CONNECTED VEHICLE PILOT Deployment Program

Partnership Finalization and Coordination - Institutional, Business and Financial Issues -

Brian Cronin, ITS JPO, Team Lead, Research and Demonstration

ITS Joint Program Office
Introductions – Today’s Speakers

- Brian Cronin, ITS JPO, Team Lead, Research and Demonstration
- Bill Hyman, Support, Noblis
- Phil Tarnoff, Consultant
TODAY’S AGENDA

- Purpose of this Technical Assistance Webinar Series
  - To assist not only the three selected sites, but also other early deployers of connected vehicle technologies to conduct Concept Development activities.

- Webinar Content
  - Connected Vehicle Pilot Deployment Program Overview
  - Institutional, Business and Financial Issues in CV Deployments
  - Stakeholder Q&A
  - How to Stay Connected

- Webinar Protocol
  - Please mute your phone during the entire webinar
  - You are welcome to ask questions via chatbox at the Q&A Section
  - The webinar will be recorded except the Q&A Section
  - The webinar recording and the presentation material will be posted on the CV Pilots website within a week
OVERVIEW OF CV DEPLOYMENT PROGRAM

Brian Cronin
Sites Selected – 2015 Awards

ICF/Wyoming

- Reduce the number and severity of adverse weather-related incidents in the I-80 Corridor in order to improve safety and reduce incident-related delays.
- Focused on the needs of commercial vehicle operators in the State of Wyoming.

New York City

- Improve safety and mobility of travelers in New York City through connected vehicle technologies.
- Vehicle to vehicle (V2V) technology installed in up to 10,000 vehicles in Midtown Manhattan, and vehicle to infrastructure (V2I) technology installed along high-accident rate arterials in Manhattan and Central Brooklyn.

Tampa (THEA)

- Alleviate congestion and improve safety during morning commuting hours.
- Deploy a variety of connected vehicle technologies on and in the vicinity of reversible express lanes and three major arterials in downtown Tampa to solve the transportation challenges.
**Deployment Schedule**

- **Overall Deployment Schedule**
  - Phase 1: Concept Development
    - Creates the foundational plan to enable further design and deployment
  - Phase 2: Design/Deploy/Test
    - Detailed design and deployment followed by testing to ensure deployment functions as intended (both technically and institutionally)
  - Phase 3: Maintain/Operate
    - Focus is on assessing the performance of the deployed system
  - Post Pilot Operations (CV tech integrated into operational practice)

- **Public webinars to share the concept development activities from the three sites**
  - Concept of Operations Webinar (February – March 2016)
  - Performance Measurement Webinar (May – June 2016)
  - Deployment Plan Webinar (August 2016)
Remainder of Webinar

- Approaches to institutional issues and importance of documentation
  - Some basics
  - Organizational context
  - Institutional Risks
  - User-oriented Business Process Maps
  - Capability Maturity Model
  - Institutional Frameworks
  - Financial Sustainability

- Task 10, Partnership Finalization and Coordination

- Q&A
BASICS AND IMPORTANCE OF INSTITUTIONAL ISSUES

Brian Cronin
Some Basics

- Dynamic tension between two goals at pilot sites
  - Successful local pilot deployment
  - Fostering national deployment

- Deployment is expected to be incremental with some exceptions
  - Norm will generally be DOT-centric or deployment facilitated by toll roads
  - May be a role for public-private partnerships and innovative business models and finance

- Pilots are resources for others to use
  - Documentation of applications, frameworks and models
  - Lessons learned for handling institutional, business and financial issues
Types of Institutional Issues

- The institutional underpinnings of technical systems and elements, for example the organizational entities and relationships that make the following possible:
  - Interoperability
  - Security and credentialing,
  - Classes of CV applications such as safety or freight

- Non-technical systems/subsystems (economic, business, social, cultural, ethical)

- Purely institutional issues (legal authority, regulations, contracts, MOUs, agreements, intellectual property rights)

- Issues concerning different geographic scale or levels of government
  - International
  - Federal
  - State
  - Regional
  - Local
Importance of Institutional, Business, and Financial Issues

It is often said that CV deployment is technically feasible but the real challenges are institutional…

Examples:

- A Midwestern state drafted a statute modeled after Minnesota’s to provide broad authority for ITS Public Private Partnerships, but the legislature never enacted the law.

- Contract negotiations were terminated regarding one of four ITS Model Deployments after the public agencies and their private sector partner could not reach agreement.

- Difficulty developing policy and corresponding institutional and business models for ITS caused a long hiatus in national deployment and large loss of benefits.
INSTITUTIONAL CONTEXT

Bill Hyman
Documenting Institutional Context

- Reasons for Preparing Institutional Context Diagrams
  - Not sufficient to just have technical context diagrams
  - Help to understand roles, responsibilities and relationships among organizations

- How to Prepare Institutional Context Diagrams
  - The Enterprise View of CVRIA/SET-IT
  - PowerPoint
  - Visio

- Example of a Context Diagram
  - Concerns ensuring CV is included in the regional Long Range Plan (LRP) and the Transportation Improvement Program (TIP)
  - Focus on regional decision making
PARTIAL "INSTITUTIONAL CONTEXT DIAGRAM"

- US DOT (Fed Policy)
- STATE (State Policy)
- LOCAL GOVT (Local Policy)

MPO (Coordination, Cooperation)

- Transportation Improvement Program (TIP)
  (Decision Makers Approve CV Applications)
- Long Range Transportation Plan (LRTP)
  (Committee Includes CV Applications)

- Expressway Authority (runs tollway)
- 3 Counties (serves transport users)
- 15 Cities (serves transport users)
- PILOT CITY (Deploys CV)

- Private Sector
  - Freight Firms
  - Other Businesses
  - Contractors

- Transit Entity (Service Provider)
  - Public/Private Partnerships

Agreements, Joint Powers, Laws, Regs, S

Agreement Resource Allocation

Agreement Future Plan

Includes, Includes, Includes, Includes

Includes, Includes, Includes, Includes

Includes, Includes, Includes

Includes, Includes, Includes

Includes, Includes, Includes

Includes, Includes, Includes

Includes, Includes, Includes

Includes, Includes, Includes
INSTITUTIONAL RISKS

Bill Hyman
Inventorying and Assessing Risks

- Do a comprehensive examination of institutional, business, and financial risks as well as related performance measurement issues

- Obtain insights from
  - Proposals and kickoff presentations of own and other Pilot sites
  - Expanded USDOT guidance
  - Early deliverables
  - Literature
  - Discussion with partners and stakeholders

- Prepare risk matrix on institutional, business, financial and related issues

- Incorporate top institutional risks in corresponding Risk Management Plan
Examples of Institutional Risks

- Security Credential and Management System is an example of a technical system with complex institutional underpinnings and risks
  - Risk: May not work seamlessly and reliably to protect security and privacy
- Economic discipline of Industrial Organization provides insight on competition, antitrust, pricing, economies of scale, public and private roles, and gaming behavior
  - Risk: Autonomous and shared vehicles plus multimodal transport likely to affect market penetration and benefits of CV
- Horizontal and vertical equity raise concerns about ability to pay for CV
  - Risk: Backlash due to social inequity of CV deployment
- Increasing numbers of elderly paired with rapid technological advances
  - Risk: Aging population will look to driverless cars, not CV, to maintain mobility
Inventory of Potential Risks (Partial)

National
- Federal law
- Federal Regulations
- Categorical limitations on use of federal funds (Construction, O&M)
- Dedicated spectrum for DSRC
- International coordination
- Interoperability
- Security and privacy (SCMS)
- A major public relations incident that draws national attention
- Coordination with and among federal agencies
- Applicability of the National Environmental Policy Act
- Frameworks for addressing sets of CV applications (Intersections, Freight)
- Chicken or egg structural issues (V2V or V2I first?)

Local, Regional or Unique
- Legal authority and regulations
- Tort Liability
- Regional joint powers authority and cooperative arrangements
- Public-public partnerships
- Public-private partnerships
- Contracts
- Revenues for financial sustainability
- Willingness to pay of users and taxpayers
- Long Range Plan (needs to include CV)
- Transportation Improvement Program (must allocate funds for CV)
- Insufficient trained staff
- Barriers to leveraging local assets (ROW, data, knowledge)
- Low Capability Maturity Level
<table>
<thead>
<tr>
<th>TITLE</th>
<th>OWNER</th>
<th>PROBABILITY (L=1;H=5)</th>
<th>IMPACT (L=1;H=5)</th>
<th>SEVERITY</th>
<th>RESPONSE</th>
<th>MITIGATION</th>
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<tbody>
<tr>
<td>Security and Credential Management System has minor perceived vulnerability</td>
<td>ITS JPO</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>Continue improving safeguards</td>
<td>Strengthen code; provide necessary training to all parties involved; develop and follow rigorous test procedures</td>
</tr>
<tr>
<td>Institutional Review Board does not give approval for Pilot to proceed</td>
<td>State</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>Be as responsive as possible to IRB's concerns</td>
<td>Keep strengthening the case for justifying the Pilot Deployment until the IRB approves</td>
</tr>
<tr>
<td>The TIP includes no funding for CV</td>
<td>State</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>Address need in Long Range Plan; line up funds</td>
<td>Take steady, concerted action to address this need – consider traditional sources of funds, transportation option taxes, creative business models, and innovative finance</td>
</tr>
<tr>
<td>Project Manager (PM) takes another job</td>
<td>City</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>Backfill with qualified PM</td>
<td>Ensure qualified backup is fully engaged in all phases of Pilot deployment</td>
</tr>
</tbody>
</table>
BUSINESS PROCESS MAPS

Bill Hyman
Recommend that Pilots document their applications by using a modified version of a standard business process map.

The modified diagramming convention is based on the following:

- Focus is on users as people and organizations
- Users are operators of vehicles with or without passengers or freight, and with or without OBEs. May be pedestrians or bicyclists with or without nomadic devices
- Shows where the most value accrues or where an actor most contributes value
- There are potential linkages to the performance evaluation (e.g. spreadsheet)

It is recommended that the “As Is,” “To Be,” and “Implemented” cases be mapped.
Modified Business Process Map for CV Intersection Application

Driver of Host Vehicle* & Passenger(s) (Link to directional counts)
- Acquires a vehicle that sends position
- Drives vehicle and sends position
- Approaches or enters intersection
- Drives vehicle that receives position, signal timing and intersection geometry
- Drives vehicle that calculates if crossing path conflict

Driver of Remote Vehicle & Passenger(s) (Link to opposing counts)
- Acquires a vehicle that sends position
- Drives vehicle and sends position
- Approaches or enters intersection
- Drives vehicle that receives position

Agency Staff & Contractors Managing TMC (Link to cost-savings tally)
- Conducts quality checks on combined signal timing and intersection geometry data
- Controls signal timing to meet safety, mobility and environmental objectives

Yes
Likely Crash?

No
Crash & Avoidance Data (Sink)

Receives warning or car takes control to avoid crash
CAPABILITY MATURITY MODEL

Phil Tarnoff
**Capability Maturity Model (CMM) Background**

- **CMM offers** proven technique applied in more than 40 transportation workshops
  - Originally developed for IT industry
  - Refined for Transportation Systems Management and Operations (TSM&O)
  - Extended for Connected Vehicles

- **Use of CMM ensures a balanced program; it is recommended**
  - Addresses both institutional and technical characteristics of Pilots
  - Maintains national deployment as long-term vision
CMM – Dimensions of Capability

- Planning and Programming: prioritizing, benefits and costs, budgeting, planning (both near term and long range)
- Technology and Systems-Design: Systems engineering, standards and procurement
- Technology and Systems-Operations & Maintenance: O&M procedures and responsibilities
- Performance Management: Definition, measurement, reporting and utilization
- Culture: Participants understanding, championship and leadership
- Organization/Staffing: Structure, adequacy and development
- Resources: Adequacy of financial and staff support
- Collaboration: Relationships with participating and external organizations
CMM – Maturity Levels for Each Dimension

Goal for the Future

Optimized
- Performance-based improvement
- Formal program
- Formal partnerships

Integrated
- Process documented
- Performance measured
- Organization/partners aligned
- Program budgeted

Managed
- Processes developing
- Performance measured
- Organization/partners aligned
- Program budgeted

Performed
- Activities & relationships ad hoc
- Champion-driven

LEVEL 1

LEVEL 2

LEVEL 3

LEVEL 4
CMM – Self Evaluation Example

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Level 1 Performed</th>
<th>Level 2 Managed</th>
<th>Level 3 Integrated</th>
<th>Level 4 Optimizing</th>
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<tbody>
<tr>
<td>Planning &amp; Programming</td>
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<tr>
<td>Technology &amp; Syst.-Design</td>
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<tr>
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<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Performance Management</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Culture</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization &amp; Staffing</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaboration</td>
<td></td>
<td></td>
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<td>X</td>
</tr>
</tbody>
</table>

Lowest levels are the constraint
CMM – The Assessment Process

1. Participants Identify the state of play at their site – consensus on strengths and weaknesses
2. Participants Identify current level of capability (criteria)
3. Participants Identify actions to get to next level
4. Follow up: Convert actions to plan for achievement and secure commitment
INSTITUTIONAL FRAMEWORK

Phil Tarnoff
BAA indicates that a robust institutional framework is a desirable output of the Pilot Program.

A key consideration is the program’s long-term sustainability.

Sustainability must be achieved without reliance on Federal funding.

Current DOT-Centric approach may not be optimum for achieving these goals.
Institutional Framework - Alternatives

- DOT-Centric
  - Overall approach defined by USDOT BAA
  - Federal funding is primary resource
  - Contractor selection and system development process governed by Federal and State procurement regulations

- Two additional alternatives are emphasized
  - Public-private partnership (P3)
  - Franchise
  - Not mutually exclusive – public-private partnership can operate with a franchise
  - Suggested alternatives proven for other infrastructure-based applications
Institutional Framework – P3

- **Characteristics**
  - Contractual arrangement between one or more public agencies and one or more private sector entities
  - Skills and resources of public and private sectors are shared
  - Typically managed by a governing board made up of representatives from participating parties

- **Incentives**
  - Private sector funding offsets public sector cost
  - Private sector personnel resources minimize demands on public sector staffing
  - Private sector flexibility when contracting for services and products

- **Advantages**
  - Access to expanded range of funding
  - Public sector retains some degree of control over program
  - Private sector has access to potentially profitable program
Characteristics
- Definition: Privilege of a public nature granted to a private entity (e.g. use ROW)
- Electric utilities and many other industries build out and operate under franchises
- Revenues can come from a utility fee or a franchise fee

Incentives
- Similar to P3
- Private sector has flexibility to determine location and applications to be provided
- Exclusive franchise increases incentive for investment

Advantages
- Attracts outside investment
- Minimizes or eliminates need for public sector resources
FINANCIAL SUSTAINABILITY

Bill Hyman
Need formal commitment to continue to fund Pilots after deployment

Sources of Public Funds
- Traditional sources such as Federal aid, state and local gas taxes, transportation fees and impact fees
- Toll road revenues
- Bonds
- Local option transportation taxes
  - Parking taxes and fees
  - Property taxes,
  - Vehicle registration fees
  - Car rental taxes
  - Sales tax
Some other possible sources of funds in addition to PPPs and Public Franchises

- Shared products or services involving vehicles, infrastructure, products or services through renting or purchase
- A business franchise that replicates a format and logo for selling products or services in different locations
- Internet freemium model offering free and subscription (or member) premium content, either or both possibly ad-supported
- Cost savings of insurance companies resulting from fewer claims due to the safety benefits of the CV system
- Crowdfunding venture capital – in some cases has raised millions

Other Financial Considerations

- FHWA Office of Innovative Program Delivery
- Incentives
- Business Plan with financial statements
To this end, under Task 10, the Pilots are required to document agreements, contracts and subcontracts among partners that cover:

- Agreed-upon and main elements of the ConOps
- Performance measures and targets
- Operational Changes
- Governance framework and processes
- Financial agreements
Stakeholder Q&A

- Please keep your phone muted
- Please use chatbox to ask questions
- Questions will be answered in the order in which they were received
- This Q&A section will not be recorded, nor posted to the website
Join us for the *Getting Ready for Deployment* Series

- Discover more about the Wave 1 CV Pilot Sites
- Learn the Essential Steps to CV Deployment
- Engage in Technical Discussion

Website: [http://www.its.dot.gov/pilots](http://www.its.dot.gov/pilots)
Twitter: [@ITSJPODirector](https://twitter.com/ITSJPODirector)
Facebook: [https://www.facebook.com/DOTRITA](https://www.facebook.com/DOTRITA)

Contact for CV Pilots Program:
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Kate.hartman@dot.gov

December 2015 Technical Assistance Webinars:

- **12/7/2015, 2:00 – 3:30 pm EST**
  *Preparing a Safety Management Plan for Connected Vehicle Deployments*

- **12/9/2015, 1:30 – 3:00 pm EST**
  *Preparing a Security Concept for Connected Vehicle Deployments*

- **12/10/2015, 12:30 – 2:00 pm EST**
  *Preparing Institutional/Business Models and Financial Sustainability for Connected Vehicle Deployments*

Please visit the CV pilots website for the recording and the briefing material of the previous webinars.