SAND2006-6688C

HOMELAND SECURITY & DEFENSE

# Exceptional Careers in the National Interest:
## Homeland Security at Sandia National Laboratories

**DHS Scholars and Fellows Conference**

**November 5, 2006**

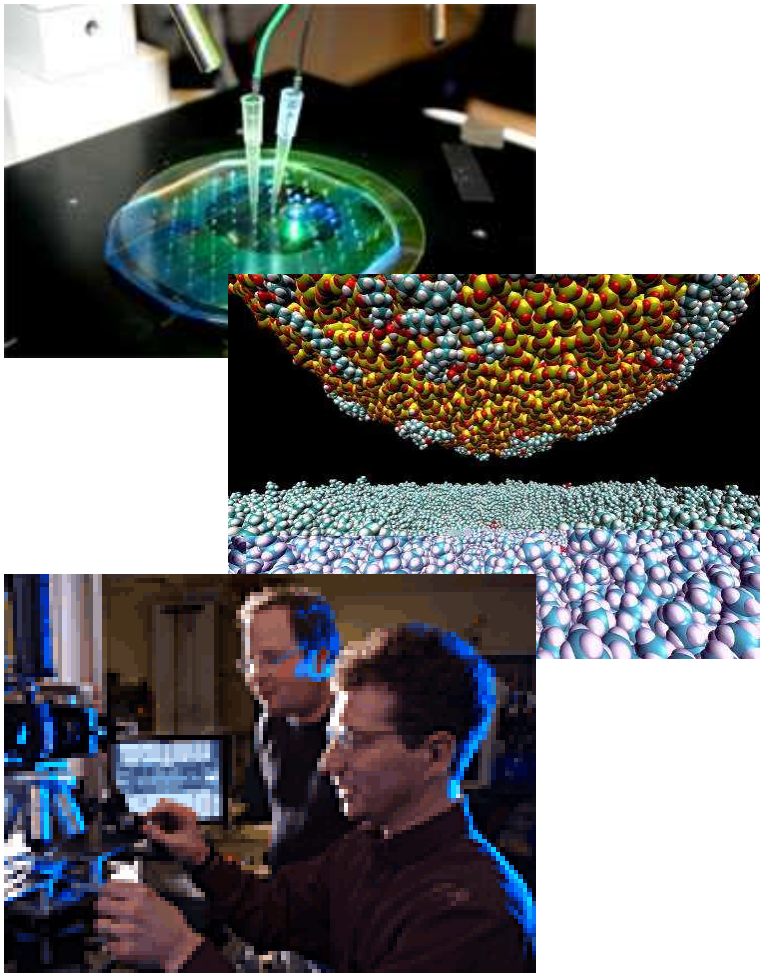
**Jill M. Hruby**

**Director of Homeland Security Systems and Development**

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Sandia National Laboratories

# Sandia is a mission-driven laboratory



We serve many agencies of the U.S. Government including DHS, DOE, DoD:

- Design and development of non-nuclear portions of U.S. nuclear weapons:
  - Production of advanced components
  - Safety, security, use control
- Treaty verification, counter-proliferation, nonproliferation
- Energy and environment
- Homeland security, countering weapons of mass destruction
- Advanced military technologies and applications

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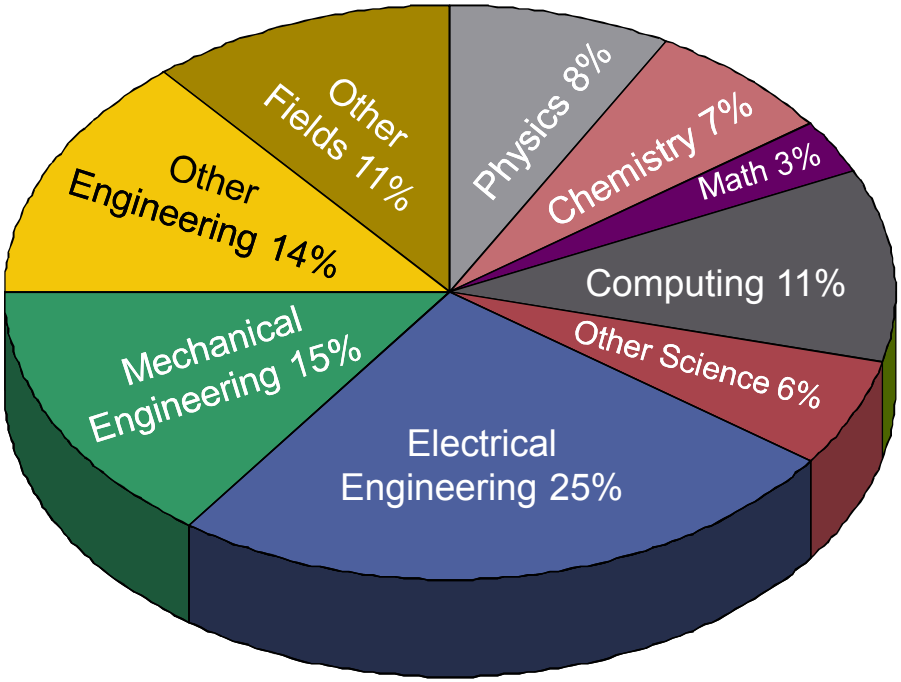
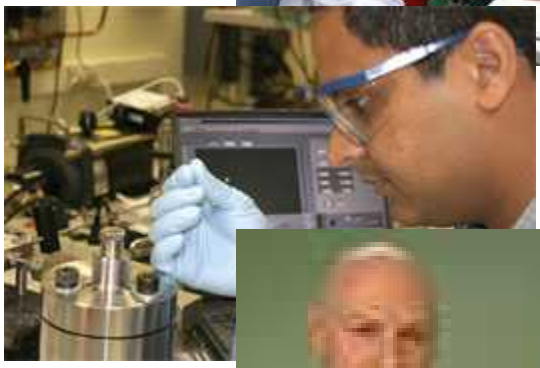
# About 8,500 employees contribute to our success



- ~8,500 full-time employees (~900 in California)
- 1,500 PhDs and 2,300 Masters
- $2.33 billion FY06 operating budget

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# Our homeland security work draws on multiple disciplines

- Sensors and detection systems
  - Chemists; nuclear, chemical, electrical, and mechanical engineers; physicists;
- Countermeasures for chemical, biological, radiological, and nuclear threats
  - Chemists, engineers, biologists, physicists
- System engineering and integration
  - Electrical, chemical, mechanical, and biological engineers
- Security risk assessments
  - Computer scientists, engineers, mathematicians, physicists, social scientists

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# We explore solutions–and need expertise–at every step of the threat spectrum

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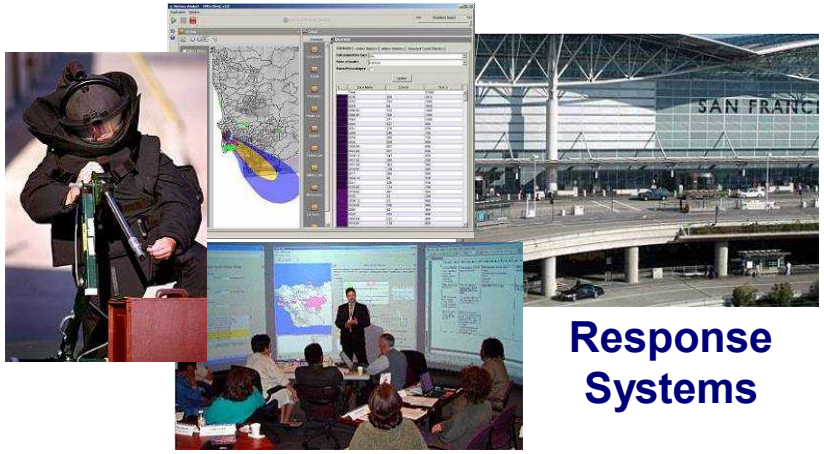
## Risk Assessment



## Response Systems

Anticipate | Prevent | Respond | Recover

## Risk Mitigation

## Recovery Systems

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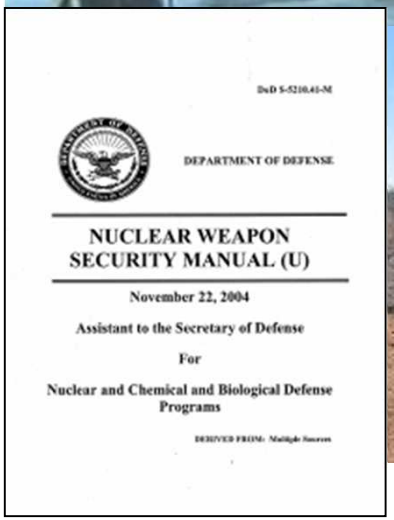
# Homeland Defense and Force Protection Programs



DoD S-5210.41-M

DEPARTMENT OF DEFENSE

NUCLEAR WEAPON SECURITY MANUAL (U)

November 22, 2004

Assistant to the Secretary of Defense

For

Nuclear and Chemical and Biological Defense Programs

- Physical Security
- Chemical and Biological Defense
- Base Infrastructure Protection
- Defensive Information Operations
- Force Protection Systems

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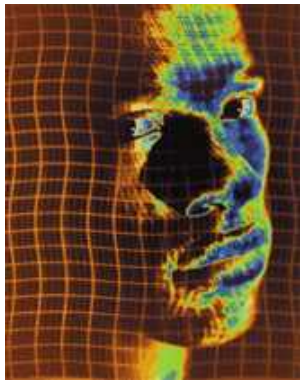
# Our layered physical protection solutions blend personnel, procedures, and technologies

Explosives detector



Scanner-less range imager

Portable chem/bio sensors

Unattended ground sensors

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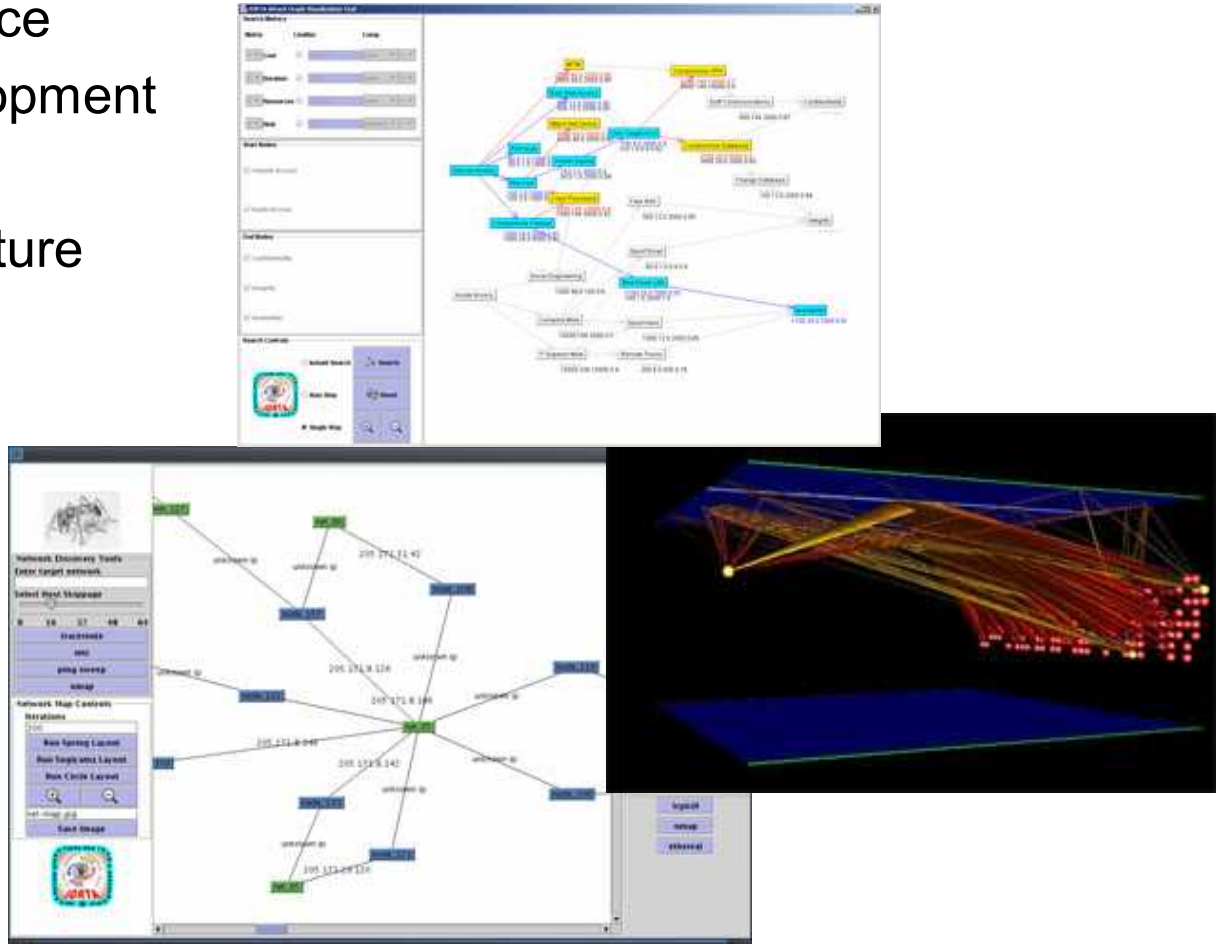
# Integrated Information Operations: Optimizing and protecting cyber assets

- Network assurance
- Cyber tool development
- Red Teaming
- Critical infrastructure understanding



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# Catastrophic Event Mitigation Program

- Chemical and Biological Countermeasures
- Radiological and Nuclear Countermeasures
- Explosives Countermeasures
- Border and Transportation Security

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# We are a key part of several chem/bio defense deployments

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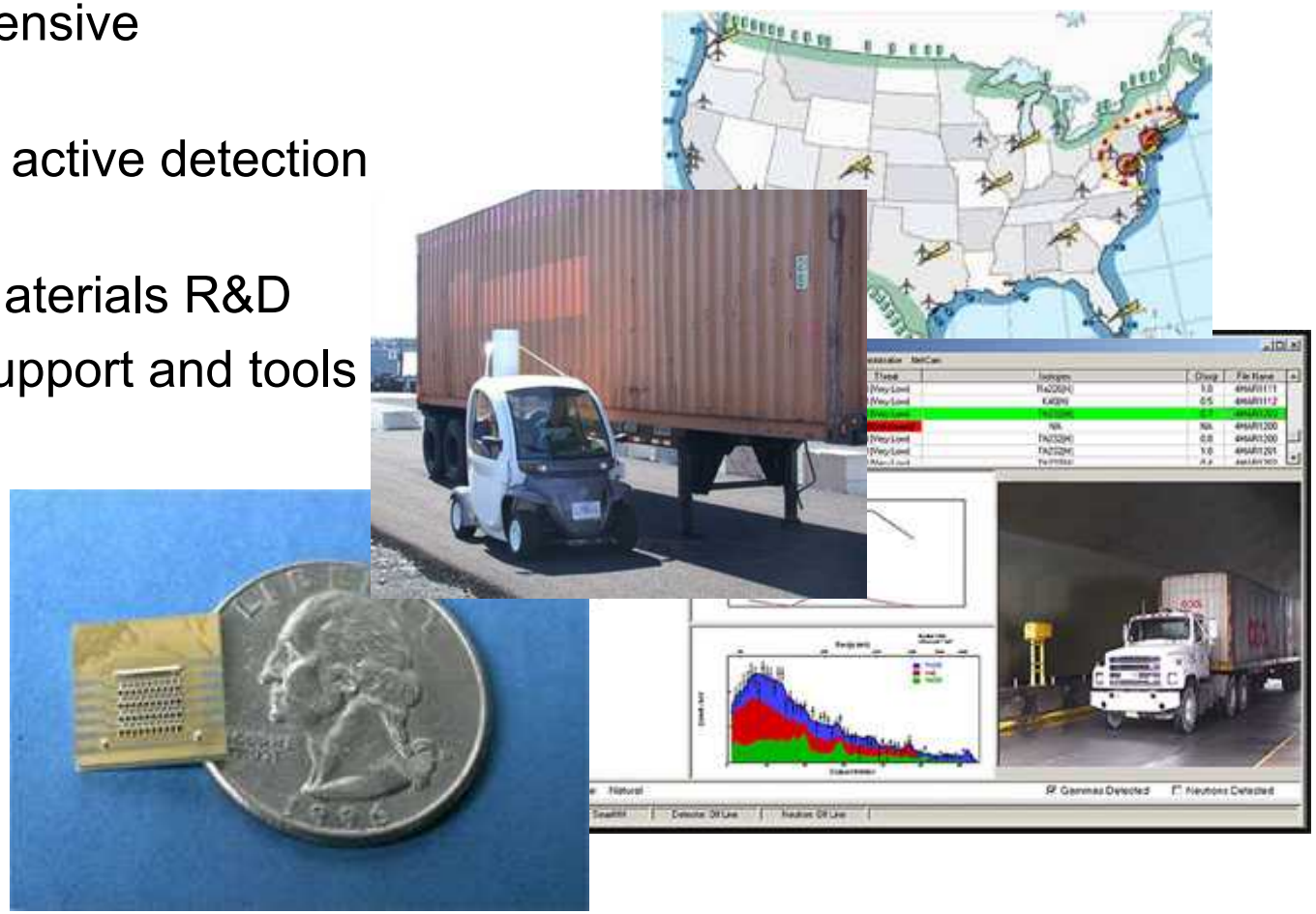
# Radiological and nuclear countermeasures aim to reduce our vulnerability to terrorism

- National defensive architecture
- Passive and active detection systems
- Advanced materials R&D
- Response support and tools



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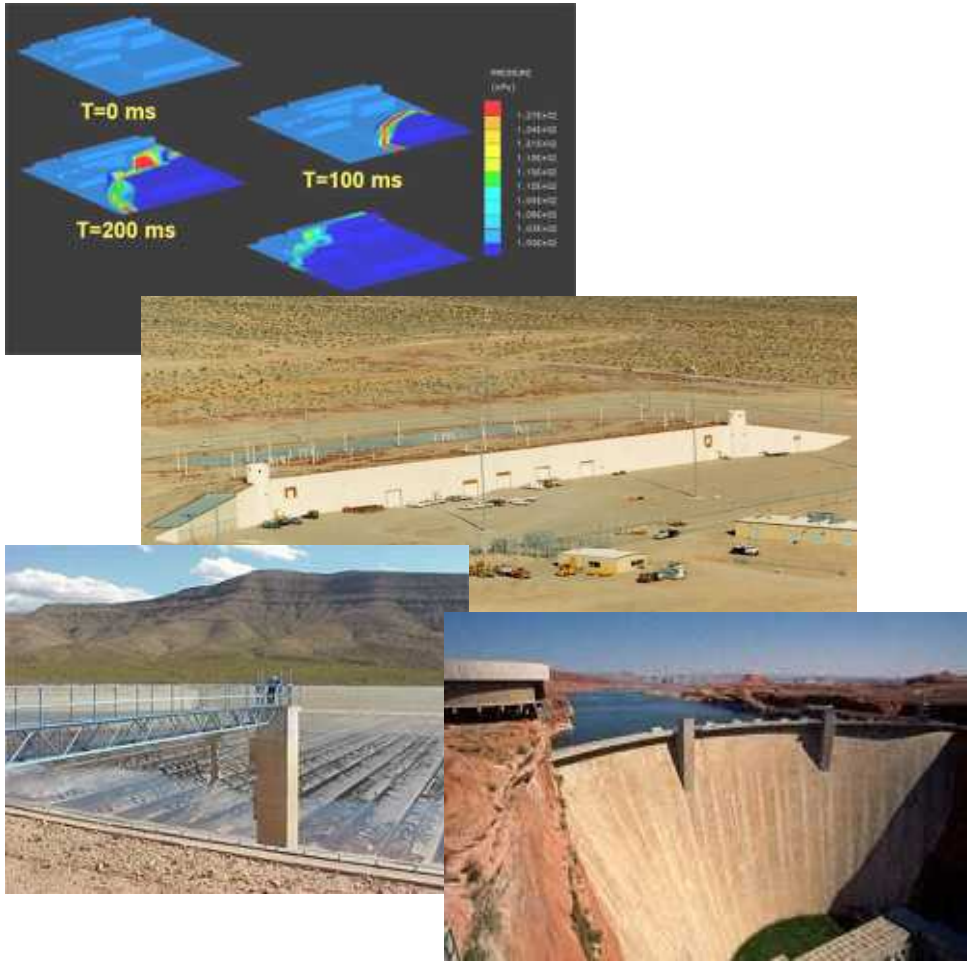
# Risk Management and Critical Infrastructure Protection Program




- Physical security solutions for the Department of Energy (DOE) and other federal agencies
- Critical infrastructure protection
- Systems analysis for risk management

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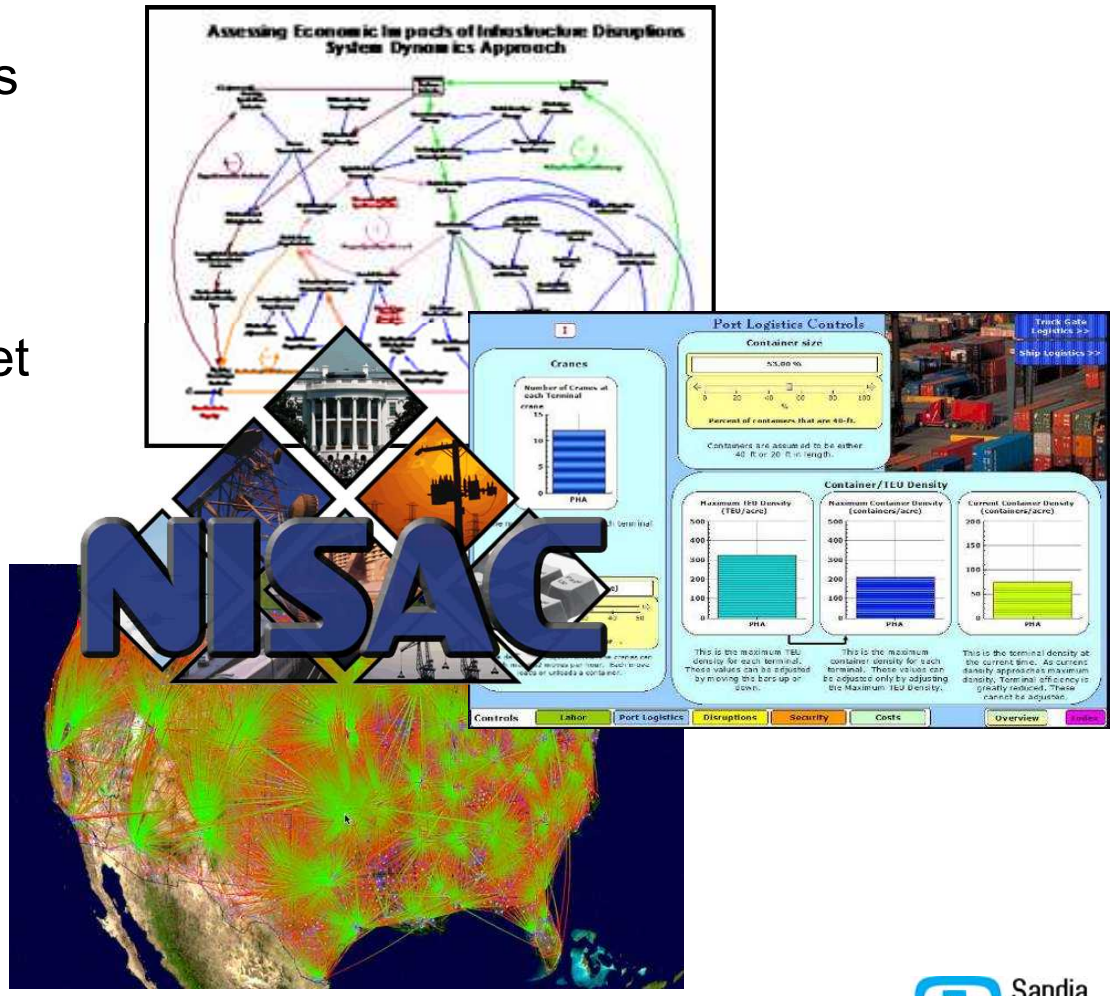
# Sandia's approach aims to prevent cascading failure of critical infrastructure

- National Infrastructure Simulation and Analysis Center
- Advanced simulation studies and tools
- Next-generation Internet security tools
- Information Operations Red Team

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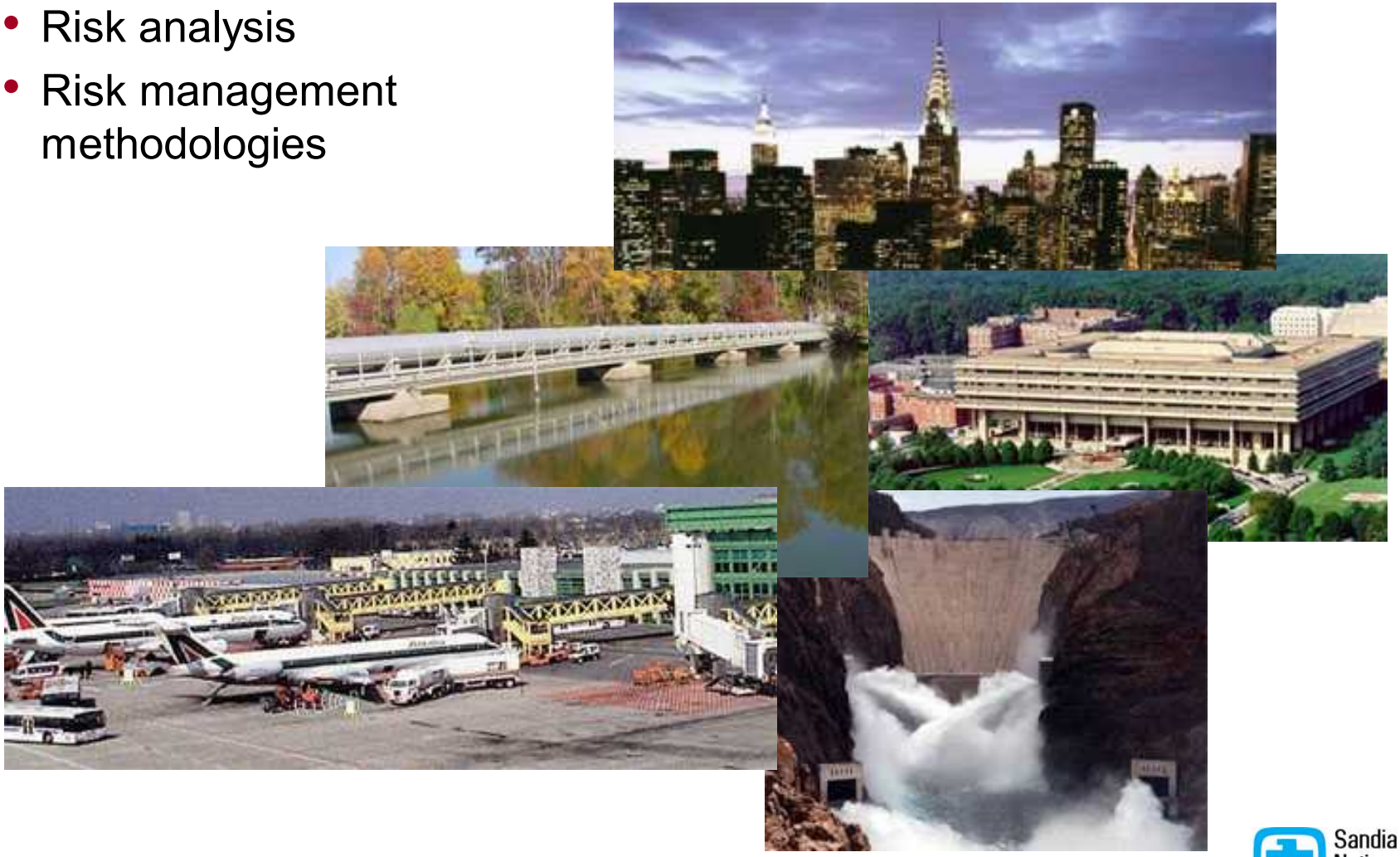
# Risk assessment helps decision-makers prioritize threats and response investments

- Risk analysis
- Risk management methodologies



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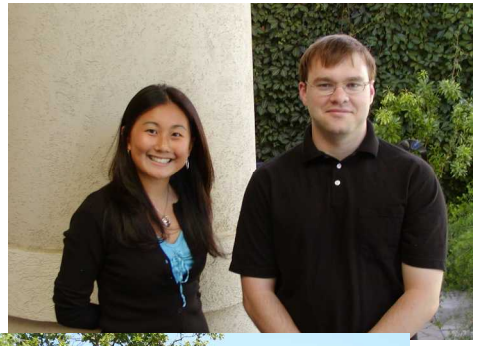
# DHS Sandia Interns in 2006

## Interns came from schools nationwide

Georgia Tech, Northwestern University
University of Alaska Fairbanks, UC Berkeley
University of Michigan, Yale



## Sample projects

- Rapid protein separation applying isolelectric focusing using a diffusion-induced immobilized pH gradient on a microchip
- Integration of pandemic influenza modeling and healthcare modeling to help policymakers mitigate a pandemic outbreak
- Use of several amine reactive dyes for protein separations for a mobile bioagent detector
- Historical analysis and querying of network log data to aid in cyber security
- Electron beam induced current analysis of diamond to determine neutron radiation detection capabilities

# Sampling of projects for Summer 2007

- Analyze effectiveness of U.S. rad/nuc countermeasures: detector performance, deployment options, and concepts of operations
- Fabricate the source of a battery-operated, portable neutron generator and detector, test active neutron interrogation techniques, and model experiments
- Develop a framework for risk-based analysis of critical infrastructure for prioritization and resource allocation using Bayesian probability theory, MCMC techniques, and modern object-oriented software design
- Build autonomous multiplex biodetector to meet specific requirements using DNA, immuno, and protein (toxin)-based assays
- Consider psychological factors in economic decision making in isolation from social contexts, and social, social-psychological, and cognitive-based responses of broad groups
- Assess chemical residuals on vehicles as improvised explosive device

**See our list for more possibilities . . .**

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# Benefits of a Sandia internship

- Association with the nation's premier lab for applied science and engineering
- Close relationship with a mentor who is an expert in your field of interest
- Opportunity to present your work at a symposium
- Hands-on experience in world-class facilities and laboratories
- Frequent seminars, tours, and professional development activities
- Housing with other student interns
- Large social network:  fun and activities

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# Extracurricular activities

- Livermore, CA
  - Bay Area: Hiking, sporting events, San Francisco, Napa Valley

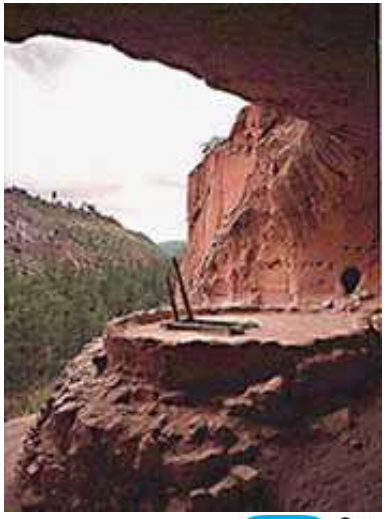





- Albuquerque, NM
  - Hiking, biking, skiing, whitewater rafting







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  - http://education.ca.sandia.gov
- Surf www.sandia.gov
  - Contact managers or staff regarding projects of interest
- Provide your contact information on sign-up sheets