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Tech Notes

Next-Generation Incident Command System

An integrated sensing and command-and-control system enables a coordinated, collaborative disaster response by improving situational awareness

The nation's emergency response capabilities have received significant attention because of the continued need to prevent, protect, respond, and recover from natural disasters, technological compromises to critical systems, and terrorist attacks. Today's information-sharing systems are stressed during large-scale events that involve thousands of responders from multiple jurisdictions and agencies working on response, relief, and recovery efforts. Organizing, coordinating, and commanding these efforts are significant technical and operational challenges, requiring timely collection, processing, and distribution of accurate information from disparate systems and platforms.

Currently, it is difficult to enable shared situational awareness and collaborative command and control across all participating responders and agencies, particularly when the communication environment is compromised by infrastructure outages.

The Next-Generation Incident Command System (NICS), formerly the Lincoln Distributed Disaster Response System (LDDRS), is developed by MIT Lincoln Laboratory in partnership with the California Department of Forestry and Fire Protection (CAL FIRE) and sponsored by the U.S. Department of Homeland Security (DHS) Science and Technology Directorate. NICS is designed to improve first-responder situational awareness and collaboration,

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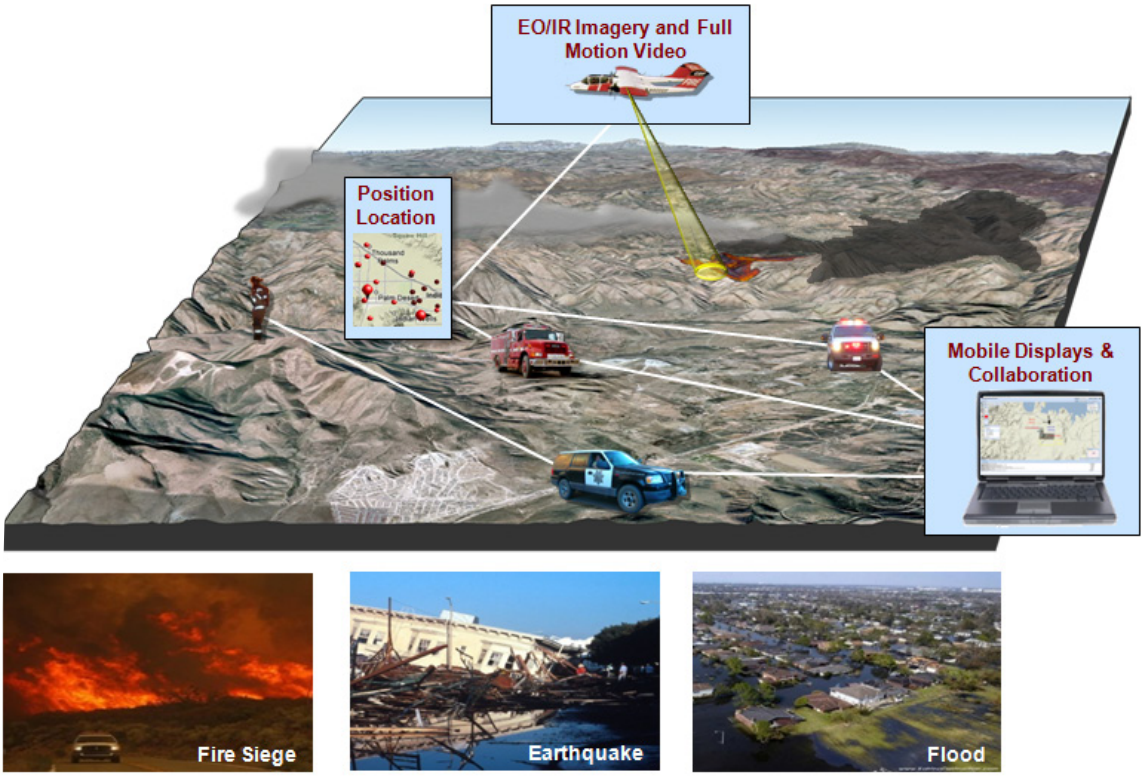

Figure 1. NICS combines sensors with communications and visualization technologies in a net-centric architecture to enable real-time, shared situational awareness during response operations.

as well as interagency interoperability in disaster response. NICS is a reliable, distributed, and scalable system that enables a common situational awareness picture to enhance collaborative command and control for first responders (Figure 1).

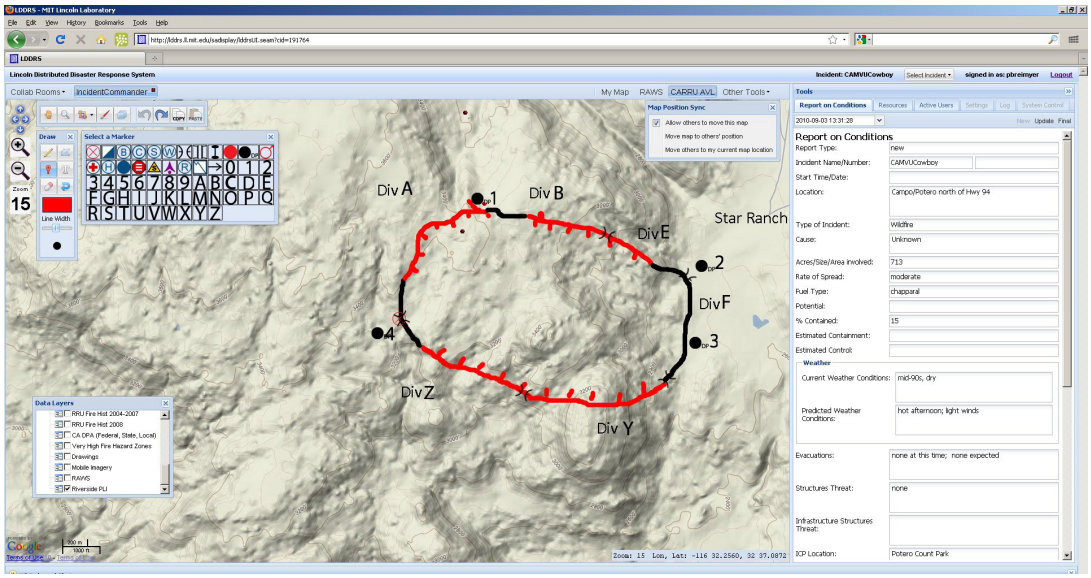

Figure 2. A web-based user interface allows multiple responders to share situational awareness across multiple computing platforms.

Capabilities

NICS provides collaboration and communication capabilities across all echelons of responders; enhances the quality and accessibility of sensor data; and integrates location data for resources, vehicles, and personnel. During an incident, NICS provides an information backbone that manages and distributes data, including real-time vehicle location feeds, airborne images, video, weather, critical infrastructure, and terrain information. In California, for example, an electro-optical/infrared (EO/IR) camera on an Initial-Attack aircraft supplies full-motion video and ground-based camera control for real-time incident assessment within NICS. This example illustrates how NICS may be leveraged as a technology test bed for evaluating new sensors, communication devices, and concepts of operation.

NICS improves first-responder situational awareness and collaboration, as well as interagency interoperability, in disaster response.

Incident data is displayed by using a web-based, open standards platform that allows users with the proper permissions to log into a map-based environment accessible via an ordinary web browser and Internet connection. NICS offers graphical tools, including georeferenced virtual whiteboards, for dynamic interagency collaboration that facilitates a coordinated response (Figure 2). Using these tools, responders are able to quickly form teams, send messages to one another, and remotely share maps and drawings that enhance the management of the incident.

Major Accomplishments

CAL FIRE in Riverside and San Diego Counties is integrating NICS into its day-to-day operations to train personnel and to respond to incidents, such as wildland fires. During the 2010 Southern California fire season (June to November), the system was used in operational evaluations on over 85% of wildland fires (Riverside and San Diego) that progressed beyond initial attack. CAL FIRE also employed NICS during the December 2010 widespread floods in Riverside County to coordinate rescues, evacuations, and road closures managed by separate fire and law enforcement agencies.

Between September 2 and 6, 2010, during the "Cowboy" fire burning in San Diego County along the Mexican border, NICS provided the first official incident map and was used to brief the media. Also in September 2010, the Airborne Initial-Attack EO/IR platform was declared operational by CAL FIRE. As of May 2011, over 400 first responders across more than 15 organizations (e.g., California Emergency Management Agency, Los Angeles County, Orange County, Riverside County Sheriff's Department, Riverside County Office of Emergency Services) have been trained in the use of NICS.

Proposed Next Steps

The future goals for NICS include the following initiatives:

- Establish a Southern California test bed to operationalize NICS for all-hazard response at a regional level
- Integrate NICS with current DHS emergency-response initiatives, including Virtual USA, a national information registry, and the Unified Incident Command and Decision Support, and with the Federal Emergency Management Agency's (FEMA) System Assessment and Validation for Emergency Responders (SAVER) program
- Transfer baseline functionality to an independent, open-source organization
- Extend NICS capability to California and other regional partners, such as the Pacific Northwest pilot states
- Migrate NICS to a national level in coordination with FEMA, the National Guard, and regional partners

Opinions, interpretations, and recommendations herein are not necessarily endorsed by MIT Lincoln Laboratory's government sponsors. Work described in this document is performed under the prime contract with the U.S. Air Force, FA8721-05-C-0002.