Argonne
NATIONAL LABORATORY

DELIVERING TOOLS AND METHODOLOGIES TO **SOLVE OUR NATION'S RISK AND RESILIENCE CHALLENGES**

The interconnectedness of physical and cyber infrastructure systems— coupled with an evolving global threat environment, climate change, population shifts, and aging infrastructure — amplify the risk to infrastructure and community resilience.

WHO WE ARE

The mission of Argonne National Laboratory's Decision and Infrastructure Sciences (DIS) Division is to help decision-makers prepare for, defend against, and respond to all hazards. Our vision is to remain a global leader in decision support for the most complex infrastructure resilience, emergency preparedness, and threat analysis challenges.

WHAT WE DO

Over the last two decades, DIS has undertaken major research efforts and developed tools and methodologies to support local, state, and federal sponsors in enhancing the security and resilience of the nation's critical infrastructure. DIS experts have developed methods to understand the dependencies and interdependencies among infrastructure systems, evaluate critical supply chains, and respond to disasters. The team has also developed unique research programs to assess the security and resilience of infrastructure systems; support emergency preparedness in U.S. communities; and conduct all-source threat analysis.

MANAGING RISK AND INCREASING RESILIENCE

- Core Capabilities
  - Decision science
  - Systems engineering and integration
  - Infrastructure risk analysis
  - Resilience analysis
  - Preparedness
  - Prevention (counterterrorism)
  - Mitigation
  - Protection
  - Response
  - Recovery
  - Social and behavior systems
  - Infrastructure systems modeling

FOCUS AREAS

Infrastructure Science

Conducts research and analysis focused on managing risk to critical infrastructure from natural hazards, accidents, or security threats.

Innovative infrastructure science projects include:

☐ Support to the Regional Resiliency Assessment Program (RRAP) with the U.S. Department of Homeland Security (DHS) to examine the resilience of critical infrastructure systems. RRAP projects incorporate infrastructure system modeling, dependency and interdependency analysis, geospatial analysis and visualization, downscaled climate projections, subject matter expert workshops and exercises.

☐ A portfolio of infrastructure assessment methodologies employed by DHS field personnel to evaluate security and resilience of individual assets, as well as clusters of infrastructure, and regional systems.

☐ Infrastructure dependency and interdependency assessments following Hurricane Maria in Puerto Rico to inform long-term disaster recovery planning and investment decisions by local, state, and federal partners.

☐ Strategic assessments and risk analyses for DHS, including consequence analysis for nefarious use of unmanned aerial systems within urban areas; cyber and physical risk ranking projects; and supply chain resilience assessments (e.g., uranium and nuclear fuels).

Emergency & Disaster Analysis

Assists emergency managers, planners, and responders in preparing for, responding to, and recovering from human-caused incidents and natural hazards.

Innovative projects include:

☐ Technical assistance programs for state and local emergency managers on critical supply chains, community resilience, dam safety, and evacuation. This work includes award-winning tools, such as the Grassroots Infrastructure Dependency Model (GRID-M), that are deployed to FEMA and communities nationwide to inform disaster preparedness efforts.

☐ Virtual Community Platform (VCP), a Web-based virtual online tool that facilitates collaboration, coordination, and communication activities by federal departments or state, local, or tribal agencies.

☐ The Public Affairs Science and Technology (PAST) Fusion Center, which draws researchers, scientists, and public affairs professionals together to improve all aspects of public safety and emergency management communications.

Threat Analysis

Conducts rapid, all-source analysis by fusing intelligence with complex datasets to deliver highly sophisticated scientific analysis through actionable products, portals, and tools.

Innovative threat analysis projects include:

☐ Analyses to assess the potential local, regional, domestic and global impacts of international incidents related to energy supply.

☐ Quick-turn modeling during a hurricane to estimate the probable impacts on the electric grid and to forecast electric infrastructure restoration needs.

☐ Methodologies and systems used by DHS to conduct threat assessments, cybersecurity assessments, and vulnerability assessments at federal facilities nationwide.

☐ Training for domestic and international partners on emerging risks associated with hybrid threats.

Social, Behavioral, and Decision Science

Uses these capabilities— including operations research, agent-based modeling, and high-performance computing—to support methodology design and stakeholder decision making.

Innovative projects include:

☐ Using agent-based modeling to understand human responses to a potential Ebola outbreak in the United States. DIS personnel generalized the models to apply to other infectious diseases and created the Chicago Social Interaction Model (chiSIM), an agent-based model of more general social interactions.

☐ Models and tools used by DHS at airports to drive resource allocation and procedures used at checkpoints; measure performance; and understand adversarial decision-making.

CONTACT

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