ITS DEPLOYMENT TRACKING SURVEY 2016-2017: CONNECTED VEHICLE RESULTS AND BEYOND

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PURPOSE OF TODAY’S WEBINAR

• Provide background on the ITS JPO’s Deployment Evaluation Program and ITS Deployment Tracking Surveys
• Review 2016-2017 ITS Deployment Tracking Survey results on Connected Vehicles
• Q&A
WHO IS PARTICIPATING TODAY?

- Private Sector/Consultants: 55%
- State and Local Agencies: 21%
- Federal Agencies: 8%
- Academia: 10%
- MPOs: 3%
- Associations/Non-Profits: 2%
- Other: 1%
- Other: 1%

464 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 Costs Database

ITS Benefits Database

ITS Deployment Statistics

ITS Lessons Learned Database

ITS BCLL Fact Sheets

ITS Asset Viewer
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 DEPLOYMENT TRACKING SURVEY OVERVIEW
BACKGROUND AND METHODOLOGY

• ITS JPO Deployment Tracking Survey (DTS) originally administered yearly to track and manage progress toward a 10-year ITS deployment goal - Goal set by the Secretary of Transportation in 1995

• Current DTS conducted on a three-year cycle; it continues to monitor deployment and informs various ITS program assessment and deployment goals (but not tracking national goal)

• The online survey targets transportation agencies in 108 metropolitan areas (78 large and 30 medium size areas) - freeway, arterial, and transit management agencies

• Most recent survey conducted 2016-2017 - Responses from 95 freeway, 274 arterial, 99 transit

• Questions and responses are currently posted along with data files on the Knowledge Resources Portal; final report expected in March 2018
WHERE CAN I FIND THE 2016-2017 ITS DEPLOYMENT TRACKING SURVEY RESULTS?

www.itskrs.its.dot.gov
SURVEY RESULTS: CONNECTED VEHICLE FINDINGS
SURVEY QUESTIONS ON PLANS TO DEPLOY CONNECTED VEHICLE (CV)

• Does your agency have plans to deploy connected vehicle applications?
  
  If yes,
  - When do you expect to deploy?
  - Which of the following connected vehicle applications is your agency planning to deploy?

• Agencies were asked if they have been in discussions with public and/or private partners about forming CV partnerships
FREEWAY AGENCIES LEAD ARTERIAL AND TRANSIT IN PLANS TO DEPLOY CONNECTED VEHICLE (CV) APPLICATIONS

Agency Plans to Deploy CV Applications

Base: All agencies

<table>
<thead>
<tr>
<th>% Freeway Agencies (n=95)</th>
<th>62% Planning to Deploy CV</th>
<th>35% Not Planning to Deploy CV</th>
<th>3% No Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>%Arterial Agencies (n=274)</td>
<td>35% Planning to Deploy CV</td>
<td>60% Not Planning to Deploy CV</td>
<td>5% No Response</td>
</tr>
<tr>
<td>%Transit Agencies (n=99)</td>
<td>33% Planning to Deploy CV</td>
<td>62% Not Planning to Deploy CV</td>
<td>5% No Response</td>
</tr>
</tbody>
</table>

Why aren’t more Arterial and Transit agencies planning to deploy Connected Vehicles?
MOST OF THE PLANNED CV DEPLOYMENT WILL OCCUR WITHIN THE NEXT THREE YEARS

**Deployment Timing for CV Applications**

Base: Agencies planning to deploy CV (who responded)*

<table>
<thead>
<tr>
<th>Timing</th>
<th>Freeway Agencies (n=59)</th>
<th>Arterial Agencies (n=87)</th>
<th>Transit Agencies (n=24)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within the next 3 years</td>
<td>61%</td>
<td>53%</td>
<td>63%</td>
</tr>
<tr>
<td>In 3 to 6 years</td>
<td>23%</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td>In 7 or more years</td>
<td>16%</td>
<td>14%</td>
<td>4%</td>
</tr>
</tbody>
</table>

*What factors are delaying deployment for agencies waiting more than 3 years?

*Agencies planning for CV who did not answer the question were not included in base: Freeway=2, Arterial=8, Transit=9.

**Small sample size.
Advanced Traveler Information Systems (ATIS), Road Weather Systems, and Intelligent Traffic Signals are top CV applications for Freeway Agencies.

ATIS and Intelligent Traffic Signal Systems are among the top CV applications planned by Freeway, Arterial, and Transit agencies. Commercial Vehicle technologies are also higher up in the list. One eco-CV application was also of interest.
INTELLIGENT TRAFFIC SIGNAL SYSTEMS AND ADVANCED TRAVELER INFORMATION SYSTEMS RISE TO THE TOP FOR ARTERIAL AGENCIES

<table>
<thead>
<tr>
<th>CV Applications Planned to be Deployed</th>
<th>Base: Arterial agencies planning to deploy (n=95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligent Traffic Signal Systems</td>
<td>67%</td>
</tr>
<tr>
<td>Advanced Traveler Information Systems</td>
<td>53%</td>
</tr>
<tr>
<td>Incident and Emergency Management</td>
<td>47%</td>
</tr>
<tr>
<td>Pedestrian and Bicycle</td>
<td>42%</td>
</tr>
<tr>
<td>Road Weather</td>
<td>35%</td>
</tr>
<tr>
<td>Other Speed Management Applications</td>
<td>28%</td>
</tr>
<tr>
<td>Agency Data Applications</td>
<td>27%</td>
</tr>
<tr>
<td>Reduced Speed/Work Zone Warning</td>
<td>24%</td>
</tr>
<tr>
<td>TransitSafety</td>
<td>19%</td>
</tr>
<tr>
<td>Curve Speed Warning (CWS)</td>
<td>15%</td>
</tr>
<tr>
<td>Eco-signal Operations</td>
<td>14%</td>
</tr>
<tr>
<td>Eco-traveler Information</td>
<td>7%</td>
</tr>
<tr>
<td>Commercial Vehicle Applications</td>
<td>7%</td>
</tr>
<tr>
<td>Integrated Dynamic Transit Operations</td>
<td>7%</td>
</tr>
<tr>
<td>Fee Payments</td>
<td>4%</td>
</tr>
<tr>
<td>Low Emission Zones</td>
<td>3%</td>
</tr>
<tr>
<td>Eco-ICM</td>
<td>2%</td>
</tr>
<tr>
<td>Eco-lanes</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
</tr>
<tr>
<td>No Response</td>
<td>4%</td>
</tr>
</tbody>
</table>

Arterial agencies overlap somewhat with freeway agencies, but arterial agencies show greater interest in bicycle and pedestrian applications. Road weather is also of interest.
TRANSIT AGENCIES ARE LOOKING TO DEPLOY MULTI-MODAL INTELLIGENT TRAFFIC SIGNALS, ADVANCED TRAVELER INFORMATION SYSTEMS, AND FEE PAYMENT

<table>
<thead>
<tr>
<th>CV Applications Planned to be Deployed</th>
<th>Base: Transit agencies planning to deploy (n= 33)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Modal Intelligent Traffic Signal Systems</td>
<td>64%</td>
</tr>
<tr>
<td>Advanced Traveler Information Systems (ATIS)</td>
<td>52%</td>
</tr>
<tr>
<td>Fee Payments</td>
<td>36%</td>
</tr>
<tr>
<td>Pedestrian in Crosswalk Warning (PCW) and Bicycle</td>
<td>33%</td>
</tr>
<tr>
<td>Agency Data Applications</td>
<td>27%</td>
</tr>
<tr>
<td>Forward Collision Warning (FCW)</td>
<td>24%</td>
</tr>
<tr>
<td>Transit Stop Pedestrian Warning (TSPW)</td>
<td>21%</td>
</tr>
<tr>
<td>Reduced Speed/Work Zone Warning (RSWZ)</td>
<td>18%</td>
</tr>
<tr>
<td>Vehicle Turning Right in Front of Transit Vehicle...</td>
<td>15%</td>
</tr>
<tr>
<td>Emergency Electronic Brake Lights (EEBL)</td>
<td>15%</td>
</tr>
<tr>
<td>Curve Speed Warning (CSW)</td>
<td>12%</td>
</tr>
<tr>
<td>Integrated Dynamic Transit Operations (IDTO)</td>
<td>12%</td>
</tr>
<tr>
<td>Other</td>
<td>9%</td>
</tr>
<tr>
<td>No Response</td>
<td>12%</td>
</tr>
</tbody>
</table>

Both Transit (33%) and Arterial (42%) agencies are considering pedestrian and bicycle warning systems.
AGENCIES ARE HAVING DISCUSSIONS WITH PUBLIC AND/OR PRIVATE PARTNERS ABOUT CV PARTNERSHIPS

Connected Vehicle Partnerships
Base: Agencies planning to deploy CV applications

- Yes, both public and private sector partners: 54% Freeway, 40% Arterial, 43% Transit
- Yes, public sector partners only: 15% Freeway, 11% Arterial, 18% Transit
- Yes, private sector partners only: 2% Freeway, 4% Arterial, 3% Transit
- No: 22% Freeway, 43% Arterial, 43% Transit
- No Response: 7% Freeway, 2% Arterial, 6% Transit

Freeway, arterial, and transit agencies are partnering with other agencies for CV deployment and operations.
Will your organization undertake (or support) a CV deployment project/CV research project in the next 3 years?

1. Yes, CV project
2. Yes, CV research
3. Both
4. Neither
5. Don’t Know
SURVEY QUESTIONS ON ISSUES IMPACTING THE DECISION TO DEPLOY CV

• If your agency is not planning to deploy connected vehicle (CV) applications, why not?

• What types of assistance or resources would your agency need in order to begin planning to deploy Connected Vehicle applications?
THERE ARE MANY FACTORS THAT PREVENT AGENCIES FROM DEPLOYING CV APPLICATIONS; THEY DIFFER BY AGENCY TYPE

**Top Reasons for Not Planning to Deploy CV Applications**

Base: Agencies not planning to deploy CV (who responded)*

<table>
<thead>
<tr>
<th>Reason</th>
<th>Freeway Agencies (n=23**)</th>
<th>Arterial Agencies (n=138)</th>
<th>Transit Agencies (n=50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Higher Priorities</td>
<td>30%</td>
<td>52%</td>
<td>30%</td>
</tr>
<tr>
<td>Limited Staffing</td>
<td>26%</td>
<td>43%</td>
<td>28%</td>
</tr>
<tr>
<td>Technical Risks</td>
<td>13%</td>
<td>28%</td>
<td>28%</td>
</tr>
<tr>
<td>Institutional Issues</td>
<td>28%</td>
<td>39%</td>
<td>39%</td>
</tr>
<tr>
<td>Cost</td>
<td>32%</td>
<td>39%</td>
<td>39%</td>
</tr>
<tr>
<td>Unclear Benefits</td>
<td>28%</td>
<td>35%</td>
<td>33%</td>
</tr>
</tbody>
</table>

*Respondents who did not answer question were not included in the base: Freeway=10, Arterial=27, Transit=11.

** Small sample size.

Freeway and Arterials most often cite **other priorities** and **staffing issues**; Transit agencies are more likely to cite **cost**.
FUNDING IS THE MOST DESIRED RESOURCE, BUT EDUCATION AND TRAINING ARE ALSO NEEDED TO OVERCOME BARRIERS TO CV DEPLOYMENT

<table>
<thead>
<tr>
<th>Types of Assistance Needed to Begin CV Application Planning</th>
<th>Freeway Agencies (n=20)**</th>
<th>Arterial Agencies (n=111)</th>
<th>Transit Agencies (n=47)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding</td>
<td>95%</td>
<td>95%</td>
<td>91%</td>
</tr>
<tr>
<td>Information/data on costs of CV technologies</td>
<td>75%</td>
<td>55%</td>
<td>51%</td>
</tr>
<tr>
<td>Information on the benefits/return on investment</td>
<td>65%</td>
<td>58%</td>
<td>57%</td>
</tr>
<tr>
<td>Technology procurement information</td>
<td>65%</td>
<td>65%</td>
<td>68%</td>
</tr>
<tr>
<td>Information on institutional arrangements/agreements</td>
<td>51%</td>
<td>50%</td>
<td>51%</td>
</tr>
<tr>
<td>Training</td>
<td>56%</td>
<td>50%</td>
<td>47%</td>
</tr>
<tr>
<td>Technical assistance</td>
<td>50%</td>
<td>40%</td>
<td>34%</td>
</tr>
</tbody>
</table>

ITS JPO can help fill the information needs through updates to the databases, the Deployment Tracking Survey, CV-focused training and web-based resources including webinars.

*Respondents who did not answer question were not included in the base: Freeway=13, Arterial=54, Transit=14.
** Small sample size.
SURVEY QUESTIONS ON READINESS TO DEPLOY CV

• Familiarity with the Connected Vehicle Reference Implementation Architecture (CVRIA);
• Familiarity with the Systems Engineering Tool – Intelligent Transportation (SET-IT);
• Hiring a Chief Technology Officer/Chief Information Officer;
• Obtaining a Federal Communication Commission license to use a 5.0Ghz Frequency Spectrum (Dedicated Short Range Communication);
• Adoption of CV applications and communication interfaces within their metropolitan area;
• Inclusion of CV technologies and/or applications in agency planning documents.
FREeways AGENCIES ARE THE FURTHEST ALONG IN READINESS INDICATORS; SOME ARTERIAL AND TRANSIT AGENCIES HAVE INVESTED IN CTOs/CIOs

**Summary: Actions Taken by Agencies that Support CV Development**

*Base: All agencies (who responded)*

<table>
<thead>
<tr>
<th>Action</th>
<th>% Freeway Agencies</th>
<th>% Arterial Agencies</th>
<th>% Transit Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hired a Chief Technology Officer or Chief Information Officer</td>
<td>33%</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>Included CV technologies and/or applications in agency planning documents</td>
<td>40%</td>
<td>12%</td>
<td>25%</td>
</tr>
<tr>
<td>Obtained an FCC License to use 5.9Ghz frequency spectrum (DSRC)</td>
<td>26%</td>
<td>12%</td>
<td>26%</td>
</tr>
<tr>
<td>Included CV applications and communications interfaces within your metro area</td>
<td>25%</td>
<td>9%</td>
<td>6%</td>
</tr>
<tr>
<td>Very Familiar With Systems Engineering Tool Intelligent Transportation (SET-IT)</td>
<td>19%</td>
<td>6%</td>
<td>1%</td>
</tr>
<tr>
<td>Very Familiar With Connected Vehicle Reference Implementation Architecture (CVRIA)</td>
<td>12%</td>
<td>3%</td>
<td>1%</td>
</tr>
</tbody>
</table>

*Comms are critical factors*

- Familiarity with architecture & standards is important
- Very Familiar With Systems Engineering Tool Intelligent Transportation (SET-IT)
- Very Familiar With Connected Vehicle Reference Implementation Architecture (CVRIA)

The survey revealed the beginnings of “factors for success” that can show other agencies how to start down the road to CV deployment.

*Respondents who did not answer question were not included in the base: Freeway=17 to 23, Arterial=42 to 70, Transit=17 to 23.
THOSE PLANNING CV ARE MUCH MORE FAMILIAR WITH CV REFERENCE IMPLEMENTATION ARCHITECTURE (CVRIA); FREEWAY AGENCIES IN PARTICULAR

<table>
<thead>
<tr>
<th>Category</th>
<th>Planning to Deploy</th>
<th>Not Planning to Deploy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning to Deploy (n=57)</td>
<td>42%</td>
<td>43%</td>
</tr>
<tr>
<td>Not Planning to Deploy (n=21)**</td>
<td>10%</td>
<td>38%</td>
</tr>
<tr>
<td>Arterial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning to Deploy (n=93)</td>
<td>23%</td>
<td>42%</td>
</tr>
<tr>
<td>Not Planning to Deploy (n=138)</td>
<td>6%</td>
<td>21%</td>
</tr>
<tr>
<td>Transit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning to Deploy (n=31)</td>
<td>10%</td>
<td>29%</td>
</tr>
<tr>
<td>Not Planning to Deploy (n=52)</td>
<td>4%</td>
<td>19%</td>
</tr>
</tbody>
</table>

*Respondents who did not answer question were not included in the base: Freeway=17, Arterial=43, Transit=16.

** Small sample size.
SURVEY QUESTIONS ON COMMUNICATIONS SYSTEMS

To assess whether agencies have the necessary communications systems to support ITS, agencies were asked:

• What type of communications technologies does your agency use to communicate between any of its ITS devices, or between ITS roadside devices and a central processing location?
MOST AGENCIES ARE USING ADVANCED COMMUNICATIONS METHODS TO CONNECT TO FIELD DEVICES

Media Used to Communicate with Field Devices
Base: All agencies (who responded)*

- Fiber: 96% (92% Freeway, 88% Arterial, 79% Transit)
- Cellular (LTE): 88% (79% Freeway, 79% Arterial, 82% Transit)
- Digital Subscriber Line (DSL): 33% (20% Freeway, 19% Arterial, 15% Transit)
- Microwave: 51% (18% Freeway, 18% Arterial, 31% Transit)
- Cellular (GPRS): 31% (8% Freeway, 19% Arterial, 20% Transit)
- Wi-Fi: 62% (15% Freeway, 20% Arterial, 18% Transit)
- Dedicated Short Range Communications (DSRC): 16% (6% Freeway, 13% Arterial, 13% Transit)
- Cable TV: 11% (8% Freeway, 13% Arterial, 13% Transit)
- WiMAX: 13% (7% Freeway, 5% Arterial, 8% Transit)
- Ultra wideband (UAB): 8% (0% Freeway, 8% Arterial, 8% Transit)

*Respondents who did not answer question were not included in the base: Freeway=5, Arterial=61, Transit=22.

Agencies are using a wide variety of wired and wireless communications that can support CV applications.
POLL QUESTION 2

Which types of CV deployment information collected by the survey are/would be most useful to you? *Please select no more than three responses.*

1. Agency Plans for CV Deployment
2. Timing of Planned CV Deployment
3. Planned CV Applications
4. Barriers to CV Deployment
5. Types of CV Assistance Needed
6. CV Readiness Factors (e.g., SET-IT tool)
7. CV Public/Private Partnerships
8. Other
9. None of These
NEXT STEPS

• Meet with Deployment Tracking Survey users and stakeholders to better understand needs of the community of practice
  - Contact us with your ideas
• Update the ITS Deployment Survey
  - For example, what new questions do we need to add to the survey related to CV?
• Implement new questionnaires with next survey (2019?)
POLL QUESTION 3

Which one of the following best describes your experience with the ITS Deployment Tracking Survey? *Please select one.*

1. I have heard of the Deployment Tracking Survey, but have not used the data or the survey reports
2. I have occasionally used the Deployment Tracking Survey data or reports
3. I have frequently used the Deployment Tracking Survey data or reports
POLL QUESTION 4

How will you use the Deployment Tracking Survey data and reports in the future? *Check all that apply.*

1. ITS Deployment Support
2. ITS Project Pre-Planning
3. Academic Research
4. General ITS Knowledge Building
5. Market Research/Trend Analysis
6. Product and/or Service Development
7. Other
8. Do not plan to use the DTS in the future
POLL QUESTION 5

What topics do you think are most important to include in the next ITS JPO Deployment Tracking Survey? **Please limit to 3 topics.**
NEXT WEBINAR: UPDATING THE ITS BENEFITS AND COSTS DATABASES TO BETTER ANALYZE, PLAN, AND EVALUATE YOUR ITS PROJECTS
WEBINAR #3: UPDATING THE ITS BENEFITS AND COSTS DATABASES

- Learn how to use data from the ITS costs, benefits, and lessons learned databases (located in the ITS Knowledge Resources Portal) to help plan your ITS deployment, assist with assessing deployment effectiveness, and aid in the evaluation of your next ITS project.

- Answer questions such as:
  - How much does it cost to implement adaptive traffic control in an intersection or corridor?
  - What are the benefits of this technology and what performance metrics can be used?
  - Where has it been successfully implemented?

- Help us improve the databases to better meet your needs

  Tuesday, March 27, 2018; 1:00 to 2:00 PM EST
ITS Deployment Tracking
http://www.itsdeployment.its.dot.gov/

Contact:
Marcia Pincus
Marcia.Pincus@dot.gov
QUESTIONS?