using crowdsourced data (project data provided by users who register and login to the website)?

A. Yes, I think that is a great idea.

B. Maybe, if I had the contact name for the data provided.

C. Maybe, if the data were first verified by a USDOT analyst.

D. No way, I don’t think crowd sourced data are reliable.

E. No opinion.
Q6. Please provide a short comment on what would make you more likely to use the databases.

*Please keep responses to within 140 characters (classic Tweet length) to fit in the box.*

**Example:** cleaner design, easier search, more cost data
POLLING QUESTION

Q7. After seeing the demonstration today, how likely are you to use the ITS benefits, costs and lessons learned databases to analyze, plan, and evaluate your ITS project?

A. Very Likely
B. Somewhat likely
C. Not very likely
D. Not at all likely
E. Not sure
QUESTIONS?