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# Homeland security, car crashes and traffic incident data: Killing three birds with one IT architecture

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## 1. Problem

The method for receiving information about an emergency event should be the same whether it is a homeland security event, car crash, or other emergency incident. Unfortunately, in today's environment, incident information is either not collected or not exchanged at all, or occurs in a limited sense between separate systems residing in each emergency response domain. In fact, many emergency response agencies in the United States cannot send or receive incident data. Recent major events like September 11, 2001, the Northeast blackout, and the California wildfires brought to light these deficiencies in our emergency communications infrastructure. Such emergencies demand real time data and interoperable communications across all jurisdictions and domains.

The lack of a national interoperable communications infrastructure is a critical homeland security and emergency response problem. The solution is not for the federal government to buy a new "national emergency network" or to achieve "interoperability" by buying a single software tool for all emergency agencies to use. Nor does the solution need to be a multi-billion dollar, decade-long challenge. Our emergency responders need communications tools that provide first class, all-hazards incident management and response nationwide. With an emergency response coalition, great progress can be made.

## 2. NEARS solution

The National Emergency Alerting and Response Systems (NEARS) Initiative implements an interoperable emergency messaging framework using national emergency message standards, commercial information technologies, and shared facilitation services. It is a three-track initiative that promotes the interoperable framework, develops the service, and tests it for national implementation with actual deployments in several regions.

The program is endorsed and led by a growing, diverse coalition of emergency response and industry organizations that include representatives from fire, law enforcement, 9-1-1, emergency medical services (EMS), emergency medicine, public health, emergency management, private infrastructure, and media. Collectively these coalition members represent over 50,000 individual agencies and over 400,000 individuals in the emergency response professions.

## 3. NEARS discussion

The NEARS framework enables the exchange of incident information. It can be used for all hazards, from homeland security to public warning and everyday emergency events such as traffic incidents. Organizations can use it to ensure that they receive real time information about emergency events such as those that affect traffic flow and information for the responders trying to reach the scene. The framework offers a unified emergency Web services architecture that ties together the various data systems used by law enforcement, fire, emergency medical, public health, transportation and emergency management agencies, among

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others. It treats the entire emergency response community as one extended enterprise. It promotes the use of common standards and shared common services to enable secure, authorized communications across professions and jurisdictions while, at the same time, allowing agencies to maximize their current technology investments.

As seen in Fig. 1, there are five architectural layers that must be in place to achieve effective data interoperability using the NEARS framework. These layers include data *transport*, *standard data sets*, shared *facilitation services*, individual *agency applications*, and the *policies and protocols* that govern the use of the system when data interoperability is achieved.

The *transport* layer represents the networks used for communications. This layer manages the end-to-end delivery of messages and determines how data are transferred between network devices. It manages user sessions and dialogues, and controls establishment and termination of logic links between users. The framework requires reliable and secure broadband data connections using Internet protocols.

*Standards* create a common language that enables data sharing between individual agency application systems. Recently many XML standards efforts have been launched by the emergency response community. As “grass roots” efforts, practitioners develop and field test emergency message standards. To date, these efforts have resulted in many XML standards including the Common Alerting Protocol<sup>1</sup> (CAP), the Vehicular Emergency Data Set<sup>2</sup> (VEDS), and the Emergency Data Exchange Language<sup>3</sup> (EDXL) suite of standards.

*Facilitation Services* are common shared tools, services, and resources offered through a collective effort of the emergency response community. They enable interoperability and are available for use by authorized emergency

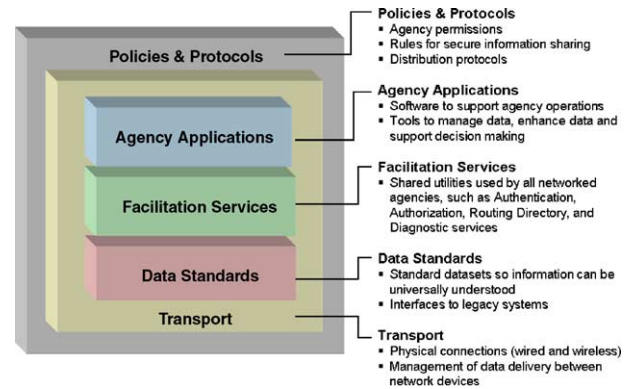


Fig. 1. Data interoperability architectural layers.

entities. These services include, but are not limited to, security, diagnostics, routing directory, identity management, access control, digital rights management, and authentication.

By using these facilitation services, agencies do not have to spend their limited funds creating and maintaining these functions on their own. Some agencies have already started to create some of these services, but struggle to maintain them. Take the case of a simple routing directory. Data cannot be routed without a directory of agencies and their electronic addresses. Each user or vendor can create its own, which by definition ensures less quality, less comprehensiveness, and less accuracy. Rather than the inefficient profusion of single purpose directories, the more efficient alternative would be a shared utility, owned and managed by all emergency response professions collectively. The Emergency Provider Access Directory (EPAD) was designed for this very purpose under a grant from the Department of Justice. It is a secure registry where authorized agencies enter their name, contact information, professional function, level of government, geographical areas of interest for each type of incident, and emergency data delivery address(es). The simple act of registration supports the automatic routing of vital information about a mass emergency or a single event quickly and securely.

There are numerous emergency *agency applications* in use today, including complex Computer Aided Dispatch Systems (CAD), web-based emergency management tools, local and statewide GIS systems, hospital capacity reporting systems, and other applications. Agencies are encouraged to purchase systems that best meet their needs. However, in order to operate in the NEARS framework, these applications must be able to send and receive XML messages to and from other applications in standardized formats. It should not matter to a 9-1-1 CAD system that it is receiving data from an emergency management tool about a flood, a telematics message from OnStar, a bio-terrorism alert from the Center for Disease Control (CDC), or data from a wireless or Voice over Internet Protocol (VoIP) call. The same data interface should be used.

<sup>1</sup> The Common Alerting Protocol (CAP) standard is an open, non-proprietary OASIS (Organization for the Advancement of Structured Information Standards) standard for the exchange of emergency alerts and public warnings over data networks and computer-controlled warning systems.

<sup>2</sup> The Vehicular Emergency Data Set (VEDS) is an XML standard for the transmission of telematics data to emergency agencies. Initially designed to transmit Automatic Crash Notification data to an emergency agency, VEDS also serves as a data receptacle, collecting important bits of information as the response effort unfolds. The data set can contain data transmitted directly from the vehicle like vehicle speed, airbag deployment, direction of force and rollover, as well as information from the telematics provider about the vehicle and its owner. Questions asked by a 9-1-1 operator about the age and gender of the occupants and data from responders and witnesses at the scene can be added as well.

<sup>3</sup> Department of Homeland Security Disaster Management eGov Initiative launched a program in 2004 to facilitate standards development by bringing together leaders from all professions needing to share data during emergency response operations. This effort resulted in the Emergency Data Exchange Language (EDXL) suite of emergency messaging standards. The OASIS Emergency Management Technical Committee manages the review and approval of all EDXL standards after practitioner development.

The NEARS framework is not complete without the *policies and protocols* that determine rules for operating within it. Does a hospital have the same privileges as the county Department of Transportation (DOT), the 9-1-1 center, the police, or the towing company? Who has access to what data and who is allowed to send what messages? These policies and protocols need to be addressed by the organizations using the system before this architecture is deployed.

#### 4. Summary

The NEARS five-layer architecture enables the integration of data providers to data collectors. Data from devices in cars and trucks, incident data, or personal medical data can immediately be sent to those registered and authorized to receive this type of information. The framework provides one approach for all-hazards emergency messaging, whether messages are about mass emergencies or single events, and whether an agency needs to contact other agencies, private entities, or the public. It is adaptable for use by a wide range of organizations and improves operational efficiency so the focus is on emergency response, not on the administrative tasks of data entry, looking up contact information or filing paper records.

#### 5. Impact on industry

Through NEARS, traffic management systems as well as other discipline-specific systems can be integrated across the entire emergency response spectrum. Real time data can be collected for all types of hazards, improving the ability to detect trends and threats. Traffic managers will know immediately when an emergency event occurs. Responders can receive timely information about road conditions and traffic information to determine the most navigable route to an incident. Traffic congestion will improve and the possibility of secondary incidents will diminish.

**Judith Woodhall** is Managing Director of COMCARE. Currently she is focused on two major initiatives: the development of the Emergency Provider Access Directory (EPAD) and the deployment of the National Emergency Alerting and Response Systems (NEARS) program designed to enable geographically targeted emergency data messaging across disciplines and jurisdictions. Through her work with EPAD and NEARS, Ms. Woodhall has worked closely with stakeholders representing the disparate emergency response disciplines as well as with technology vendors whose products are being used by these stakeholders. Judith earned a bachelor's degree from the University of Rochester and a master's degree in computer systems management from the Rochester Institute of Technology. She can be reached at [jwoodhall@comcare.org](mailto:jwoodhall@comcare.org). This paper summarizes a presentation given at the 2005 Traffic Records Forum held in Buffalo, New York. Similar papers and presentations have been given by Ms. Woodhall at other conferences.