

# Improving Shared Understanding of National Security and Emergency Preparedness Communications

Serena Chan

## The Problem

The current infrastructures that support the nation's communications comprise a highly interconnected set of commercial, private, and public networks. National Security and Emergency Preparedness (NS/EP) communications depend on these infrastructures, but, unfortunately, these interconnected networks and capabilities are neither fully documented nor fully understood.

The U.S. Government has long recognized the critical role of resilient government communications in handling national security and emergency incidents. Following the 1962 Cuban Missile Crisis, President John F. Kennedy established the National Communications System (NCS) via Presidential Memorandum in 1963 to provide better communications support to critical government functions during national emergencies. In 1984, President Ronald Reagan signed Executive Order (E.O.) 12472 (Assignment of National Security and Emergency Preparedness Telecommunications Functions), which expanded the NCS from its original six members to an interagency group of 23 federal departments and agencies tasked with coordinating and planning NS/EP telecommunications to provide support during crises and disasters. In 2003, President George W. Bush transferred the NCS from the Department of Defense (DoD) to the Department of Homeland Security (DHS) in accordance with E.O. 13286 (Amendment of Executive Orders, and Other Actions, in Connection with the Transfer of Certain Functions to the Secretary of Homeland Security). In 2012, President Barack Obama replaced E.O. 12472 by signing E.O. 13618 (Assignment of National Security and Emergency Preparedness Communications Functions).

E.O. 13618 dissolved the NCS and established the NS/EP Communications Executive Committee (ExCom), which comprises eight Assistant Secretary-level representatives of departments and agencies to serve as the forum for addressing survivable, resilient, enduring, and effective domestic and international communications. The designees of the Secretary of Homeland Security and the Secretary of Defense serve as co-chairs of the ExCom.

**IDA's research on NS/EP communications contributes to continuous data collection and reporting while enabling sustained coordination of the evolving interagency NS/EP communication architecture and the application of advanced analytical tools.**

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Pursuant to Section 3.3, the ExCom is responsible for the following activities:

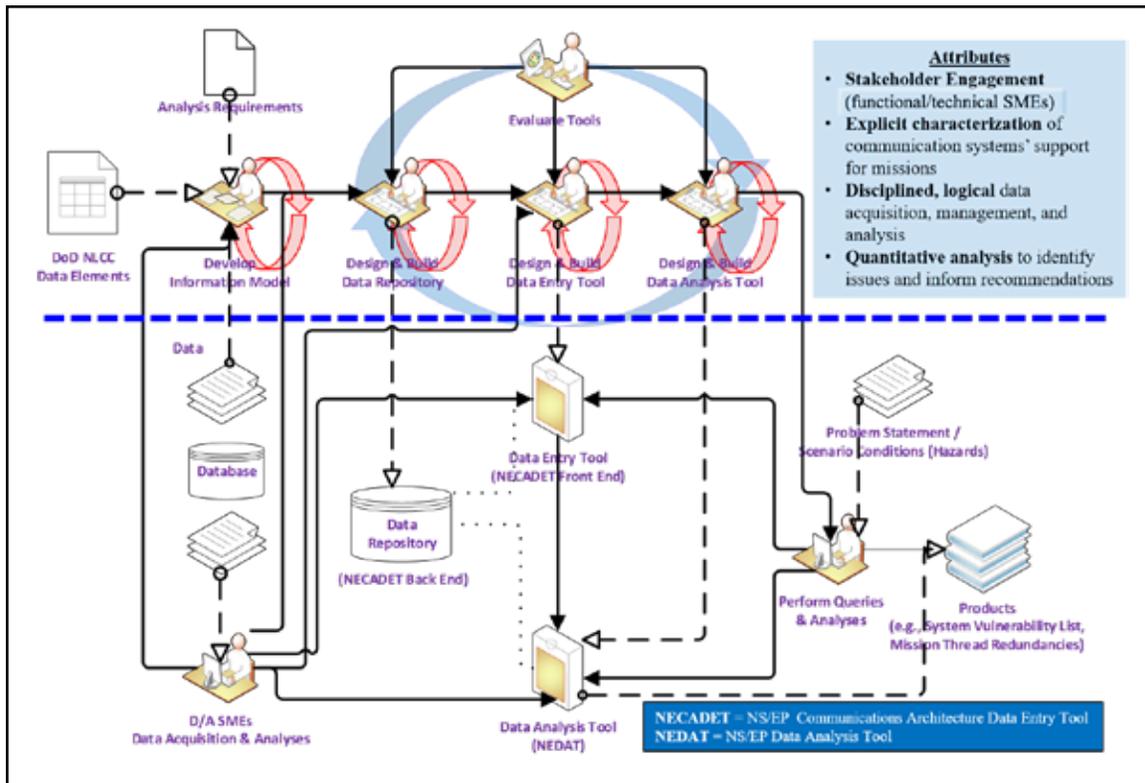
- Advising and making policy recommendations to the President on enhancing the survivability, resilience, and future architecture of NS/EP communications, including what should constitute NS/EP communication requirements
- Developing a long-term strategic vision for NS/EP communications and proposing funding requirements and places for NS/EP communications initiatives that benefit multiple agencies or other Federal entities
- Coordinating the planning for, and provision of, NS/EP communications for the Federal Government under all hazards
- Promoting the incorporation of the optimal combination of hardness, redundancy, mobility, connectivity, interoperability, restorability, and security to obtain, to the maximum extent practicable, the survivability of NS/EP communications under all circumstances
- Recommending the regimes for testing, exercising, and evaluating the capabilities of existing and planning communications systems, networks, or facilities to meet all executive branch NS/EP communications requirements, including any recommended remedial actions.

### **Approach**

In support of the NS/EP Communications ExCom, IDA's objective was to provide comprehensive

understanding of the systems, components, and data flows that characterize NS/EP communications; leverage that understanding to improve department and agency internal and interagency communication systems' support for mission-essential functions; identify policy, resource, and capability gaps; and improve analyses that support critical decisions. With DHS sponsorship, IDA worked closely with three participating departments and agencies: DoD's National Leadership Command Capabilities Management Office, the Department of Justice's Federal Bureau of Investigation, and the Department of Commerce's National Oceanic and Atmospheric Administration. Our goal was to help the ExCom working groups accurately characterize and understand the NS/EP communications environment to improve analytical capabilities and decision-making processes.

We developed an information model to support the required NS/EP communications architecture data and instantiated it in a Microsoft (MS) Access database to function as a repository. We developed a user interface—the National Security and Emergency Preparedness Communications Architecture Data Entry Tool (NECADET)—to facilitate data entry and data query for generating architecture views and identifying gaps in survivability against hazards. We thus developed an analytic front end to the repository—the NS/EP Data Analysis Tool (NEDAT)—to support the visualization of mission threads and the status of their systems in the context of hazard scenarios. Figure 1 illustrates the



**Figure 1. Workflow and Analytical Environment Development**

holistic workflow and development of the analytical environment.

confidence when tasked to provide responses and feedback.

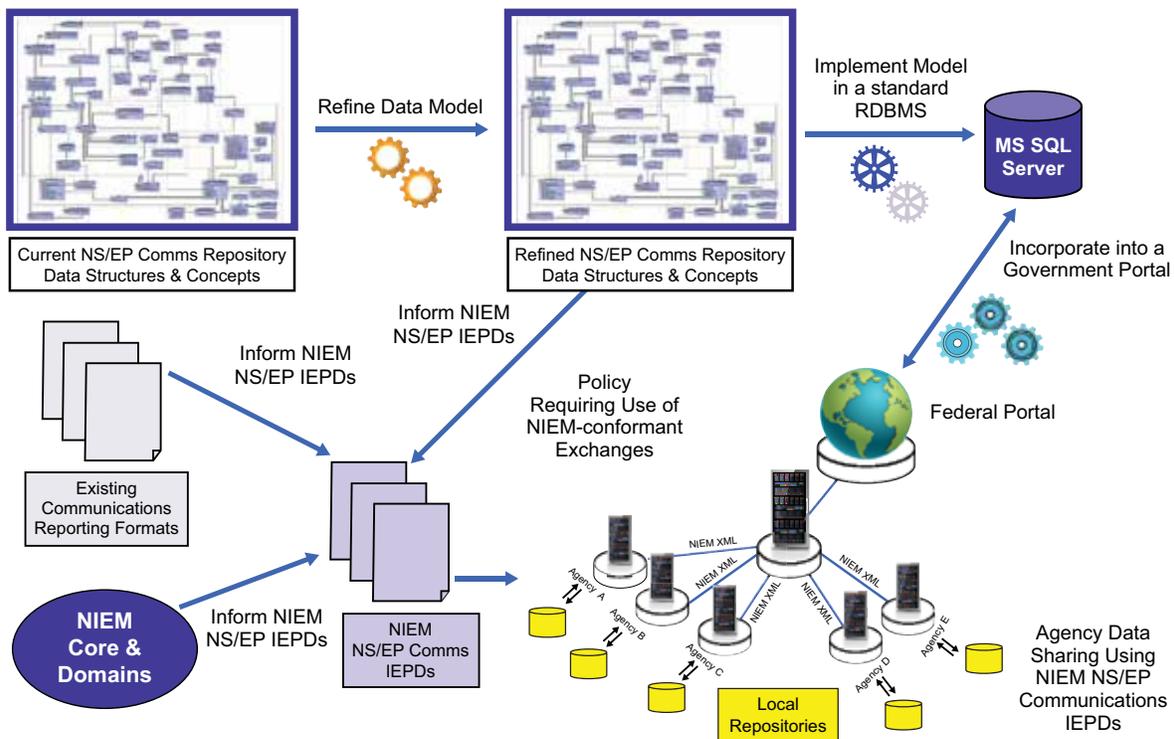
## Results

Our research revealed barriers to data interoperability and data sharing. Earlier efforts by NS/EP communications working groups to acquire consistent relevant data from departments and agencies have failed, in part, because of a lack of alignment among key stakeholders. Inconsistent responses to queries for data from departments and agencies repeatedly affected the efforts to understand and address department and agency, ExCom, and interagency activities. Such barriers are one reason why participating departments and agencies have not yet achieved an optimal degree of responsiveness and

Our research also identified the challenges faced by the ExCom and the departments and agencies in addressing their responsibilities to plan for and provide resilient NS/EP communication services. We focused on the current lack of data standards and data acquisition mechanisms and the impact on government effectiveness and efficiency in handling NS/EP communications. We then described the subsequent consequences of the lack of awareness of NS/EP communications systems and their interdependencies and status, and on shortfalls in the identification and remediation of gaps in their performance, resilience, and interoperability.

After identifying the current problems and their impacts, we proposed using an approach to information acquisition and sharing based on the National Information Exchange Model (NIEM) to improve the understanding, policy development, and resilience of NS/EP communications systems. NIEM is an existing government-wide best practice for information sharing, and a NIEM-based approach will enable NS/EP communications architecture efforts to reuse data and improve support for machine processability. We also discussed the potential cost savings of implementing this approach by leveraging existing relevant reporting mechanisms, data elements, and Federal information portals.

Figure 2 illustrates the recommended approach to standardizing NS/EP communications data sharing. It offers refinement of the NS/EP communications architecture data model, which is then implemented in a relational database management system (e.g., the MS SQL Server). The server is then incorporated into a government portal to enable controlled access and inputs by departments and agencies, which enables departments and agencies to share NS/EP communications architecture data using NIEM Information Exchange Package Documentations (IEPDs). The lower portion of Figure 2 illustrates the leveraging of existing reporting requirements to capture NS/EP



**Figure 2. Recommended Approach to Standardize NS/EP Communications Data Sharing**

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communications architecture data using NIEM IEPDs. The IEPDs are informed by the requirements of the refined data model and the existing relevant reporting requirements. This approach depends on a policy that requires NIEM-conformant data sharing of this information.

Lessons learned from IDA's analyses were categorized into the following areas of concern: governance and management, data acquisition, data modeling, data repository tools, and visualizations. Within each topic, specific lessons learned were summarized with a description of the problem or success, the impact of the problem, and recommendations to improve the situation or promote the success.

## Conclusions

After identifying current problems and their impacts, we described opportunities for improving NS/EP communications systems understanding, policy development, and resilience, using an approach to information acquisition and sharing based on NIEM. By adopting standardized vocabularies and machine-processable formats to support structured reporting of NS/EP communications architecture data, many of the identified weaknesses in data interoperability and data sharing could be eliminated and substantive benefits could accrue. We recommended key activities that would be necessary when adopting a NIEM-based approach to information collection and dissemination in support of NS/EP communications architecture analysis.

Adopting and implementing NIEM-enabled repositories would enable individual departments and agencies to:

- Improve documentation of communications systems, and their interdependencies and gaps in resiliency
- Enhance understanding of internal and external mission-critical dependencies
- Improve the resilience of communication systems in the face of all hazards
- Reduce long-term costs in communications systems and services that result from cross-department and -agency contracting.

The ExCom, under its E.O. 13618 responsibilities, could facilitate the development of NIEM-based workflows of NS/EP communications data acquisition and analysis via policy recommendations to support implementation, align reporting capabilities under its authorities, and propose funding requirements and plans for data repositories and portals. Although the efforts involved are substantial, their coordination across the ExCom departments and agencies would significantly enhance unity of effort across the departments and agencies and eliminate the duplication of effort and the conflicts that could occur if each department and agency pursued such capabilities independently. The IDA-recommended way forward would enable the NS/EP Communications ExCom to meet

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its responsibilities effectively and efficiently in:

- Conducting rigorous analysis designed to inform critical decisions
  - Identifying NS/EP communications resiliency gaps
  - Anticipating NS/EP communications requirements
  - Enhancing NS/EP community interoperability
  - Improving allocation of resources to priority requirements
  - Identifying and addressing excess capabilities
- Facilitating coordination of cross-department and -agency contracting for shared services, technology, and commercial telecommunications to reduce communications acquisition costs
  - Promoting resilient, robust, and interoperable NS/EP communications capabilities.

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**Dr. Serena Chan** is a Research Staff Member in IDA's Information Technology and Systems Division. She holds a Doctor of Philosophy in engineering systems from the Massachusetts Institute of Technology.

