Summary of Responses to the Connected Vehicle Pilot Deployment Program's Request for Information (RFI)

www.its.dot.gov/index.htm
Final Report — May 2014
Publication Number: FHWA-JPO-14-116

U.S. Department of Transportation

Produced by Noblis, Inc.
U.S. Department of Transportation
ITS Joint Program Office

Notice

Technical Report Documentation Page

1. Report No. **FHWA-JPO-14-116**	**2. Government Accession No.**	**3. Recipient's Catalog No.**
4. Title and Subtitle Summary of Responses to the Connected Vehicle Pilot Deployment Program's Request for Information (RFI)		**5. Report Date** May 5, 2014 **6. Performing Organization Code**
7. Author(s) **James Larkin, JD Schneeberger, Taylor Deurbrouck, Rick Glassco, Peiwei Wang and Liz Greer**		**8. Performing Organization Report No.**
9. Performing Organization Name And Address Noblis 600 Maryland Ave., SW, Suite 755 Washington, DC 20024		**10. Work Unit No. (TRAIS)** **11. Contract or Grant No.**
12. Sponsoring Agency Name and Address ITS-Joint Program Office 1200 New Jersey Avenue, S.E. Washington, DC 20590		**13. Type of Report and Period Covered** Final Report **14. Sponsoring Agency Code** **USDOT JPO**
15. Supplementary Notes		

16. Abstract

This document is a summary of all responses the USDOT received from the Connected Vehicle Pilot Deployment Program's Request for Information (RFI) Notice put out by the Federal Highway Administration on 03/12/2014.

17. Key Words Connected Vehicle, Pilot Deployment, RFI	**18. Distribution Statement**

19. Security Classif. (of this report) Unclassified	**20. Security Classif. (of this page)** Unclassified	**21. No. of Pages** 19	**22. Price**

Table of Contents

1 RFI Responders

1.1 Public Agencies

Public Agency
Arizona Department of Transportation and the Maricopa Department of Transportation
Arlington County
Caltrans
City of Detroit
Colorado Department of Transportation
Contra Costa Transportation Authority
Florida Department of Transportation
Florida Department of Transportation
Gateway Cities Council of Governments
Idaho Transportation Department
Los Angeles County Metropolitan Transportation Authority (Metro)
Metra
Metropolitan Transportation Commission (MTC)
Miami-Dade Expressway Authority
Michigan Department of Transportation
Minnesota Department of Transportation
Missouri Department of Transportation
New York City Department of Transportation
Utah Department of Transportation
Virginia Department of Transportation

1.2 Private sector firms

Private sector Firms
Aldis
Arada Systems
Booz Allen Hamilton
Bosch
Codha Wireless
Continental Automotive Systems
CSS Dynamac
Dering & Estrada
Ford Motor Company and Volkswagen Group of America
Indrasoft
Infineon Technologies North America Corp.
Intelligent Imaging Systems
Iteris
INRIX
Kapsch
Leidos
NextEnergy
Productivity Apex
Qualcommm
Sirius XM
Southwest Research Institute (SwRI)
Timmons Group
Verizon
Volvo Group
Weather Telematics

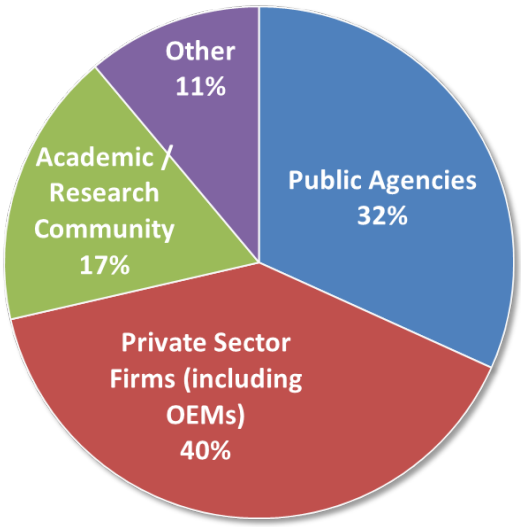
1.3 Academic / Research

Academic / Research
California PATH
Carnegie Mellon University
Idaho National Laboratory
La Trobe University
Oak Ridge National Laboratory (ORNL)
University of California at Riverside
University of Michigan Transportation Research Institute (UMTRI)
University of Minnesota
Texas A&M Transportation Institute (TTI)
Virginia Tech Transportation Institute (VTTI)
Wayne State University

1.4 Other

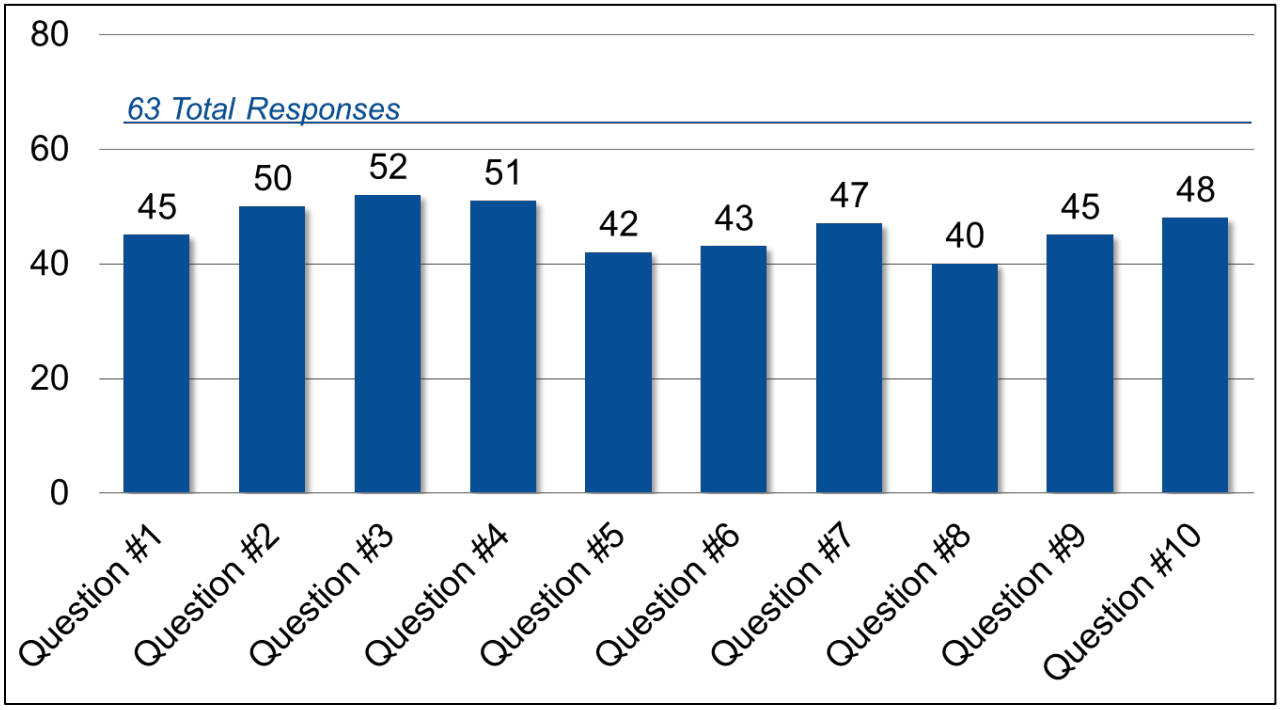
Agency
American Trucking Association (ATA)
Intelligent Transportation Society of California (ITSCA)
The League of American Bicyclists
North/West Passage Pooled Fund Program
OmniAir
Prospect Silicon Valley *(in partnership with the City of San Jose)*
Ridesharing Institute

1.5 Responders by Category



Category	Number
Public Agencies	20
Private Sector Firms	25
Academic / Research	11
Other	7
TOTAL	**63**

1.6 Responses by Question



1.7 RFI Word Wall

2 Question #1

The DOT envisions an initial wave of pilot deployments to be awarded and commence in 2015. Additional waves may follow this first wave, through 2017. After a 12-18-month planning and deployment phase for each selected pilot site, a period of pilot operational testing and data collection is expected. The operational period, results analysis, and publication of final results are anticipated to occur over a period that does not exceed 18 months. Is this schedule too cautious, too ambitious, or about right?

- **Most responders agreed that a 12-18 month planning and deployment phase for each selected pilot site (72%), and an 18 month operation, analysis, and publication of final results (66%) are reasonable.**
- Seven responders recommended allowing **more planning and deployment time**.
- Nine responders recommended **allowing more operation, analysis, and publication time**
- Few responders thought the schedule was **too cautious** based on their experiences or the expectation.

3 Question #2

There are important advantages to conducting multiple deployments, including diversity of innovation, technical approaches, and deployment environments and a more comprehensive assessment of connected vehicle technology impact and potential. At the same time, the breadth of envisioned applications and the potential costs of deployment argue for conducting a small number of deployments with critical mass. Is it feasible to achieve the goals of the program with multiple deployment sites? What is the rough order of magnitude of resources (e.g., cost, vehicles, roadside installations, devices, or size of geographic area) expected to enable a meaningful pilot deployment in a single site? What is an appropriate Federal/site cost share split?

- **The majority of responders agreed that consideration should be given to multiple deployment sites.**
- Only one responder recommended against multiple deployments citing potential limitations to resources.
- Some responders believe that **multiple deployment sites should provide a wide diversity of applications, locations (including urban, suburban, and rural), weather, topological variations, products, jurisdictions, and road types.**
- Rough order of magnitude costs for pilot deployments ranged from **$1 million to $100 million.**
- Most public agencies recommended **80/20** or **90/10 cost share split** and also recommended including soft match.
- Some private sector firms and the academic/research community **recommended 50/50 cost share split.**

4 Question #3

The DOT intends to provide open appropriate access to the data collected as part of this effort through the Real-Time Data Capture and Management Program. Appropriate access includes suitable protections regarding data ownership, intellectual property rights, and privacy.

a. Do you see value in broadly sharing the data with other researchers?

b. Will such data sharing inhibit participation in the pilot deployment program? If so, what mitigation actions will encourage participation?

c.How should the Research Data Exchange be used in support of the pilot deployments? Should data be uploaded as the deployments are being conducted (i.e., real-time feeds) or as daily archives?

- a. Nearly all responders **stated that there is value in sharing the data with other researchers.**
- b. **All of the broad classes of respondents agreed that data sharing is good and will not be an impediment to participation** provided that:
  - PII is removed; Intellectual Property (IP) is protected
  - Proprietary and commercial data is removed;
  - The data sharing agreement is not too onerous;
  - Proprietary software is not revealed and Intellectual Property (IP) is protected; and
  - Research partners are connected with the data.
- c. **Responses on the topic of daily uploads vs. real-time were mixed.**

5 Question #4

To the greatest extent possible, it is the intent of the Connected Vehicle Pilot Deployment Program that algorithms and source code associated with new applications or application enhancements, and funded as a part of these pilot deployments, be made freely available under open source agreements on the Open Source Applications Development Portal. The DOT has identified an open source approach as a method to ensure sharing of Government-funded research products and shorten the time lag between research and deployment.

a. Do you see value in making algorithms and application source code funded by this pilot deployment program broadly available?

b. Will such an open source approach inhibit participation in the pilot deployment effort? If so, what mitigation actions will encourage participation?

c. Should any particular type of application be provided in open source format (e.g., safety applications, non-safety applications, or mobility applications)?

- *d. The DOT seeks to encourage commercially developed applications based on these pilot deployments. What other ave* a. **71% of the responders agreed with the approach as a whole; 18% responders agreed with the approach,** but with reservations mostly having to do with IP rights and if the funding is government based; and **11% disagreed with the approach all together.**
- b. Many of responders think that **if IP rights can be protected** this would encourage private companies to participate.
- C. <u>Which Applications should be provided in open source format?</u>
  - Some responders believed that any application funded by the program should be Open Source.
  - There were **mixed responses about the Safety Applications** with some responders believing they should **NOT** be open source because of security and other agencies believing they should be open source to foster research activities.
  - Many responders believe **security applications should not be Open Source,** but **one agency strongly believed** they should be Open Source to avoid **'security through obscurity' problems.**
- d. <u>What is the Path to Commercialization?</u>
  - Many responders suggested the **fastest way to commercialization** is to have real-world pilot sites **up and running** to demonstrate the technology, benefits, and cost of the pilots.

- A few responders suggested **public/private partnerships as another method to faster commercialization** with fund sharing.

6 Question #5

The DOT wants to use these pilot deployments to support early implementation of connected vehicle technology. Connected vehicle technology needs to be interoperable and, as a result, requires consistency across implementations. What is the role of the Connected Vehicle Reference Implementation Architecture?

- There was **general consensus** from responders that the CVRIA is a useful tool for **identifying the key interfaces across the connected vehicle environment which will support further analysis to identify and prioritize standards development** activities and support a national deployment of connected vehicle technologies.
- Several responders **strongly encouraged the use of the CVRIA to support planning activities for the CV Pilots**
- **Public agencies** saw the potential for the CVRIA to support replication of work already done by the USDOT
- Some private sector responders believed the architecture should define the interfaces to the vehicle via communication technologies and other back-end data exchange requirements, but **should not provide any in-vehicle architecture requirements.**

7 Question #6

How should the pilot programs be used to support early implementation of technologies enabling vehicle-to-vehicle applications?

- **Many public agencies recommended that the pilots use public vehicle fleets** (maintenance, emergency response, transit) possibly equipped with aftermarket devices, and involve commercial vehicles to accelerate deployment of V2V applications.
- **Several public agencies, researchers and private sector firms** emphasized about the importance of working in **partnership with vehicle manufacturers** through consortia such as CAMP.
- **Public agencies and academic researchers** commented on the challenges of developing and testing the **security certificate management system**, **ensuring interoperability of the applications**, and concerns about **developing common standards and architecture**.
- Several of the **private sector firms stated that testing and validation of the V2V applications should be the primary purpose** of the pilots

8 Question #7

The DOT has invested in connected test bed development. What role should the affiliated connected vehicle test beds play in preparing or conducting pilot deployments?

- Many of the responders expressed their views on whether the agencies proposing pilots should be required to obtain affiliated connected vehicle test bed status or work with an existing test bed (affiliated or otherwise).
  - Five responders were opposed to requiring affiliated status
  - Eleven responders supported the idea of the pilots expanding upon or working with an existing test bed.
- Some responders suggested other possible uses of the test beds:
  - Conducting **simulations before deploying** a full pilot;
  - **Continuing testing and validating of standards**;
  - **Testing of alternative architectures**;
  - Researching connected vehicle **applications for vulnerable road users;**
  - Conducting research into technologies such as **vehicle automation, transportation cybersecurity, and "big data" for transportation**; and
  - Forming the basis for a **peer exchange or lessons learned program**.

9 Question #8

The American Association of State Highway and Transportation Officials has prepared a connected vehicle footprint analysis. To what extent can deployment scenarios identified in that analysis be achieved as a part of a pilot deployment?

- Many responders believed that using the AASHTO analysis would be a good starting point for developing or selecting pilot deployments.
- Several respondents felt the AASHTO analysis might be too much to cover in the pilot deployments, but **a diverse set of pilots covering as wide a range of the deployment scenarios as possible is recommended**.
    - Some responders stated that a pilot deployment **should not cover all applications, but focus on the most valuable "low hanging fruit."**
    - Some responders stated that the **value of the applications** should be **determined by the benefit to the real-world needs of the community**.
- Public agencies responded favorably of the AASHTO analysis, but some agencies remarked that **it focused primarily on DSRC applications**.
- Some private sector firms stated that the lessons learned from the pilot deployments should be used **to improve the AASHTO guidance.**

10 Question #9

How can the potential value of connected vehicle applications best be measured and estimated in concert with pilot deployment activities?

- **All responders supported the use of performance measurements** in pilot deployment activities, but suggest a broad range of criteria and/or methods.
- Some responders stated that they support **a 'before and after' study**

11 Question #10

Based on the nature of the pilot deployments, DOT believes that a multimodal cooperative effort involving private and public sector organizations will be required. Feedback is requested on issues including the challenges in forming the teams as a lead organization, a partner, or another participant. What forms or demonstrations of commitment by the participants are reasonable and appropriate requirements of respondents to a solicitation for the pilot deployment program (e.g. letters of intent, proposed matching requirements, or draft project plans)?

- **All responders indicated support for multi-modal cooperative teams** involving public, private, and civic organizations with emphasis on public-private partnerships.

12 Key Takeways

- The responses were overwhelmingly positive with regard to the idea of having CV Pilot Deployments.
- There do not seem to be any major red flags, although there needs to be a nuanced approach around key issues such as data sharing, privacy, and IP protection.
- Security and credential management were brought up in several responses, although the RFI did not specifically ask a question about it.
- The time frame for the pilots was considered to be generally practicable, although some respondents felt the time frame might be too ambitious.
- There appears to be a split between respondents who think of the CV Pilots as primarily non-DSRC and mobility/environmentally related, and those who consider the CV Pilots to be heavily DSRC-dependent and safety-focused.
- The costs estimated range wildly, from as little as $1M to $100M.
- The idea of having multiple sites was broadly supported.

U.S. Department of Transportation
ITS Joint Program Office-HOIT
1200 New Jersey Avenue, SE
Washington, DC 20590

Toll-Free “Help Line” 866-367-7487
www.its.dot.gov

FHWA-JPO-14-116

U.S. Department of Transportation