

**L**arge-scale events have broadened the definition of interoperability to include the exchange of voice and data among organizations and agencies, horizontally — CAD to CAD — and vertically within command echelons and levels of government. Through this evolution, the technologies have progressed from using proprietary data formats to open Internet Protocol (IP)-based rules, underscoring the need for standards to ensure the integration of data from various systems and transform it into actionable information.

Technological advancements frequently solve problems, but in doing so may present new challenges. For example, the conversion from analog to digital transmissions was a technological leap that provided more capacity on wireless networks. This, however, presented a major problem in that radio vendors created their own over-the-air digital protocols, causing major radio interoperability issues. To mitigate, radio standards such as APCO Project 25 and Terrestrial Trunked Radio (TETRA), have helped streamline communications among responders during large-scale incidents.

Now the challenge lies in the ability for agencies and organizations to coordinate multiple, disparate data types while responding to a major event. As part of this evolution, agencies in various parts of the world have begun consolidating or changing their organizational structures to improve operational efficiencies and leverage their investments in supporting technologies. This has solved part of the problem, but cross-agency communication and collaboration during emergency response remains a challenge. The need for standards to ensure the successful transmission of vital data, wherever it is needed, is of paramount importance.

The growing asymmetrical threat of

## The life of standards

Steve Marz &  
Robert Scott III

terrorism and natural catastrophes have punctuated this need among public safety and security agencies. The events in Madrid, London, and Mumbai emphasize the fact that terrorism is a global concern. Additionally, Hurricane Katrina, the earthquake in Haiti, and the wildfires in Australia demonstrated the need to expand response to "all hazards" for emergency management and multi-agency interoperability. Security experts are expending considerable effort to improve preparation, prevention, detection, assessment, response and recovery — shifting us from a security paradigm of concrete and barbed wire to one of intelligence fusion. While doing so, it's essential we don't

introduce new problems with the very technology we use to help us advance toward our goals.

IP-based protocols promote data convergence and help us on the path to achieving operational interoperability. However, without standards, barriers remain. Today's standards play a vital role in solving today's challenges; standards for formatting and exchanging data include the Extensible Markup Language (XML) and the Standard Query Language (SQL). Additionally, the standard for information exchange, National Information Exchange Model (NIEM), provides the context in which to share data to enable information flow. As software and system providers produce applications that support these common data formatting and exchange standards, it will become easier to achieve true interoperability.

### Bringing life to standards

There are many means through which standards are brought to fruition. The industry has made significant strides during the past decades to drive geospatial standards. The Open Geospatial Consortium (OGC) and the Infrastructure for Spatial Information in Europe (INSPIRE) are driving spatial data standards within the industry to ensure decision-makers have access to shared information from disparate sources.

In the domain of emergency management and the operational environment this represents, these standards are used to fuse information to create a digital map. Geospatial context truly supports the old adage that "a picture is worth a thousand words," and the digital map is the optimal

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visualization tool to display complex data for decision support. The terms "common operating picture" (COP) and "user-defined operating picture" (UDOP) represent the digital map and its supporting data, enabling commanders and responders to share up-to-date operational information.

In the United States, the Integrated Justice and Information Systems Institute (IJIS) is leading the way for interoperability standards. IJIS is helping drive the adoption of NIEM across the United States, and even globally.

A prime example of how IJIS and NIEM are being incorporated in operational usage is a recent initiative driven by the City of Richmond, Va. One of the challenges associated with emergency

call-handling is the passing of alarm calls from a central station monitoring company to a public safety answering point (PSAP). Typically, this is accomplished by a phone call between the alarm company and the PSAP, which wastes time and is prone to errors. Richmond, which used Intergraph's computer-aided dispatch system, began working to solve this issue by spearheading an effort to automate the process and develop a standard for the industry. The standard was approved in January 2009. Richmond's two-year pilot External Alarm Interface project eliminated approximately 8,250 calls from residential and commercial security companies. This reduction means more efficient use

of 911 call-taker resources in the PSAP, and has reduced response times by at least 2 to 3 minutes, saving precious time and lives. Together, Richmond and Intergraph worked to define, develop and test the standard, which uses an XML-based approach that conforms to NIEM to facilitate the electronic transmission of critical data from alarm monitoring companies to PSAPs. This eliminates call-taker time spent manually gathering and inputting alarm alert information. The program's suc-

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cess has made it an American National Standards Institute (ANSI) standard, now recognized by the Association of Public Safety Communications Officials International (APCO) and the Central Station Alarm Association (CSAA). Each year across the United States, 911 call takers, managing more than 32 million incoming calls for assistance, stand to benefit from this technology.

Another example of an emerging standard for interoperability is the Unified Incident Command and Decision Support (UICDS) project, sponsored by the Science and Technology Directorate of the U.S. Department of Homeland Security. UICDS is a standard currently undergoing development to create a national emergency information sharing architecture. UICDS is executed through a contract with prime contractor, Science Applications International Corp. (SAIC). As part

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of a team led by SAIC, Intergraph has successfully demonstrated that emergency personnel can share information independent of the specific CAD product in use. Through a central core of middleware, users can subscribe to a feed of CAD data to monitor for incidents that meet specific criteria, such as region or type, and publish requests for assistance from other agencies when such an incident occurs. This advanced interoperability promotes situational awareness and cross-jurisdictional information sharing.

The UICDS initiative enables commercial and government incident management entities to share information and support decisions for the National Response

Framework (NRF) and National Incident Management System (NIMS) to prevent, protect, respond and recover from catastrophic events. After two successful demonstrations to several state and federal agencies, the UICDS team continues to refine the architecture and broaden the workflows supported by the middleware foundation.

To achieve operational interoperability in today's world is a complex endeavor. Standards are required to enable the sharing of data for systems to begin exchanging data and commands, in both a syntactic and semantic context, to derive information for decision-making and coordinated response efforts. But the technological challenges are just the beginning; breaking down hierarchical and interagency communications barriers must also occur.

To achieve optimal situational awareness across agencies, standards and best practices must progress and be applied. Government entities around the world must continue to fund pilot programs, such as UICDS, to work through policy, doctrine, governance and technology issues to drive these standards and approaches forward. Much has been done and is now in place, but there is still more to do before applications, solutions, and protocols are truly plug-and-play, and we achieve the desired state of complete operational interoperability. ■

*Intergraph Vice President of Public Safety Steve Marz can be contacted at [steven.marz@intergraph.com](mailto:steven.marz@intergraph.com). Professional Engineer Robert H. Scott III is the executive director of Security Solutions at Intergraph. He can be contacted at [robert.h.scott@intergraph.com](mailto:robert.h.scott@intergraph.com).*

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