High Demand for Automation and Artificial Intelligence in NOAA Post-disaster Products and Services

HSRP Disaster Recovery Issue Paper - Draft v2.2

More effective and efficient government emergency/disaster response—whether local, state, or federal—requires on-demand, actionable information from NOAA's National Ocean Service (NOS), includes the National Geodetic Survey (NGS), the Center for Operational Oceanographic Products and Services (CO-OPS), and the Office of Coast Survey (OCS). It is essential that NOAA post-disaster products and services, including high resolution photography, channel contour verification, and aerial port and waterway surveys are available immediately to support response. This requires that that the tools are optimized and analyze data in real or near real-time with minimal human intervention/interaction. Automation and analytic tools that rely on artificial intelligence are likely the key to meeting this demand.

During times of natural or human-induced disasters, NOAA collects and disseminates a wide-range of data and products that support aid delivery for decision-making, damage assessment, port re-opening, setback creation, property recovery and rebuilding, beach replenishment projects and many other efforts. As NOAA data and products become more prolific, end users of such information are eager for technological advances that allow for more rapid development of a clear operating picture regarding what is actually happening on the ground. Efforts to both enhance and streamline NOAA products and services when disaster strikes, if done so with stakeholder requirements in mind, could certainly improve response and recovery efforts exponentially. Performing research in the use and implementation of artificial intelligence (AI) will strengthen NOAA's ability to provide real-time emergency products and services more efficiently applying modernized tools and techniques.

Background

NOAA's emergency response mandate stems from the National Response Framework (NRF). As a supporting agency under the NRF, the Department of Commerce, of which NOAA is a component agency, supplies specific capabilities and/or resources that support the primary agency (FEMA) in executing the emergency support function mission. In short, this means that NOAA is tasked with supporting FEMA or other primary agencies. Additionally, under the Coast and Geodetic Act of 1947, NOS is required "to provide charts and related information for the safe navigation of marine and air commerce…and basic data for engineering and scientific purposes and for other commercial and industrial needs." Certainly, this organic authority plays a huge part in rapid and successful disaster response and recovery.

Within NOAA NOS, the Remote Sensing Division (RSD), Regional Navigation Managers, and the Navigation Response Teams (NRTs), directly support these U.S. homeland security and emergency response requirements. For example, RSD acquires high resolution digital photography and rapidly disseminates the imagery datasets to a variety of users, including the general public. The NRTs, as part of the port's U.S. Coast Guard Marine Transportation System Recovery Unit, work with other NOAA offices, federal agencies, state and local governments, and port authorities to gather data and evaluate conditions so that maritime commerce can quickly resume after disaster strikes.

Challenges

Current datasets disseminated by NOAA prior to and after disaster or other emergency events can be unwieldy, requiring ever increasing manpower hours to efficiently utilize the data and products provided by NOAA. Individuals at all levels—federal, state, and local—are often tasked with parsing, collating, and analyzing large swathes of data in an attempt to develop meaningful and actionable information with which to plan and execute necessary operations. With different methodologies, interpretations, interests, etc., many different "ground truths" may develop, causing confusion and likely impeding response and recovery efforts. An automated clear and standardized operational picture (COP) stemming from NOAA products and services would be invaluable to stakeholder planning, coordination, and response functions, as well as reducing duplication of effort at all levels of government. Currently, however, response agencies struggle to capture a complete or shared COP, especially in the midst of the quick-paced nature of disaster response.

Now that NOAA has a mechanism for funding for disaster response, NOAA contends with a dwindling pool of trained personnel and at-the-ready assets to undertake data collection and analysis efforts in support of disaster response and recovery. This challenge is compounded by the lack of automated, standardized analytic tools that would/could reduce the manpower demand.

Future Federal Action Recommendations:

- NOAA NOS offices should invest in and undertake research and development in artificial intelligence (AI) related specifically to data collected in support of disaster response with the intent of creating on-demand actionable information/products for disaster response and recovery
    - As part of this effort, NOAA NOS should consider stakeholder needs at the local, state, and federal levels in order to efficiently and dynamically engage in disaster response.
- NOAA NOS offices should review current disaster-related products and services and identify areas for improvement which might include:
    - Developing a way to deliver survey data quickly to the Captain of the Port to facilitate faster resumption of port operations
    - Modernizing tools/methods for aerial surveys of large areas (e.g., Tampa Channel)