Connected Vehicle (CV) Technology Procurement State of the Practice Analysis

Summary Findings

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CV Procurement Analysis
Purpose

- Research and assess current state-of-the-practice for CV Procurement
  - How do transportation agencies purchase (or plan to purchase) ITS CV equipment, systems, and services?
  - “Case study” agencies to provide different real-world examples

- Document challenges, lessons learned, and recommendations from early CV deployers

- Identify potential actions for US DOT to facilitate successful CV procurements
CV Procurement Analysis
Research Plan Overview

- Scan Literature: Oct-Dec 2017
- Develop and Test Questions: Jan-Feb 2018
- Conduct Interviews: Mar-Apr 2018
- Develop Case Studies: May-July 2018
- Document and Share Findings: Summer/Fall 2018

- Preliminary Findings Brief: Jan-Feb 2018
- Survey Instrument: Mar-Apr 2018
- Survey Response Summary: May-July 2018
- Case Study Briefs: Summer/Fall 2018
- Webinar Summary Findings: Oct-Dec 2017

U.S. Department of Transportation
Legend:
- CV Pilot Site
- Interviewed CV Deployment Location
CV Procurement Analysis
Projects/Sites for Contacts Interviewed (11)

- Maricopa County, AZ (Anthem, AZ)
- State of Colorado
  - Denver, CO
    (Smart City ATCMTD Grant)
  - I-70, statewide
- State of Florida
  - Tallahassee, FL
  - Osceola County, FL
- Atlanta, GA

- State of Michigan
- Marysville, OH (ATCMTD Grant)
- State of Pennsylvania
  - Pittsburgh, PA
  - Harrisburg, PA
  - Philadelphia, PA
- State of Utah
- Commonwealth of Virginia
CV Procurement Analysis
Top Motivators for Interest in Deployment

- **Improve Safety!**
  - “Move the needle on safety”
  - Most interviewees mentioned safety as an important goal (#1 motivator)
  - Chance to have a significant impact

- **Improve Mobility and Operations**
  - Manage congestion
  - Enhance access to employment
  - Reduce environmental impact

- **Facilitate Economic Growth/ Stimulate the Economy**
  - Attract high technology businesses/ Support job creation
  - Encourage testing
  - Develop partnerships

- **Support Agency Goals and Direction**
  - Agency sees CV as the future and wants to be out in front
  - Strong leadership and upper management support exists for CV
  - Desire to test the new technologies/equipment
  - Meet the SPaT challenge
CV Procurement Analysis
Planned/Procured CV Applications

- **Safety Applications**
  - Pedestrian crossing/bike safety
  - Red light violation warning
  - School zone/work zone warning
  - First responder preemption
  - Spot weather warning
  - Curve speed warning

- **Data Environment Applications**
  - SPaT/MAP
  - Probe-enabled traffic monitoring
  - Integrated data environment

- **Mobility and Environmental Applications**
  - Multimodal Intelligent Traffic Signal Systems (MMITSS)
  - Adaptive signal control
  - Transit priority
  - Snowplow priority
  - Speed harmonization
  - Queue warning
  - Traveler information
  - Dynamic ridesharing
  - Virtual Active Traffic Management
  - Eco-approach and departure
Interviewees reported that their CV projects have **moderate to substantial software development** requirements. Most projects are being developed using the **Vee Development Model**. Use of **Agile/Scrum methods** was reported by a few interviewees and appears to be **emerging as a trend** for larger projects. A few interviewees said they were using a **phased approach**. Several reported use of U.S. DOT guidance based on **CV pilots documentation** to assist with their approach.
CV Procurement Analysis
Overall Procurement Approach

How Agencies Are Procuring or Planning to Procure CV

<table>
<thead>
<tr>
<th>Approach</th>
<th>Count</th>
</tr>
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<tbody>
<tr>
<td>Design, Bid, Build</td>
<td>6</td>
</tr>
<tr>
<td>Design-Build (Operate-Transfer)</td>
<td>4</td>
</tr>
<tr>
<td>Have not decided yet/unknown</td>
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</table>

n=11
CV Procurement Analysis
Consultant Assistance

Planned Use of Consultant Assistance

- Consultant help for overseeing the work: 7
- Consultant help for preparing procurement specifications: 8
- Consultant help for system planning: 8

*Respondent could select multiple answers

n = 11
Contract Types

- Most agencies are using firm fixed-price contracting (for base tasks)
- T&M (Time & Materials) is next most frequently used
- Optional tasks tend to be done using a T&M approach

Method of Award

- Most agencies appear to be able to use both qualifications and cost factors in selecting contractors
- One agency used a sole-source method of award to bring on a contractor
- For buying equipment (esp. large quantities), public agency may be more limited on method of award
  - Specifications must be very good to enable correct vendor choice
  - If purchase will be made by contractor or another party, public agency can still participate in selection
CV Procurement Analysis
Overall Observations

- Contractor roles vary, but DOTs are giving them a lot of responsibility:
  - Several DOTs have design-build (-transfer) or (-operate-transfer) contracts with contractors
  - Several DOTs are using traditional design – bid – build approach
  - Some DOTs have used both of these approaches for CV projects
  - Most agencies surveyed are using contractor/consultants to perform or assist with project planning, project specifications, and oversight (systems manager roles) as well as a systems integration role

- Some agencies are partnering with universities:
  - Especially for early stage deployments and testing
  - Universities often purchased the DSRC equipment for testing and research purposes

- Many agencies still do not have direct experience with CV procurements
CV Procurement Analysis
Observed Trends

- Scope Expanding from SPaT/MAP only to Multiple Applications
- Increasing Use of Design-Build-Operate-Transfer Approach
- Increasing Use of Agile Development Methods
CV Procurement Analysis
Procurement Challenges Faced

- **Growing pains of a young market**
  - Robust, mature marketplace still isn’t there today
    - Very low market penetration for intersections, roadside, and vehicle equipment
  - Vendors are still fine tuning equipment and software and working interoperability issues associated with deployment
  - **Standards and technology are still evolving**
  - Vendor interoperability claims may not translate to your environment
  - RSU vendors *not always compatible* with varying signal controller equipment across the state
  - Not yet ready for high volume production of devices
CV Procurement Analysis
Procurement Challenges Faced (2)

- **Specifying requirements correctly** to ensure good choice of vendor
- **Communication problems** with procurement staff
- **Understanding and executing FCC licensing process**
- **Funding** may not be readily available for large-scale CV projects
  - Some areas take advantage of the grant programs such as ATCMTD to jumpstart CV deployment efforts
- **Lack of federal mandate and uncertain outlook for DSRC**
  - Changes public agency procurement and market forecast
  - Vendors want to be sure the technology will be used prior to investing more money into research and product development
Procurement Planning

- Explore your contracting options for purchasing CV equipment such as communication devices, RSUs, and OBUs.
- Find a way to test potential offerors equipment with your signal equipment, controllers, and related infrastructure as part of your overall procurement strategy and vendor selection process.
- Source early in the process to help meet schedule goals.
  - Obtain sourcing commitment from suppliers so that they can gear up to meet needed demand for equipment and work with you.
- For big CV purchases with large quantities, consider contracting with multiple vendors to maximize flexibility and manage the risk of not meeting delivery targets.
- Consider technology and standards evolution in procurement and deployment strategy.
CV Procurement Analysis
Recommendations and Best Practices (2)

- **Make use of CV resources** offered by the ITS Joint Program Office (JPO), National Operations Center of Excellence, etc.

- **Use the right expertise**
  - CV subject matter experts
  - Partner with colleagues that have *contracting and legal expertise*
  - Secure access to *expertise in FCC licensing* process for DSRC

- **Communicate effectively!**
  - CV technology is new and can be challenging to understand
  - Involve your contracting and procurement personnel from the beginning of the project
  - Consider use of liaisons to accelerate effective communications
  - Understand and be able to communicate the ultimate CV outcomes or benefits
  - Ask for help when you need it
Plan for ongoing vendor support during testing and initial operations stages
  ▪ Consider use of service-level agreements

Start small to improve chance of success on bigger projects – begin on a small scale with your CV deployment before you tackle a large-scale project

Consider ways to approach CV project development and procurement that are more flexible than the approach of fully specifying and documenting all requirements upfront
  ▪ Consider phased or agile approaches
  ▪ Consider service provider model approach for CV deployments
Installation and Testing

- Plan for hardware and software issues to occur during early testing periods
- Maintain vendor support to address problems during this period
- Use simple, rudimentary installs for prototype OBUs during testing period to find problems, investigate antenna placement, etc.
- Realize that unique installation procedures are needed for special equipment like snow plows
- Build dashboarding type tools to track performance of procurement and installation activity
Schedule Considerations

- Plan time in the schedule for achieving required levels of approval/sign-off for large procurements

- Be conservative in your OBU installation schedule projections
  - If installing OBUs in private vehicles, be aware that many people will not keep their selected appointments
  - May run into unique installation problems with different model vehicles

- Allow sufficient time in the schedule for component and integration testing
CV Procurement Analysis
Knowledge And Technology Transfer (KTT) Recommendations

- Highest priority information need appears to be **model procurement documentation, case studies, and project examples**
  - **CV Pilots website**
    - “CV Pilot documentation has been very helpful in our state & local projects.”
  - SPaT Challenge Procurement Resource
  - Informal networking
  - 3 case studies included in the final report for this project

- **Interviewees also interested in guidance, participating in peer exchanges, and direct technical assistance** on the topic of CV procurement
  - “Provide model documentation and guidance.”
  - “Facilitate a cyber security cohort and other peer exchanges for deployers”
    ....(continues next slide)
  - “Create/develop a contracting approach and mechanism that works well for projects developed using Agile/Scrum methods”
Funding opportunities

- “Sponsor additional USDOT CV projects to assist deployers in understanding the undertaking of CV projects and their corresponding benefits”
- “Focus more resources for large-scale CV deployments, based on CV-Pilot experiences”
- Develop factsheets explaining potential near term funding sources for CV deployment

Training offerings

- “Provide training on network infrastructure and technology behind CV”
- “Educate agencies across the country on CV and AV technologies”
Other Recommendations for USDOT

- “Stabilize standards and certification environment”
- “Serve as technical advisor role by highlighting best practices”
- “Support peer exchange of data to consolidate and share information”
- “Continue to pull out effective things that are learned in the CV Pilots”
Closing

- Next steps?
  - Finalize documentation
  - Continue to share results
CV Procurement Analysis

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