2011 NASCIO RECOGNITION AWARD NOMINATION

Nomination Category: Cross-Boundary Collaboration and Partnerships

Routing on Empirical Data (RED) Project

California Technology Agency

Public Safety Communications Office

Section B. Executive Summary

People can die if 9-1-1 calls are not answered quickly. This simple fact and the need to preserve life and public safety drove the Routing on Empirical Data (RED) Project. The RED Project solution was conceptualized, researched and developed by the California's 9-1-1 wireless project manager. In 2007 the California (CA) 9-1-1 Division determined that 4.9 million (42.4%) of the 11.6 million wireless enhanced 9-1-1 (E9-1-1) calls received a busy signal. The high percentage of busy signals was due to the exponential increase in wireless phones used to make wireless E9-1-1 calls, which overburdened the 24 California Highway Patrol (CHP) call centers that took the wireless calls.

In 2008, the CA 9-1-1 Division developed the RED Project to use existing actual location and wireless data to develop an enterprise solution for making decisions on wireless sector routing. Between 2009 and 2011, the RED project developed cross boundary collaboration partnerships among 464 Public Safety Answering Points (PSAP) managers, 58 County Coordinators (responsible for cell sector routing in their county), 8 major wireless service providers, 2 database providers, 2 local exchange carriers, the vendor, the California State 9-1-1 Advisory Board and the CA 9-1-1 Division.

The primary stakeholders were:

- CA 9-1-1 Division
- CHP
- Sheriff Departments
- County Coordinators
- PSAP Managers
- Local Police/Fire Departments

In June 2008, the State of California in partnership with Public Safety Network began a proof of concept to gather and analyze empirical call data for the 20 busiest wireless sectors routed to CHP Ventura Communication Center. After validating that E9-1-1 calls could be routed from CHP call centers to the appropriate local agencies, the RED project was initiated to optimize E9-1-1 calls to all 58 counties in the State of California.

The RED Project had major innovations in integrating all the data sources for 9-1-1 calls, mapping public safety jurisdictions, on-line rapid information sharing, and secure approval processes to help make decisions that improve wireless 9-1-1 routing with no additional resources or cost. The RED Project's success is shown by improvements in wait times for emergency response services and the following statistics:

- Reduced the percentage of busy calls from 42.4% in 2007 to 4.5% in 2010
- More calls made it through to the appropriate PSAP. In 2007 all PSAPs answered 6.6 million calls. In 2010 they answered 13.5 million (6.9 million more).

RED's success was due to collaboration and strong partnerships of stakeholders that had never been achieved before. Before RED, no project brought together these fire, police, medical and other emergency agencies in a cross-boundary partnership. However, as a result of RED, many of these stakeholders now work together collaboratively on a number of issues.

Section C. Description

Problem: Too Many Wireless Calls Routed to the CHP

When someone calls 9-1-1, seconds can mean the difference between life and death. However, in 2007 the California (CA) 9-1-1 Division identified that 4.9 million (42.4%) of the 11.6 million wireless enhanced 9-1-1 (E9-1-1) calls received a busy signal.

State law (California Public Utilities Code 2892, (PUC 2892)) requires that all wireless calls be routed to the CHP unless additional criteria is met, which then allows calls to be routed to a local PSAP. However, in 2007, the CHP had only 24 call centers with 167 call taking positions, not enough to handle the unanticipated exponential increase in wireless calls routed to the CHP call centers, resulting in a high volume of busy calls that were never answered. To improve emergency response, the CA 9-1-1 Division initiated a project to route the high volume of wireless 9-1-1 calls directly to local PSAPs that had 1,776 call taking positions.

CA 9-1-1 staff met with strong resistance and skepticism when they first approached stakeholders with a concept to resolve the issue as stakeholders felt rerouting calls would be burdensome and difficult. The CA 9-1-1 Division is responsible to manage the 9-1-1 system but needed to meet the additional regulatory criteria to allow the CHP to relinquish cell sectors to local PSAPs. As a result, CA 9-1-1 Division staff pursued a strong collaboration strategy with more than 500 stakeholders across California including state and local governments and the private sector.

Solution: RED Project Overview: Collaborating to Better Use Existing Data

The Routing on Empirical Data (RED) Project conceptualized, designed, and implemented innovative methods to analyze E9-1-1 call data and identify essential data on E9-1-1 call location and the corresponding location of cellular towers. The wireless caller's location (as reported by the caller's cell phone) and cell tower location was used to determine the jurisdiction in which calls originated to optimize routing on more than 140,000 wireless sectors in the State. This data was needed to convince stakeholders to reroute cellular 9-1-1 calls directly to local PSAPs, dramatically reducing 9-1-1 system busies. To reroute cell sectors, the RED Project required:

1. Collection of E9-1-1 Call Data Records (CDR), development of jurisdictional shape files to make a visual representation showing which jurisdiction received the most calls in a sector.
2. PSAPs and County Coordinators agreeing to accept additional cell sectors.
3. CHP to relinquish authority of the agreed cell sectors to the local PSAP.

In 2008, the CA 9-1-1 Division contracted with Public Safety Network, a vendor familiar with gathering and developing data to improve the routing of E9-1-1 cell phone traffic. The proof of concept quickly showed that California could use existing data to identify where E9-1-1 calls originated. With this information, cell phone sectors could be optimized so the 440 local PSAPs with their 1,776 call taking positions could answer calls directly rather than only utilizing CHP's 167 call taking positions.

With the successful proof of concept, initial implementation began in 2009 with overlaying millions of E9-1-1 calls over jurisdictional boundary maps for more than 140,000 cell sectors. Project staff then presented the maps to three groups of decision makers (PSAP, County Coordinator, and CHP) to show which jurisdiction received the majority of calls. If the maps showed that the majority of the calls were in the local PSAP's jurisdiction, that sector could be rerouted to speed the emergency response. To overcome skepticism and organizational inertia, project staff gave stakeholders decision-making power with a web-based geographic information system that enables PSAPs, County Coordinators and CHP to analyze emergency call data and collaboratively determine the most efficient routing for E9-1-1 calls.

To ensure ongoing call optimization, the CA 9-1-1 Division and 500 stakeholders are developing a subsequent project to verify call routing optimization on an ongoing basis.

Project Costs and Management:
The RED Project used existing CA9-1-1 personnel but required a contractor, Public Safety Network, to lead in data management and analysis. Total project costs were just under $8 million. Overall project management was led by the CA9-1-1 Division Project Manager in coordination with the Public Safety Network's PMP-certified Project Manager.

The RED Project's Critical Ingredient: Active Communication and Collaboration:
The RED Project required collaboration among six distinct sets of stakeholder groups that totaled more than 500 individual organizations across state and local government, and private organizations. Without active collaboration between RED Project staff and these participants, the project could not have succeeded. The key wireless participant groups were as follows:

- 440 PSAP Managers
- 58 County Coordinators
- CA 9-1-1 Division
- 24 CHP Centers
- 2 Data Base providers
- 8 Wireless Providers

Because many participants were skeptical of RED at project outset, the project had a robust communication plan that employed active communication, personal contact, and the web-based, interactive GIS system that put decision making power in stakeholders' hands by giving them access to site data. RED developed a web-based graphical user interface that allowed stakeholders to access the site to pull data and collaboratively make sector routing decisions.

To reach stakeholders across the state, project staff maintained email contact and conducted webinars with County Coordinators and PSAPs during every stage of the project to get input and review. The Project Manager gave presentations and training sessions to many of the 440 local PSAP Managers at the County Coordinator's quarterly meetings. Two personalized system training webinars were conducted for each of the 58 County Coordinators prior to 1) the jurisdictional approval process, and 2) the sector selection process. To reach many stakeholders who work non-standard hours in dispatch centers, the Project Manager was available during non-standard business hours to provide training and communication regarding project issues.

Collaboration was critical to develop strong working partnerships between CA 9-1-1 Division and stakeholders. To achieve success, we needed to overcome initial skepticism and resistance to convince all stakeholders to participate. For example, we collaboratively engaged CHP and provided supporting data to local PSAPs to illustrate how distributing the authority of cell sectors would allow more efficient routing of E9-1-1 cell phone calls.

Baseline and changes in metrics:

- The Project reduced missed wireless E9-1-1 calls from 4.9 million calls in 2007 to 639,000 in 2010, a reduction from 42.4% of total call volume down to 4.5%.
- The project simultaneously enabled the system to process an increase in wireless call volume from 11.6 million in 2007 to 14.2 million in 2010.
- The Project allowed California to distribute an additional 2.6 million wireless calls across the state while answering 98 percent of E9-1-1 wireless calls within 10 seconds in 2010. This metric exceeds the National Emergency Number Associations (NENA) standard (Ninety-five (95%) of all 9-1-1 calls answered within twenty (20) seconds.)

Timeline with initiation and implementation dates:

With the successful proof of concept in 2008, the CA 9-1-1 Division began project implementation in 2009. The RED Project has been fully implemented in the Bay Area, Northern California, Central California, and all areas of Southern California except Los Angeles. The statistics covered in this nomination reflect the phases that have been fully implemented to date.

Innovative characteristics:

The RED Project shows that cross-boundary collaboration and technology can produce results, even when working with many stakeholders, few resources, and no authority to require stakeholders to act. RED's innovative characteristics include:

- An aggressive collaboration that involved more than 500 individual stakeholders across government and the private sector. We had to collaborate to get stakeholders to give up control or take calls from a cell sector.
- Standardized jurisdiction maps collaboratively developed and used by stakeholders. Before RED, no standard jurisdiction maps were available.
- Converting existing, scattered data into a usable format to enable decisions on routing of 9-1-1 cell calls. RED rapidly deployed a web-based system to enable decisions. Paperwork for this project would reach over 70 stories high.
- Developing California's first statewide Web-based, Geospatial Information Service that is used by hundreds of public safety agencies to collaboratively determine the most effective emergency responder for wireless E9-1-1 calls received by each of California's 150,000 cell tower sectors.
- Decision processes were simplified by an unbiased presentation of previously unavailable actual 9-1-1 caller locations.

Leverage and Transferability:
All systems and processes developed by the RED Project can be used in other states. Based on the RED Project's success, the State of Massachusetts is adopting California's enterprise solution under the project name "Wireless Direct." The Wireless Direct Project is in the proof of concept phase to review wireless E9-1-1 calls currently routed to the Massachusetts State Police.

Section D. Significance
In today's severely resource-constrained times, the RED Project demonstrates how government can combine collaboration and technology to protect citizens and do more with less. Key areas of significance to government include:

- Using collaboration to convince more than 500 individual stakeholders of the need to adopt new routing methods.
- Using technology to extract usable information from mountains of data and present it in a way stakeholders need in order to make decisions.
- Greatly improved emergency services to citizens with little investment. As a result of the RED Project, more cell phone callers can get through to 9-1-1.
- Creating process improvements such as a centralized database of GIS shape files for public safety agencies in all 58 California Counties, streamlining the approval process to re-route wireless calls among more than 500 stakeholders.
- Creating an enterprise system that is significantly more effective in the management and maintenance of wireless call data collection points.
- The RED Project can be easily copied by other states, as shown by Massachusetts' adoption of the RED methodology.

The RED Project's objectives directly align with Governor Brown's priorities of reducing state costs and improving state efficiencies while furthering state government's mission and strategic goals. For example, the RED Project:

- Utilized cross boundary collaboration and enterprise system implementation consistent with Goal 2 of the Statewide IT Strategic Plan:
    - Drive Innovation and Collaboration: Through collaboration and coordination, and the use of shared governance principles, the State will continue developing innovative solutions that leverage the state enterprise investments in data and infrastructure and enhance the performance, productivity and outcomes of state programs and services.
- Furthers the CA 9-1-1 Division's mission to provide PSAPs with the fastest, most reliable, cost-effective and secure access to emergency services for the public.

The RED Project directly supports NASCIO's priorities of optimization, cost control connectivity, and information management by using existing data to optimize the routing of wireless 9-1-1 calls, which helps avoid costs to state government while improving lifesaving services.

Section E. Benefit of the Project

The RED Project provides a quantitative Return on Investment (ROI) of almost 300% annually through cost avoidance. To answer the 4.9 million calls routed by the RED Project, the traditional approach would have been to hire 233 additional call taking positions at an estimated cost of $21.4 million per year ($1 million in network costs, $400,000 in equipment costs, and $20 million in personnel) compared with a one-time cost of under $8 million for the RED Project.

While the RED Project has improved many facets of California's 9-1-1 program, its greatest benefit is ensuring that people in emergency situations can get through to emergency responders, shaving minutes from response times. This dramatically improves life saving outcomes for the public who call 9-1-1 and increases the chance of survival for a person in cardiac arrest or a family whose house is on fire. The RED Project reduced system busies from 4.9 million missed wireless E9-1-1 calls in 2007 to 639,000 in 2010, a reduction from 42.4% of total call volume down to 4.5%.

The RED Project produced these results:

- Enabled California to process an increase in wireless call volume from 11.6 million in 2007 to 14.2 million in 2010.
- Significantly increased the wireless E9-1-1 call distribution to local PSAPs. In 2007, local PSAPs processed 3.1 million wireless calls. In 2010 they answered 6.6 million, more than doubling the calls that could be responded to by the public safety agency nearest the emergency.
- Reduced calls the CHP takes on behalf of local PSAPs, thereby routing the wireless 9-1-1 calls to the right PSAP the first time.
- Distributed a 22% increase in wireless call volume across California's local PSAPS, allowing the state to answer 98% of 9-1-1 calls in 10 seconds or less, exceeding the NENA Standard.

RED accomplished this by analyzing existing data and using existing resources. For example, RED required:

- No new equipment or software in the 464 participating PSAPs.
- No additional personnel at the 464 participating PSAPs.
- No additional 9-1-1 Network Infrastructure. (e.g. Trunks, Workstations)

In summary, the RED Project developed a unique collaborative response to a common public safety problem using existing resources and an innovative technical and analytical response that are applicable to many other states. The RED Project ensures efficient routing of wireless E9-1-1 calls to the appropriate PSAP the first time. The astounding result of the RED Project is that it showed all participants what state and local government in collaboration with the private sector can do to improve public safety service to our citizens to further improve their quality of life.