Oregon Department of Transportation

Intelligent Transportation Systems (ITS)

Project: Oregon Interoperability Service

Category Entered:

Best New Innovative Practice-Partnership Deployment

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1. **Project Description:**
   a) **What is the purpose of the project?**

The management of highway traffic incidents that occur on Oregon state highways requires the response of multiple state and local government organizations. Emergency incidents can range from a vehicle crash to a landslide that has closed a highway. Interagency communication is needed to insure that the right responders are contacted and are responding.

Prior to the Oregon Interoperability Service (OIS) project, the crossing of organizational boundaries for highway incident communications was done using systems that were not interconnected. This resulted in delays in responding to incidents and inefficiency in incident management. Each agency recorded the incident data in their systems and communication between agency, 911 center and state police dispatch centers was primarily done via the phone.

The new Oregon Interoperability Service (OIS) currently provides automated sharing of incident data between ODOT, Oregon State Police (OSP), Deschutes County 911 and Hood River County Computer Aided Dispatch (CAD) systems with expansion to other 911 centers planned. Incident information is now transferred in a more efficient, accurate, and timely way resulting in improved interagency communication and collaboration. Each agency receives updates, at their preference, that indicate:

a. who is responding to the reported incident,
b. when the responder has arrived on the scene,
c. updated details of the incident and
d. the progress of the management of the incident through its lifecycle.

The system also allows an agency to request assistance from another agency through the OIS and for the other agency to respond with whether or not they have resources available to respond. The new system provides a more efficient, accurate, and effective manner in which to communicate critical incident information. By exchanging data automatically in near real time, the system results in reduced need for agencies to call to relay incident reports to other agencies thereby improving the efficiency of dispatch personnel and the accuracy of incident status information resulting in faster clearance times for incidents.

   b) **What needs and challenges does it address? Whom does it serve?**

In serious or life-threatening incidents, seconds and minutes matter. Safe, quick clearance of incidents improves the safety for both first responders and users of the transportation system as well as reduces the impact of the incident on transportation system operation. The OIS addresses the need for better, more accurate communication of incident details as well as improved efficiency for dispatchers at times when they are most busy. Phone calls are a very inefficient means of data exchange. During busy times, a dispatcher calling another center often has to wait on hold for a dispatcher to be available. Once available, information must be relayed and re-entered into the other agencies CAD system.

Due to these challenges, phone calls often don't get made and critical incident updates impacting coordination of response resources don't get shared. Translation of information via the phone creates the possibility for miscommunication or data entry error. The OIS offers a cross-walk mechanism between different computer aided dispatch software solutions used by the various response agencies allowing those systems to automatically exchange information electronically. Once an incident is shared with other agencies, an additional benefit of the OIS is the ability to

automatically send and receive updates in real-time as the incident unfolds in each agency's CAD system. Ultimately the OIS serves first responders by enhancing the sharing of information about response activities among agencies and enhances the accuracy of the data.

In addition to serving incident responders and dispatchers, the project serves the general public by reducing incident clearance times. By streamlining communications between agencies incident responders are dispatched quicker with better information resulting in reduced clearance times. Reduced clearance times result in reduced congestion and reduce the probability of secondary incidents.

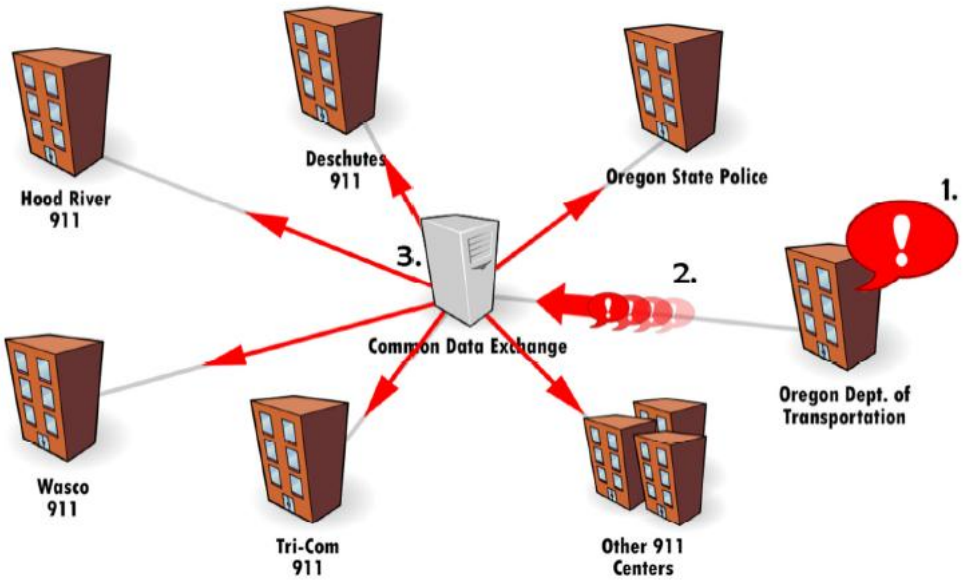

Figure 1 Oregon Interoperability Service Project Overview

c) Was it designed as a short-term or long-term effort?

Prior to 2009, Oregon DOT and the Oregon State Police shared the same Computer Aided Dispatch (CAD) system. In September 2009 when ODOT deployed its own transportation oriented CAD system, ODOT and OSP deployed the ODOT/OSP CAD Interconnect System to maintain the capability of sharing information between the agencies that was available when a common CAD system was used. This interconnect system was an external interface between the ODOT and OSP CAD systems which allowed dispatch personnel from ODOT/OSP to view (real time) the active calls from the other agency. This provided staff the opportunity to monitor the other's active calls, and make a determination as to whether to respond (without waiting for a phone call from the originating agency).

This project concept was to build on the model of the ODOT-OSP Interconnect System and expand it to connect all of the 911 Centers along the US 97 corridor in Central Oregon and then to expand to other 911 Centers statewide. Connecting the Deschutes County 911 Computer Aided Dispatch (CAD) system was the first step in streamlining the communication process. Hood River County 911 CAD system was added to the system in February 2015. Later this year, Wasco County 911 will be the next to join followed by the 911 centers covering Crook, Gilliam, Jefferson, Klamath, Lake, Sherman and Wheeler counties.

The key to the long term strategy was a system architecture that supports the efficient expansion of users. Specifically, the development of a central messaging bus with a connection kit with defined standards based message sets provides an efficient means for a CAD vendor to develop a single interface to the OIS which allows for connection to many endpoints. This is much more efficient than individually connecting to each agency directly and makes the system easily scalable to add more partner agencies. In this way, the project supports the vision of additional users of the system over the long term.

d) How does it further the development and/or deployment of ITS? How does it help the organization achieve its goals?

While there are a few examples of incident sharing between transportation agencies and law enforcement or 911 CAD systems within the US, the architecture of this system takes the integration to a new level. The OIS is a two way data exchange system allowing ODOT to not only view law enforcement or 911 CAD system data, but to also send data to these CAD systems. The synchronization of incidents among CAD systems allows the continuous updating of incident data throughout the incident lifecycle. The system was designed from the ground up to improve interagency collaboration and information sharing about incidents with the specific purpose of furthering traffic incident management safe, quick clearance goals.

2. Project Results: Using a "before and after" comparison, please describe the project's results—the specific and measurable outcomes—and explain how you measure performance.

a) Prior to the start of the project, what were the conditions, results, or situations that serve as "the baseline" against which you compare the project's outcomes?

Prior to implementing the OIS, an incident call coming in to a 911 center would require the 911 dispatcher to contact Oregon State Police dispatch via phone if OSP resources were needed and to contact ODOT dispatch via phone if ODOT resources were needed. The evaluation approach was to analyze CAD system data from Oregon State Police, Deschutes County 911, and ODOT prior to implementation and then to compare that to data from after the implementation.

An analysis of the CAD system data was performed for both the before and after scenario to determine the extent the OIS dispatch interconnect system affected incident response time and dispatcher efficiency. The following performance measurements were analyzed to evaluate the benefits of the system:

- Incident duration
- Notification time
- Dispatch time
- Responder arrival time
- Percentage of highway-related notifications received by ODOT

Table 1 below displays the data details for the before and after evaluation, showing evaluation periods, number of records and type of data available.

Record Source	Previous System (Dec 2010)			New System (Dec 2013)		
	Number of Records	Precision of Recorded Time	Key Data Fields	Number of Records	Precision of Recorded Time	Key Data Fields
ODOT	455	Nearest Second	• Event Date • Event Time • Event Type • Event Location • OSP Event ID Number • Response Unit Dispatch Time • Response Unit Arrival Time • Response Unit Clear Time	303	Nearest Second	• Event Date • Event Time • Event Type • Event Location • Response Unit Dispatch Time • Response Unit Arrival Time • Response Unit Clear Time
OSP	201	Nearest Second	• Event Date • Event Time • Event Type • Event Location • OSP Event ID Number	N/A	N/A	N/A
9-1-1	726	Nearest Second	• Event Date • Event Time • Event Type • Event Location • Agency Involved	728	Nearest Second	• Event Date • Event Time • Event Type • Event Location • Agency Involved

Table 1 Data Details for the Previous and New Systems

b) What are the results of the project?

Kittleson & Associates, Inc. (KAI) analyzed system data, prior to and after implementation, to determine the benefits of the OIS implementation between Deschutes County 911, ODOT and OSP. Table 2 shows the comparison between the period prior to the OIS (December 2010) and the period after implementation (December 2013) of the OIS CAD interconnect project. One of the objectives of the evaluations was to explore change in incident duration (minutes). The incident duration in the ODOT CAD system, prior to the OIS implementation, took an average of 67 minutes to close while incident duration in the ODOT CAD system, after the OIS implementation, took an average of 42 minutes to close. A similar trend can be noticed in the notification time objective, in the dispatch time and in the responder arrival time objective.

Objective		Previous System		New System	
		Number of Observations	Results	Number of Observations	Results
Incident Duration (minutes)	ODOT Events with 9-1-1 Matches	84	67	64	42
Notification Time (seconds)	9-1-1 to ODOT	110	281	69	220
	9-1-1 to OSP	**39***	**244**	**N/A**	**N/A**
Dispatch Time (ODOT Dispatchers) (seconds)	ODOT Events with 9-1-1 Matches	25	211	23	157
Responder Arrival Time (ODOT Dispatchers) (seconds)	ODOT Events with 9-1-1 Matches	12	1736	23	1229
Percentage of Notifications	9-1-1 to ODOT	110/455	24%	69/303	23%

* May have excluded some potential matches between 9-1-1 and ODOT logs

Table 2 9-1-1 CAD Interconnect Performance Measurement Results

c) What is "the new dimension of performance?" How are the results in 2b superior to those in 2a?

KAI's evaluation of the system indicated a 25% reduction (54 seconds) in dispatch response, 30% reduction (8.5 minutes) in incident response and 38% reduction (25 minutes) in incident duration. The results indicated that the OIS has facilitated faster response times and quicker arrivals on scene due to better information sharing and enhanced accuracy of data such as crash locations and which first responders are nearby or already en-route.

One of the objectives of the OIS was to reduce the need for phone calls between agencies. The Deschutes County 911 Manager, Rick Silbaugh, provided the number of calls the agency made to ODOT or OSP. The Table 3 below displays the number of outbound calls for the month of December 2012 (before implementation) and the month of December 2013 (after implementation).

Time Period	911 Phone Calls to ODOT	911 Phone Calls to OSP	Total
December 2012 (before Interconnect System)	96	285	381
December 2013 (after Interconnect System)	42	117	159
% Difference	-56%	-59%	-58%

Table 3 Interconnect System Summarized Impact on 911 Outbound Calls

d) Did the project produce any unanticipated results?

The project generally produced the results expected; although the magnitude of change was higher than expected. The reduction in call volumes was more dramatic than was expected immediately after implementation. The magnitude of reduction in overall incident duration was also more dramatic than anticipated.

3. Project Impact: How does it make a difference in the lives of people?

Incident information is now transferred through more efficient system to system communication resulting in 7-10 minute decrease in response times to provide critical incident response services to the public from ODOT, OSP and Deschutes County. The improvement in communication efficiency has collectively moved the agencies toward quicker and therefore safer highway incident clearance. In addition, quicker clearance reduces delay and improves reliability for transportation system users. An added benefit of faster clearance of incidents is the reduction in the potential for secondary incidents. Improved information sharing also improves the timeliness and accuracy of traveler information for the public. While it is harder to measure, improved interagency information sharing results in the more efficient use of first responder resources.

4. Potential as a Model: How can the project serve as a model that can be replicated or adapted by other organizations?

The OIS project demonstrates the potential for technology to improve traffic incident management. It also demonstrates the value of systems engineering and good system architecture and showcases the use of national standards. The project has already been a model for expansion of the system to other 911 centers within Oregon. It is also a showcase of

what can be accomplished through good collaboration between transportation and other first responder agencies.

5. **Additional Background: Provide information about the origin and implementation of the project, such as: Who was responsible for starting it? Were any particular funding sources, resources, partnerships and alliances particularly helpful in implementing and sustaining it? What is its future?**

   Funding for this project came from a competitive funding program implemented by the Oregon Transportation Commission that was called the Operations Innovation and Demonstration Program. The program was designed to spur innovative thinking and application of technology to improve the operation of the state highway system in Oregon. The project was proposed jointly by ODOT's district office and the Deschutes County 911 center but included support from all of the 911 centers along the US97 corridor in Central Oregon. Project funding was supplemented with a grant for $380,000 from Department of Homeland Security to use for linkages for the remaining 911 Centers that was received by Deschutes County. The grant from Department of Homeland Security was instrumental in implementing and sustaining the project.

   The project evaluation was performed with the original addition of Deschutes County 911 to the system. Hood River County 911 went live on the system in February 2015. The remaining 911 centers utilize the same CAD vendor as Hood River 911, so now that Hood River County 911 vendor has completed the needed modifications to the CAD system the additional 911 centers will have the ability to connect to the OIS with minimal effort from the vendor. The eventual goal is to connect with as many of the Oregon 911 centers as are willing to participate.

6. **Statement by the Project's Leadership: Regarding the processes of innovation, leadership, and building partnerships—have you gained any knowledge or insights that might be instructive or inspiring to others?**

   There have been many lessons learned about managing and completing a project in a multi-agency environment. Clear understanding of the project objectives, and buy-in from all parties from the start is required. Project leadership is essential. It is necessary for one agency to take on the coordination role to keep things moving forward, and it is critical to work through the roles and responsibilities for on-going operations of the system. Putting national standards into practice in a real-world environment also presented many learning opportunities.

   There were many difficult technical and partnership related issues to work through on the project, but maintaining the commitment to the project vision enabled implementation of the project and the achievement of the benefits measured in the evaluation effort. This was possible due to the commitment of the partner agencies on the project.

   "The integrated system has increased the accuracy and number of calls/incidents that 911 receives, by the text-based (non-phone based) relaying of information. Particularly the right information, has allowed our response time to be faster."

   Rick Silbaugh
   Public Safety Systems Manager
   Deschutes County 911

"By utilizing the Oregon Interoperability Service, all responders have the same information. Be it ODOT or OSP, each has a common understanding of what they are about to face on the highway."

Captain Tom Worthy
Oregon State Police