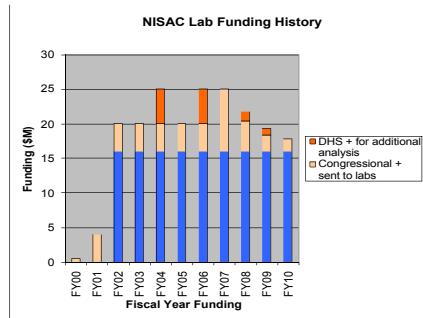


National Infrastructure Simulation and Analysis Center (NISAC): FY2011 Opportunities



Overview: NISAC is a modeling, simulation, and analysis program that prepares and shares analyses of critical infrastructure and key resources including their interdependencies, vulnerabilities, consequences of disruption, and other complexities. NISAC was established by the USA Patriot Act to “serve as a source of national competence to address critical infrastructure protection and continuity...”, and became part of the Department of Homeland Security Office of Infrastructure Protection (DHS OIP) upon its inception in 2003.

Sandia National Laboratories (SNL) and Los Alamos National Laboratory (LANL) are the prime contractors for NISAC, integrating the two laboratories' expertise in the modeling and simulation of complex systems for evaluating national preparedness and security issues. The two national laboratories and OIP have developed a true partnership in developing and applying Modeling and Analysis tools to provide answers to the decision makers.

The initial thrust of NISAC was to develop advanced simulation tools for predictive consequence analysis. The program has been extremely successful in supporting the DHS OIP mission needs such that it is heavily relied on to support numerous events, catastrophes and policy analyses. However, the NISAC budget has remained constant in recent years, and NISAC is now under-resourced for both its new operational mission and its initial thrust to develop advanced simulation tools for predictive consequence analysis. Additionally, NISAC has raised the expectations for what can be done to such an extent that new operational requirements being generated are beyond the initially developed capabilities. Increased investment is necessary to ensure these capabilities remain relevant and are able to answer ever more increasing requirements and expectations.

Future Needs: A Consequence Based Analysis (CBA) was conducted in early FY2010 by DHS Infrastructure Protection, Risk Development and Modeling Branch where analysis gaps were identified by various agencies based on their current agency requirements. An earlier estimate for the funding of a fully capable NISAC was determined to be \$100M per year to develop, maintain, and provide analyses for current operational analysis support and continual upgrading of 18 sector infrastructural modeling, data, and knowledge. The CBA conducted this year confirms that need. The Rough Order of Magnitude estimate to fully address the top 17 priorities is \$100M. For FY11, to ensure the *start* towards closing the gaps and to maintain current analysis and modeling capability, a minimum of \$35M is needed.

NISAC Funding	
FY10 Appropriations:	\$20,000,000
FY11 Budget Request:	\$16,000,000
FY11 Funding Needed:	\$35,000,000

NISAC's Impact: NISAC's mission is to support the preparedness and protection of our nation and society by providing technical, economic, and national security implications analyses if Critical Infrastructures/Key Resources (CI/KRs) are disrupted or lost, and to add defensible understanding of infrastructure protection, mitigation, response, and recovery options. This information is used for assistance to local, state, region, and national planning, exercising and response activities. Examples:

- **2009 H1N1 Impacts Analysis** – Used results of impact analysis to plan for 2009-2010 flu season.
- **Pandemic Influenza** - Influenced CDC/HHS community containment strategy
- **Asset Impact Analyses** - Provides justification for inclusion/exclusion of specific sites on DHS security priority lists
- **National Network Asset Ranking Studies** - Provides quantification of asset impacts and rankings for DHS asset priority lists for Electric Power, Telecommunications and Road Transportation
- **Hurricane Pre-landfall impact analyses** - Provides information that informs DHS pre-event planning and deployment for the events and post-event security priorities
- **I-35 Bridge collapse impact analysis** - Provided information that informed DHS event response
- **National Chlorine Transportation security policy analysis** - Provided consequences for transportation security policies consideration

NISAC Models & Analysis Examples: The preceding examples of NISAC's results in addressing pressing national issues were achieved with advanced modeling and analysis tools, examples include:

Models

- Air Transportation Optimization Model (ATOM): Transportation Model
- Chemical Infrastructure Analysis Capabilities
- Electric Restoration Analysis Model (EPRAM)
- Epidemic Simulation System (EpiSimS)
- Epidemiological Forecasting Simulation Model (EpiCast)
- HCSim: Agent-Based Healthcare Surge Capacity Model
- Interdependency Environment for Infrastructure Simulation Systems (IEISS)
- LOKI Infect: Public Health Model
- LOKI Natural Gas Model
- LOKI Petrochemical Model
- National Petroleum Model
- NISAC Agent-Based Laboratory for Economics (N-ABLE™)
- Multi-scale Integrated Information and Telecommunications System (MIITS)
- Petrochemical Economic Supply-Chain Model
- Port Operations and Economic Conditions Simulators

QUIC CRB Dispersion Model

- Railroad – Network Analysis System (R-NAS): Transportation Model
- Telecommunications Network Simulation Modeling and Analysis Tools (N-SMART)

Analysis Tools

- Critical Infrastructure Protection Decision Support System (CIPDSS)
- Fast Analysis Infrastructure Tool (FAIT)
- FastEcon
- Hydra I
- LogiSims
- Rapid Economic Accounting Tool (REAcct)
- Scalable Event-Driven Infrastructure Simulation Engine (SimCore)
- Spatial Infrastructure Mapping & Analysis Tool (FASTMap)
- Transportation Simulator (FastTrans)
- Water Infrastructure Simulation Environment (WISE)

However, NISAC is about the ability to create defensible analytic products to be used by decision makers. This effort has required the development of a very strong multidisciplinary team at Sandia and Los Alamos National Laboratories. This capability represents a comprehensive and systems understanding across the 18 sectors, their dependencies, their interdependencies, and the consequences to our nation during critical events.

What could a \$35M Appropriation in FY2011 Support? As the DHS Office of Infrastructure Protection (OIP) has grown in its role responding to crises, NISAC has become more operational in support of that mission. However, since the budget has remained constant, the capability development has been reduced and the ability to fill identified gaps and maintain this singularly qualified staff is in jeopardy.

This is a critical time to change this trend so that NISAC can continue to be a cornerstone in the DHS OIP's ability to respond to and understand events that impact our nation's infrastructures and society's well being.

An appropriation of \$35 million in FY2011 for NISAC would likely be utilized in the following manner:

- \$2.2 million (est.) for DHS/IP Operational Budget
- \$11.2 million (est.) for NISAC analysis support for DHS/IP Operations
- \$21.6 million (est.) for NISAC capability development to continue to fill top priority gaps.

Assuming the full \$35 million is provided in FY2011, some of the priority gaps listed on the following page, representing the top one-third of gaps identified in the recent Consequence Based Analysis (CBA), would be candidates for funding based on DHS priorities and national needs.

Top 17 Priorities Identified by the 2010 Consequence Based analysis (CBA):

CBA Rank	CBA Activity
1	Evaluate Cascading Effects Within the Healthcare & Public Health System
2	Evaluate Cascading Effects Within the Emergency Services System
3	Estimate Deaths from Estimates of Biologically Affected Areas
4	Estimate Illness from Estimated Biologically Affected Areas
5	Estimate Deaths from Different Chemical Compounds from Estimates of Chemically Affected Areas
6	Estimate Deaths from Infrastructure Failure
7	Rapid analysis of infrastructure interdependency
8	Assess Resiliency of Interdependent Systems
9	Assess Cyber Linkages into Physical Infrastructure
10	Assess Direct Damage to Infrastructure from Physical Insults
11	Identify / Acquire / Develop Human Data
12	Identify / Acquire / Develop Infrastructure Data
13	Ensure Interoperability
14	Maintain and Update Human Data
15	Manipulate Human Data into Needed Forms
16	Evaluate Cascading Effects Within the Petroleum, Oil, and Lubricant Systems
17	Manipulate Infrastructure Data into Needed Forms

Next Set of Priorities

18	Evaluate Cascading Effects Within the Chemical Sector
19	Maintain and Update Infrastructure Data
20	Flow information across the infrastructure analysis domains
21	Manage Infrastructure Data Updates During Crisis Action
22	Manage Human Data Updates During Crisis Action
23	Prioritize Activities: Policies, Mitigations Measures, Immediate Response Activities
24	Estimate Infrastructure Impacts of Foreign Supply Chain Disruption
25	Characterize Uncertainty
26	Estimate Response Costs
27	Identify / Acquire / Develop Economic Data
28	Assess GDP Impacts of Border Closures
29	Assess GDP Impacts of Increased Trade Barriers
30	Behavioral changes that influence infrastructure operations and that impact the marketplace
31	Behavioral changes that impact the stability of civil society
32	Estimate Effects of Liquefaction
33	Estimate Nuclear Electro-Magnetic Pulse Effects