



Research Problem Statement

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I. TITLE

17-062 Evaluating Connected Vehicle Deployment Readiness for Oregon: Infrastructure and Regulatory Processes

II. PROBLEM

Emerging connected vehicle technologies offer opportunities to substantially enhance safety through communications between vehicles (V2V). There is also a potential to leverage this technology to improve mobility and further enhance safety through interactions with road infrastructure (V2I). NHTSA does not require state and local DOTs to deploy any connected vehicle infrastructure, however it is important for Oregon DOT and local agencies to understand (1) what the pending regulatory decision could mean to us; (2) what Oregon DOT needs to know to prepare for an emerging connected vehicle environment; and (3) what investments could be made in light of FHWA's guidance to leverage a nationwide fleet of equipped vehicle in support of state and local policy and operational objectives (FHWA, 2015).

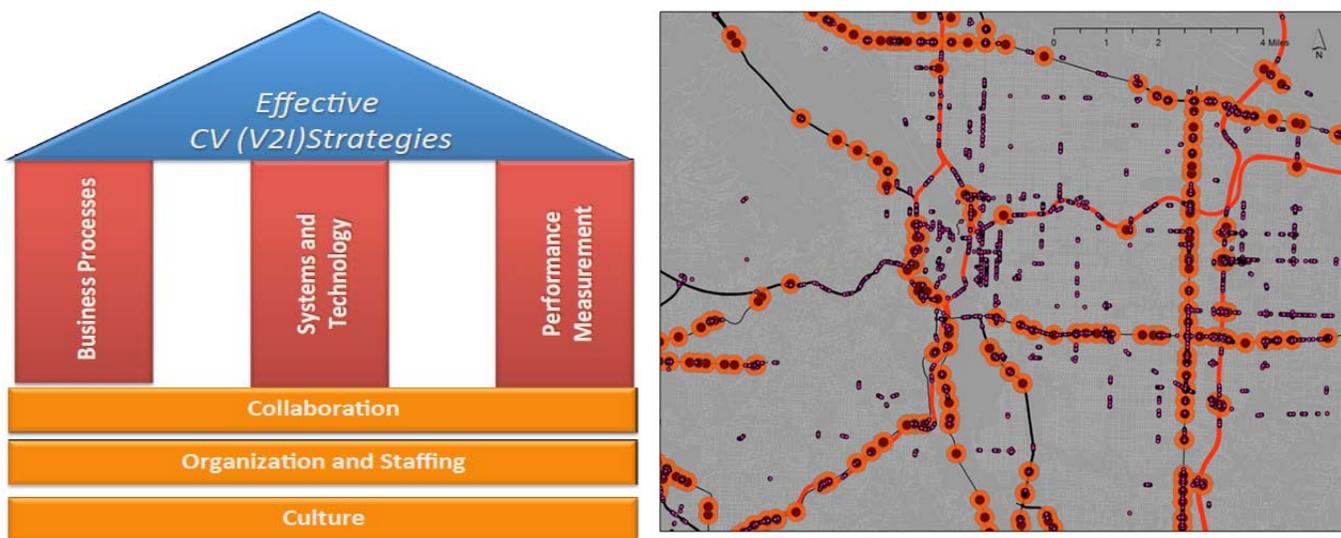


Figure 1: The “Dimensions” of Agency Capabilities to Support V2I (Source: Steve Lockwood) and ODOT ITS Assets

ODOT SPR 764 “Preparing a Possible Oregon Roadmap for Connected Vehicle/Cooperative Systems Deployment Scenarios” has evaluated the internal cultural and technical readiness for connected vehicles (i.e., vehicle to infrastructure communications) by surveying key ODOT staff members. The ODOT CAV initiative team leader and members have participated in connected vehicle deployment meetings at national and state levels to identify opportunities and challenges for Oregon DOT. As a follow up for SPR764, this project will use a structured assessment framework (capability maturity model) to evaluate Oregon DOT’s six dimensions of capabilities for V2I deployment determined as is shown in Figure 1 (Steve Lockwood, 2015). The three pillars/dimensions are process oriented: **Business Processes** including planning, programming, and budgeting (sources); **Systems and Technology** including the use of systems engineering, system architecture standards, interoperability, and standardization; **Performance Measurement** including defining performance measures, data acquisition, and utilization. There are three other institutional dimensions (the foundation blocks shown in Figure 1) which consist of: **Culture** including technical understanding, leadership, outreach, and program legal authority (SPR764); **Organization and Staffing** including programmatic status, organizational structure, staff deployment and recruitment and retention; and **Collaboration** including relationships with public safety agencies, local governments, MPOs, and the private sector. The objective of this research project is to evaluate the readiness of implementing connected vehicle vehicle-to-infrastructure applications in Oregon from infrastructure and regulatory process perspectives. This project will develop strategies for ODOT to improve key agency capabilities at the technical and managerial levels and to develop appropriate outsourcing/public private partnership (PPP) business models.

III. PROPOSED RESEARCH, DEVELOPMENT, OR TECHNICAL TRANSFER ACTIVITY

This project will propose a list of tasks including but not limited to:

Task 1 Literature Review: A thorough literature review including progress made by vehicle manufacturers, U.S. DOT, other state DOTs and MPOs/local agencies in preparation for possible V2I implementation to advance deployment readiness and gain a better understanding of deployment issues for Oregon DOT. This will help inform the decision-making process of V2I deployment readiness regarding where, when, and how to deploy V2I for safety, mobility and environmental benefits.

Task 2 Infrastructure Readiness Planning: Identify a practical and phased approach for regional infrastructure deployment in Oregon. The evaluation will be performed at four different levels: Level 1 - performed, Level 2 - managed, Level 3 - integrated, and Level 4 - optimized for each of the six agency dimensions of agency support for V2I (see above).

Task 3 Statewide Network Analysis: A GIS-based spatial analysis will be conducted for the Oregon statewide network for the 8,300 miles of highway, 55 million vehicle miles traveled (VMT) daily, 805 intelligent transportation assets, and 1955 signal assets to further explore the network coverage for traffic signals and ITS assets (building on SPR 764).

Task 4 ITS Assets and Signals Assessment: Assess scale and feasibility of upgrading Oregon's traffic signal controllers and other roadside devices for DSRC operations. Sketch deployment map for roadside units (RSUs).

Task 5 V2I Deployment Sites and Testing: SPR764 has identified a prioritized list of connected vehicle applications for possible implementation in Oregon based on Oregon's safety and mobility needs. This task will explore the possible deployment sites and smaller-scale testing of the selected applications collaborating with state and local governments. Vehicle manufacturers and the Safety Pilot project in Michigan have been focusing V2V applications. Oregon's focus on V2I deployment differentiates itself from the V2V demonstrations. The latest connected vehicle pilots in Tampa, New York City and Wyoming are focusing on V2I. Some of the potential V2I applications to be tested include curve speed warning (CSW), reduced speed/work zone warning, stop sign gap assist, and pedestrian in signalized crosswalk warning (Transit-PSCW).

Task 6 Regulatory Process: This project will also evaluate the legal and regulatory implementation issues necessary to address the fact that both automated and connected vehicles will require legislative and regulatory actions, resulting in updates to ORS and OAR. This technology will prompt changes to Oregon's Rules of the Road. We anticipate that CAV will have a significant impact on how ODOT regulates vehicles and drivers. ODOT will not be leading this front, but instead follow national standards and best practices.

Task 7 Final report and delivery.

IV. POTENTIAL BENEFITS

This project will benefit ODOT as a public agency to be ready for V2I implementation for potential mobility, local safety, and operational performance, active safety in the future to meet the goal of eliminating fatalities and severe injuries on Oregon's transportation system. At the same time, this project will help the CAV team to better define the business investment map which impacts different areas such as transportation system planning, cultural and workforce readiness, transportation data, strategic investments, systems and technology, legal and regulatory implementation, and collaboration with others.

V. IMPLEMENTATION

This project will produce a V2I capability maturity and readiness assessment framework for infrastructure and regulatory readiness planning. The CAV initiative team and the ITS program will lead the implementation of potential V2I applications and this project will provide decision-making support to identify the relative levels of capability for ODOT today and in the future.

VI. LIST OF REFERENCES

1. FHWA [Vehicle to Infrastructure Deployment Guidance](#) and Products, 2015.
2. Lockwood, S. State DOT Deployment "Readiness" for Connected Vehicle System Support, 2015.

VII. CONTACT INFORMATION

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