SAND2010-1630C

National Security Technologies & Systems (NSTS)

Atomic Weapon Establishment (AWE) UK Delegation Visit

March 17, 2010

Margie Tatro
Vice President
Energy, Security & Defense Technologies

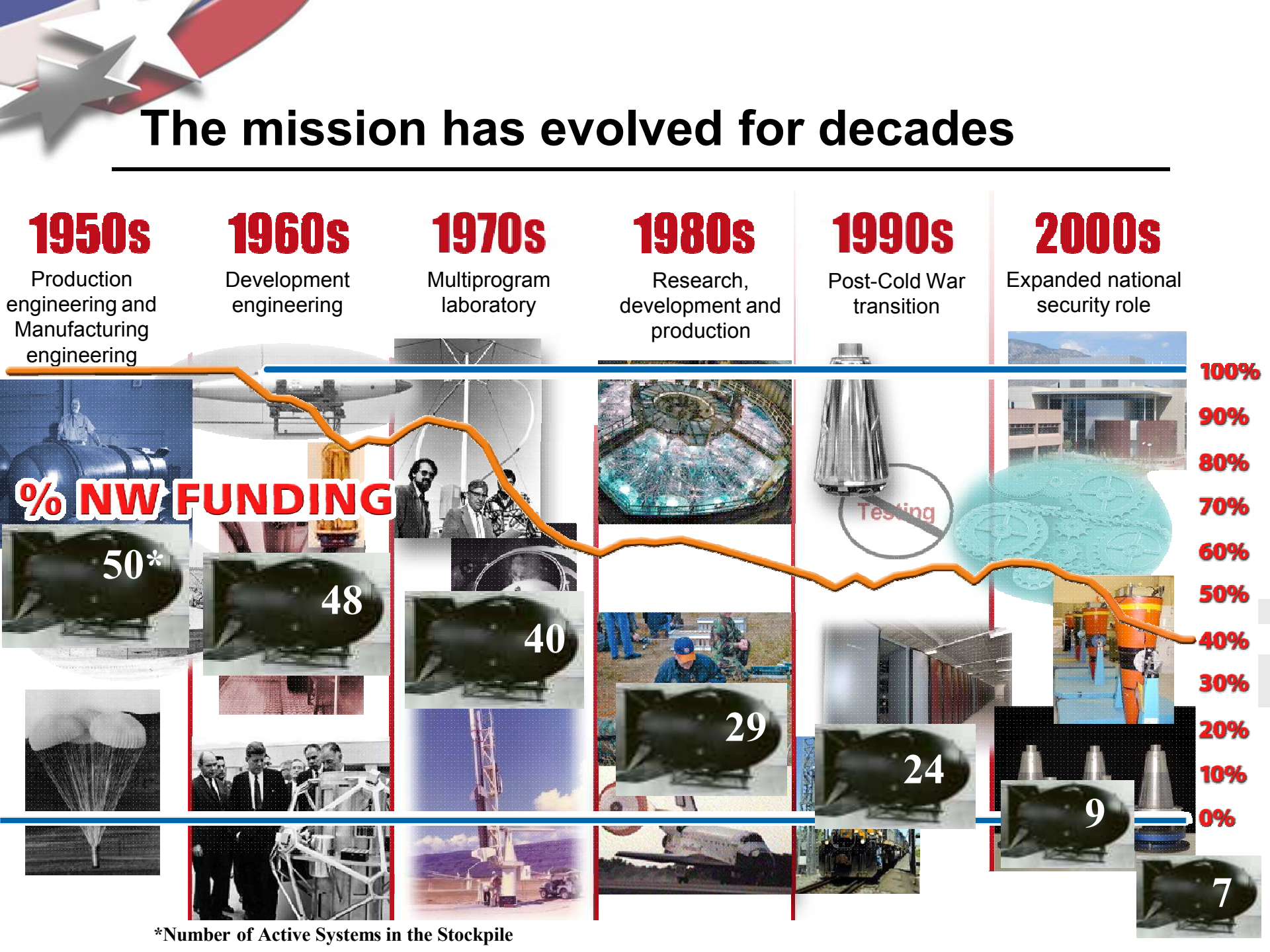
Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Sandia has four mission areas

- Nuclear Weapons
- Defense Systems and Assessments
- Energy, Resources, and Nonproliferation
- Homeland Security and Defense

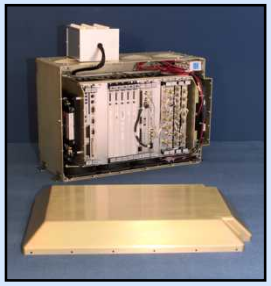
Sandia National Laboratories

The mission has evolved for decades

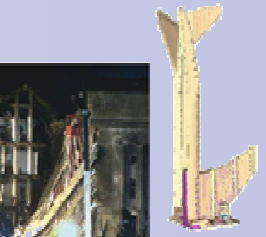


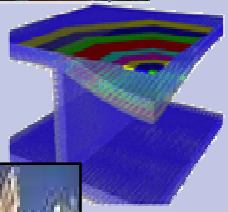
*Number of Active Systems in the Stockpile

Multi-program Synergy



- **Mutually-beneficial missions**
  - Development of product or technology in a program with application to another mission area
  - Cooperative nurturing of key capabilities
  - Development or beneficial application of supporting processes





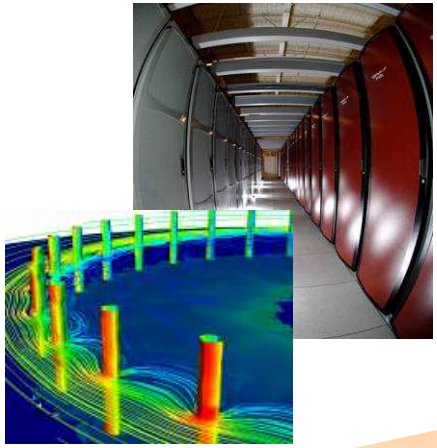
- **Sandia infrastructure**
  - Supports both DOE & Work for Others missions
  - Investment by other agencies in Lab infrastructure

- **Staffing**
  - Complementary research attracts best talent
  - Possible increased efficiency & innovation

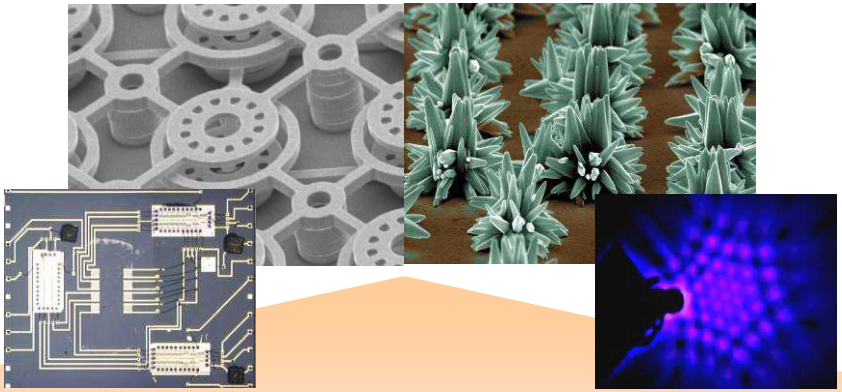
Examples

- Radar technology
- Radiation (SNM) detection
- Risk-based Security Solutions
- Nuclear forensics
- Threat Assessments
- Uncertainty & risk analysis methods

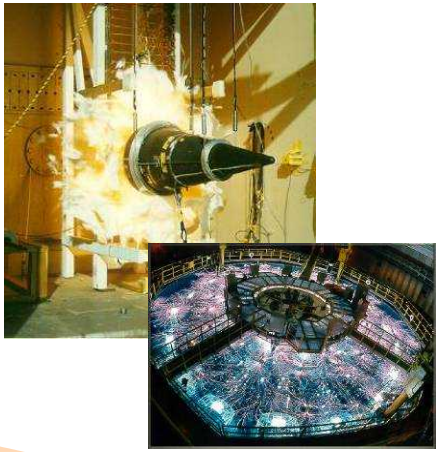
Research Disciplines Drive Capabilities



High Performance Computing

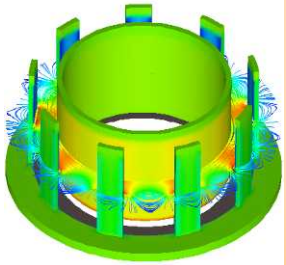


Nanotechnologies & Microsystems

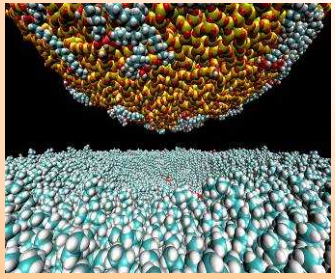


Testing in Extreme Environments

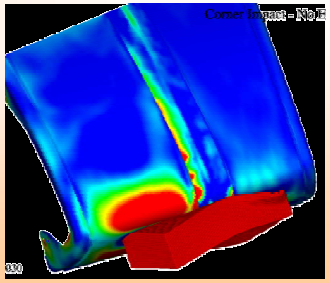
Computer Science



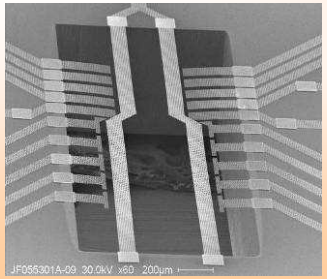
Materials



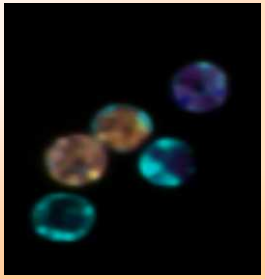
Engineering Sciences



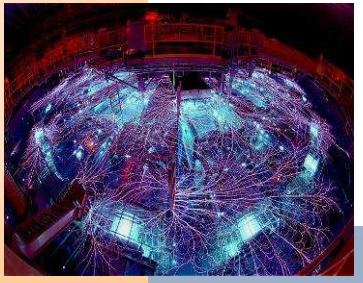
Micro Electronics



Bioscience



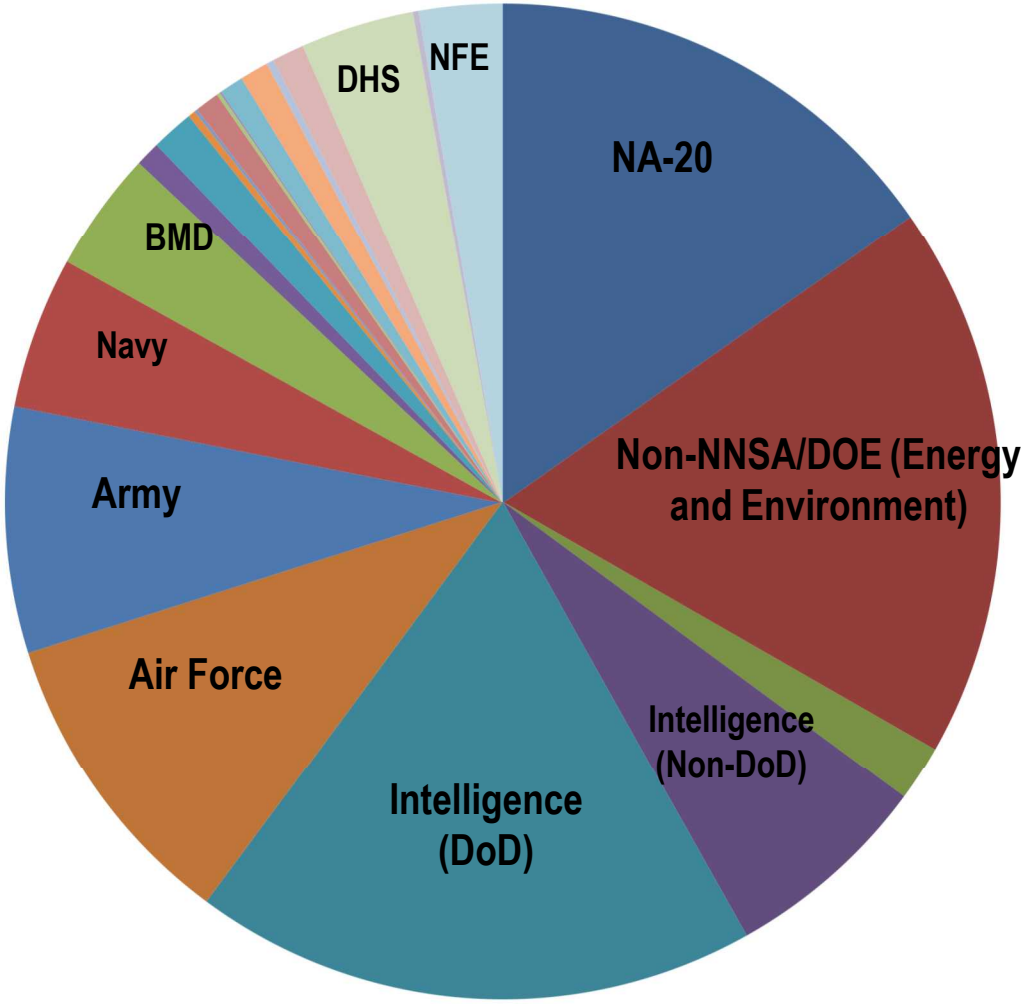
Pulsed Power



Research Disciplines

Sandia National Laboratories

FY08 National Security Technologies & Systems (NSTS) Revenue = $1.3B



Sandia National Laboratories

NSTS has eight mission themes

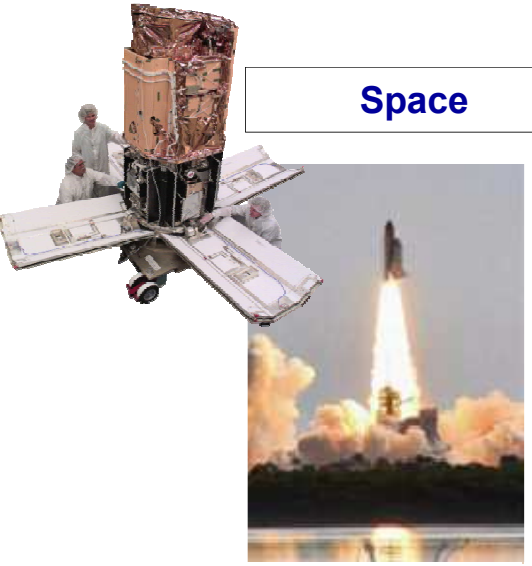
Nuclear Security

Energy Security

Science and Technology

Cyber Security

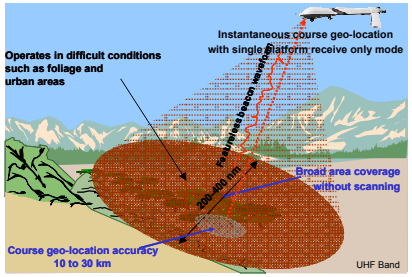
Space



Strategic Technical Surprise

WMD Protection, Prevention & Response

Domain Awareness and Precision Response



Sandia National Laboratories

The NSTS mission themes address the nation's critical vulnerabilities

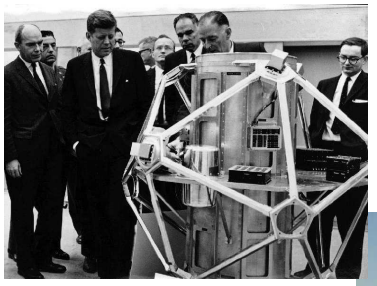
We must respond to customer needs with flexibility and agility, and deal with situations that we have never encountered before.

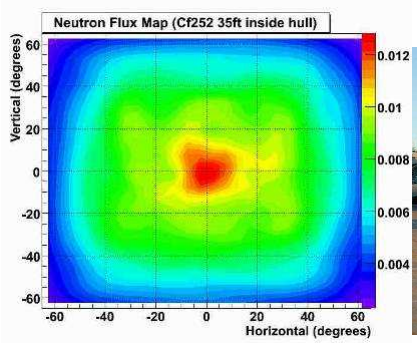
" … Discover, Innovate, Deliver … "

Sandia National Laboratories

Our nuclear security mission remains critically important

- Treaty verification
- Secure weapons and material
- Reduce fissile material inventories
- Detect undeclared state activities
- Detect/interdict nuclear smuggling
- Prevent malevolent radiological dispersal
- Secure borders and ports

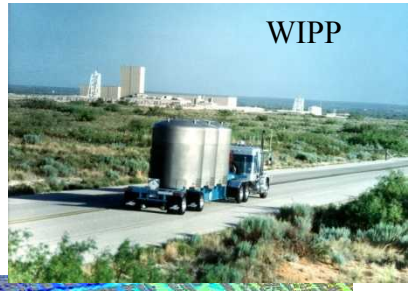


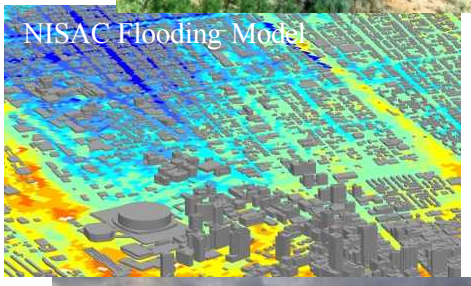


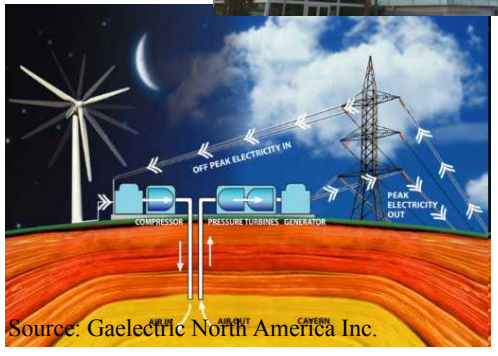
Sandia National Laboratories

Sandia is currently addressing key energy security challenges

- Transportation Energy – Reduce Oil Dependence
  - Combustion Research Facility – fuel and engine efficiency (DOE, University, Industry)
  - Joint BioEnergy Institute – cellulosic bio-fuels (DOE, University, Industry)
  - Sunshine to Petrol – solar energy to fuel conversion (LDRD)
- Global Energy Infrastructure – Protect Against Disruption
  - National Infrastructure Simulation and Analysis Center (DHS)
  - Liquefied natural gas safety and security (DOE, U.S. Coast Guard)
  - International energy infrastructure protection (Foreign Government, DoS)
  - Strategic petroleum reserve (DOE)
- Nuclear Energy – Manage Waste and Reduce Proliferation
  - Yucca Mountain / WIPP (DOE)
  - Waste packaging and transportation (DOE, Industry)
  - International non-proliferation programs (DOE, DoS, Foreign Government)
- Next Generation Infrastructure – Deploy Low-Carbon Energy Sources
  - Information and cyber security (DOE, DHS, Intelligence Community)
  - DoD base energy security assessments (DoD)
  - Mesa del Sol / Kirtland Air Force Base (DOE, DoD, Industry)
- Climate Change – Mitigate and Adapt to Changes
  - Carbon reutilization (LDRD)
  - Carbon capture, management, and sequestration (DOE)
  - Monitoring for treaty verification (DOE)



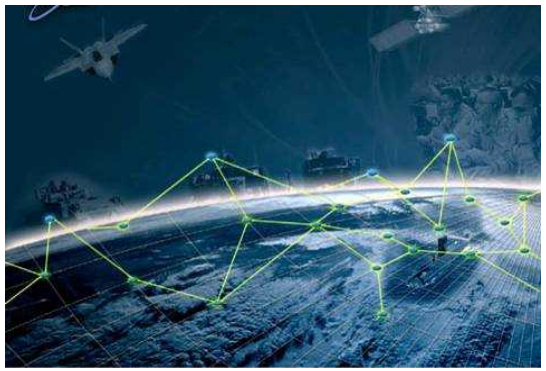


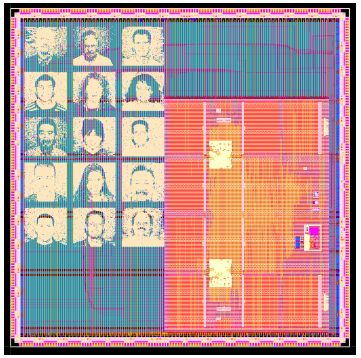


Source: Gaelectric North America Inc.

We are addressing the nation's cyber security vulnerabilities

- **Three major elements of Sandia's strategy:**
  - **Provide information security for the nation's most critical systems.**
  - **Be a model of cyber security.**
  - **Be a hub of cyber innovation and learning.**



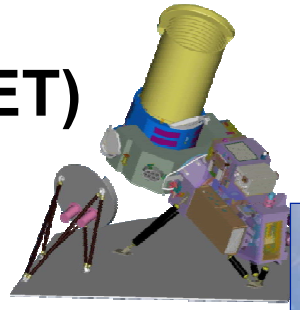


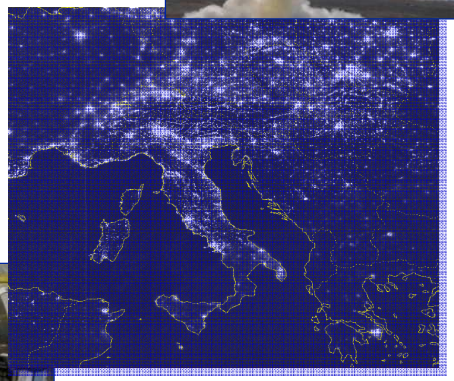
Secure microcontroller for SAASM

Sandia National Laboratories

We continue to advance technology in support of critical space missions

- Traditional Nuclear Detonation (NUDET) detection system role
- Develop a national role in persistent surveillance
- Lead in technology transition & sustaining technology development & maturation
- Continue to develop, deliver and sustain pathfinder systems
- Build a diverse space portfolio

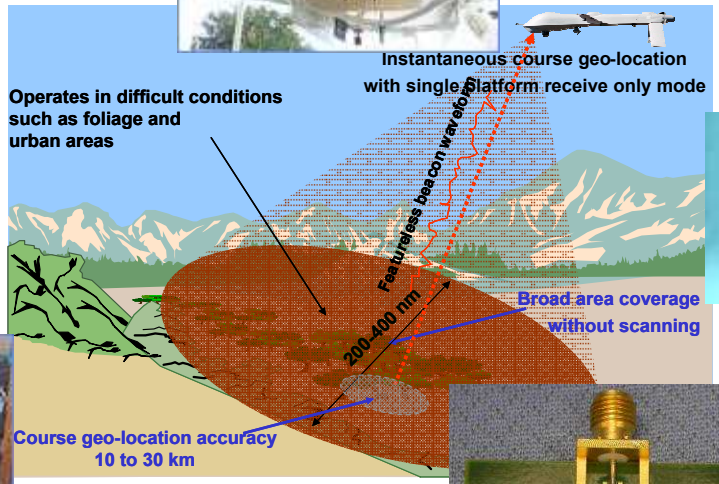




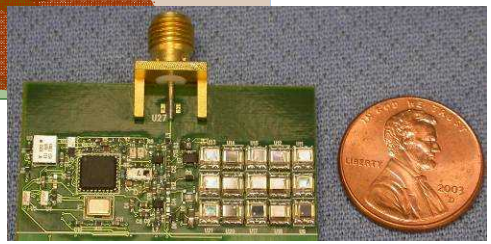
Sandia National Laboratories

We are supporting our warfighters on the battlefield of the future

- Domain Awareness and Precision Response
  - –Recognized successes with synthetic aperture radar and tags
  - Expertise from a variety of disciplines and organizations across Sandia
  - Synergies among technologies
  - Three major focus areas:
    - – Precision Knowledge
    - – Precision Decisions
    - – Precision Response



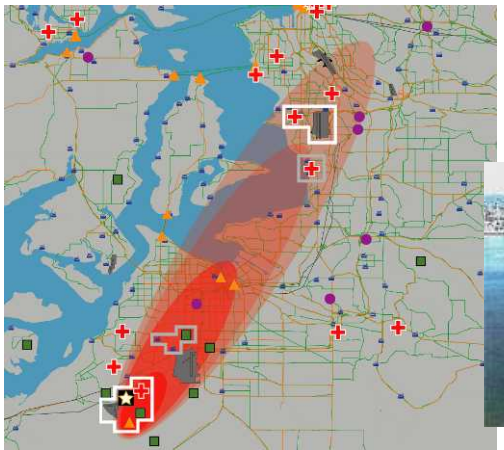
Tagging, Tracking and Locating (TTL)



Sandia National Laboratories

We are working to enhance the Nation's ability to protect, prevent, & mitigate the threat of WMD

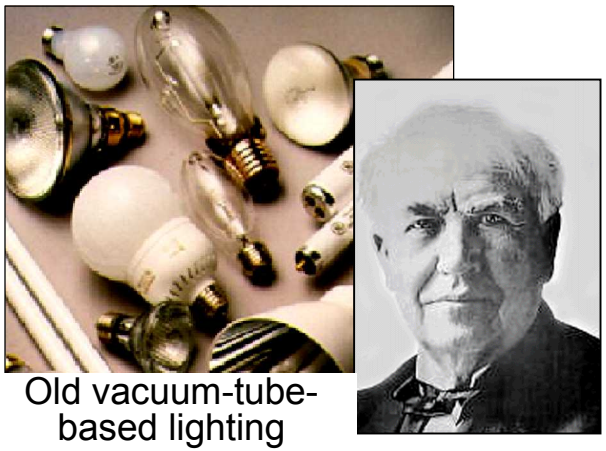
- Relationships with many of the key agencies involved
- Programs across the entire WMD threat spectrum for a range of government agencies
- Broad spectrum of relevant technical skills, subject matter experts, and solutions



Sandia National Laboratories

Innovation fuels our mission success

Solid State Lighting (SSL) will change the way we light the world



Old vacuum-tube-based lighting

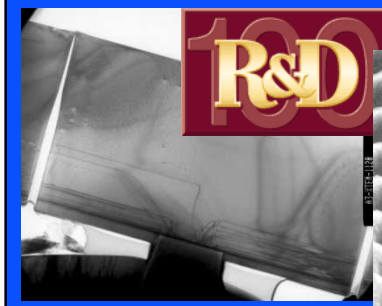
Lighting

SSL has the potential, by 2025, to:

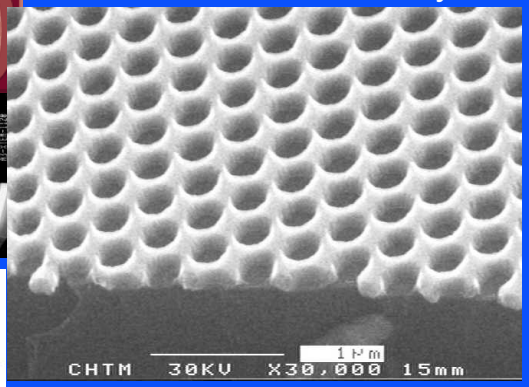
- **Decrease electricity consumed by lighting by 50%**
- **Decrease total electricity consumption by 10%**
- **Reduce carbon emissions by >30 million tons/yr**

Successful R&D investments made Sandia the Lead Lab in US for SSL developments.

Cantilever Epitaxy



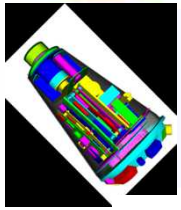
Photonic Crystal



LDRD
LABORATORY DIRECTED RESEARCH & DEVELOPMENT

Sandia plays a Unique Role in National Security

"The Sandia National Laboratories develop science-based technologies that support national security through science and technology, people, infrastructure, and partnerships." ***DOE Website (http://www.energy.gov/organizations/labs-techcenters.htm)***

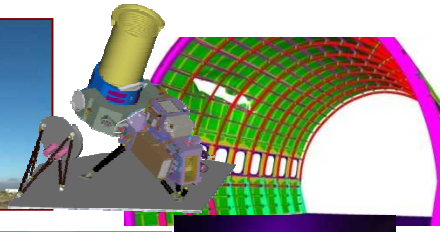


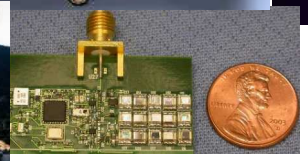
Extraordinary People and Culture

World-class, multidisciplinary capabilities

High-Risk Challenges, Pathfinder Programs

Full spectrum of open to secure environments





COMBUSTION RESEARCH FACILITY

National Security Technologies and Systems

QUESTIONS?

Sandia National Laboratories