

*Exceptional service in the national interest*



# Sandia National Laboratories and Laboratory Operating System *An Overview*

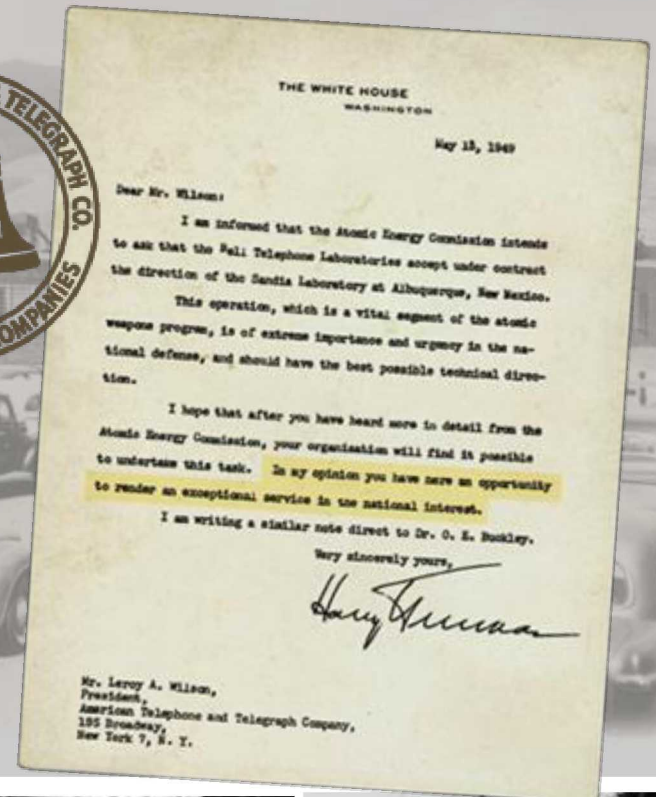
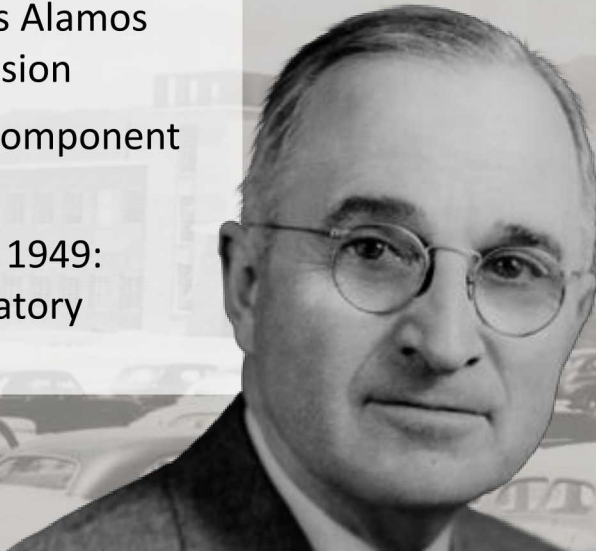


Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under Contract DE-NA0003525. SAND2018-4953C

# Sandia's History

*Exceptional service in the national interest*

- July 1945: Los Alamos creates Z Division
- Nonnuclear component engineering
- November 1, 1949: Sandia Laboratory established



to undertake this task. In my opinion you have here an opportunity to render an exceptional service in the national interest.



# Governance of Sandia Laboratories

## Sandia Corporation

- AT&T: 1949–1993
- Martin Marietta: 1993–1995
- Lockheed Martin: 1995–2017
- National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc.: 2017-present
- Government owned, contractor operated

Federally funded  
research and development center



# Sandia Sites

*Albuquerque, New Mexico*



*Livermore, California*



*Kauai, Hawaii*



*Waste Isolation Pilot Plant,  
Carlsbad, New Mexico*



*Pantex Plant,  
Amarillo, Texas*

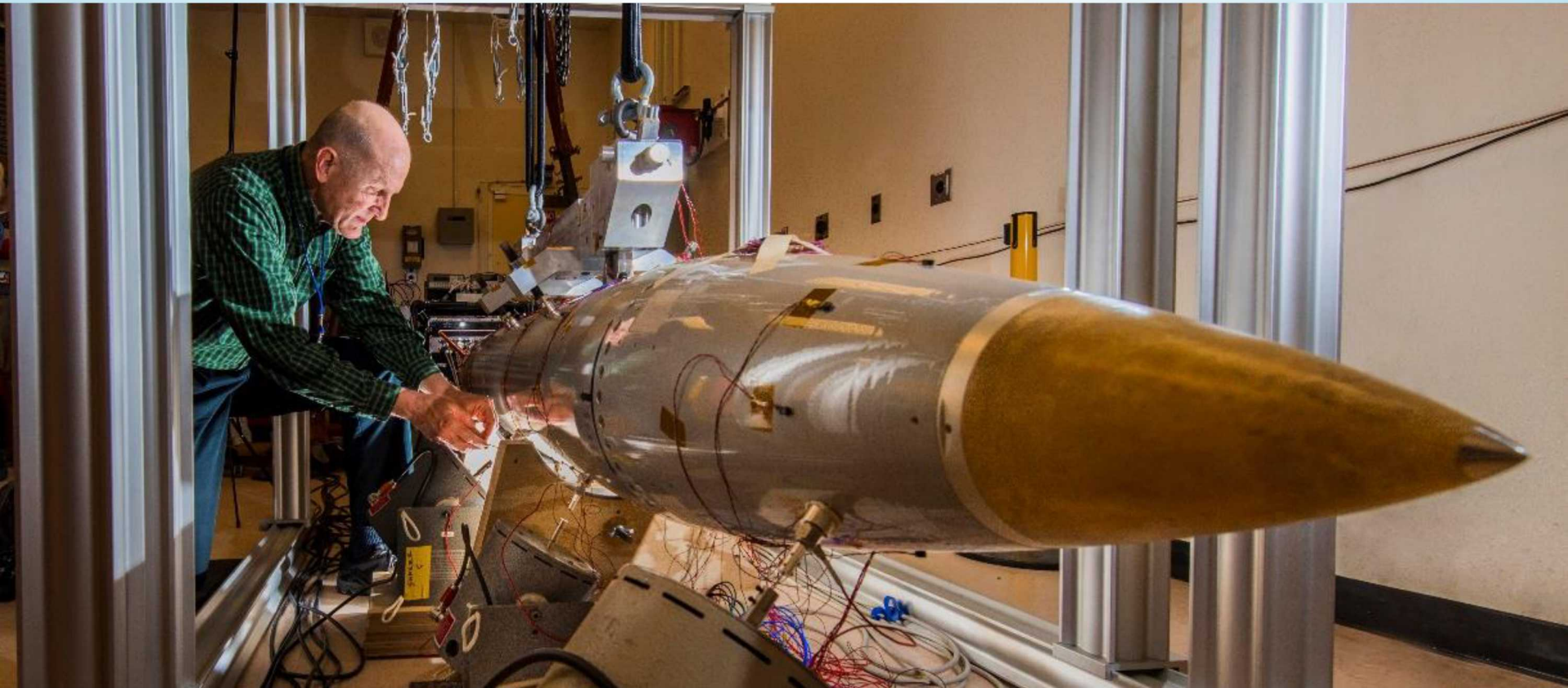


*Tonopah,  
Nevada*



# Purpose Statement

*Sandia develops advanced technologies to ensure global peace*



# Sandia Addresses National Security Challenges

**1950s**

Nuclear weapons

Production and  
manufacturing  
engineering



**1960s**

Development  
engineering

Vietnam conflict



**1970s**

Multiprogram  
laboratory

Energy crisis



**1980s**

Missile defense  
work

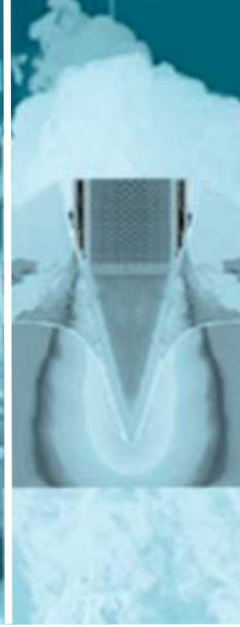
Cold War



**1990s**

Post-Cold War  
transition

Stockpile  
stewardship



**2000s**

START  
Post 9/11

National security



**2010s**

LEPs  
Cyber, biosecurity  
proliferation

Evolving national  
security challenges



# Sandia's Current Nuclear Weapons Activities



*Warhead Systems Engineering and Integration*



Gas Transfer systems



*Design Agency for Nonnuclear Components*



Arming, fuzing, and firing systems

Safety systems



*An extensive suite of multi-disciplinary capabilities are required for Design, Qualification, Production, Surveillance, Experimentation / Computation*

**Major Environmental Test Facilities and Diagnostics**

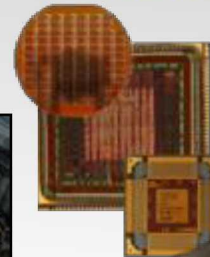


Z Machine

Light Initiated High Explosive

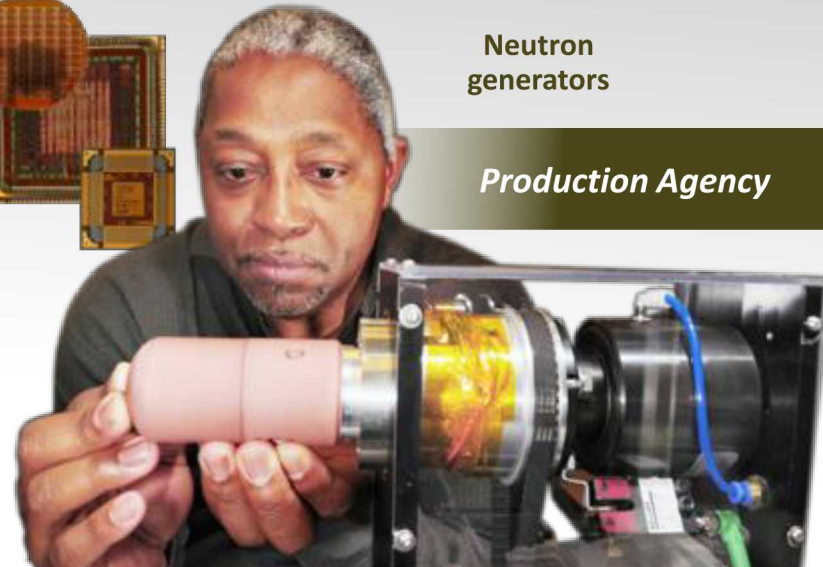
Annular core research reactor

MESA Microelectronics



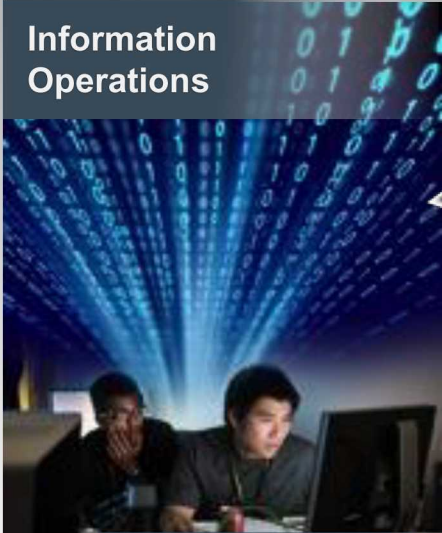
Neutron generators

*Production Agency*



# National Security and Defense Nuclear Nonproliferation Programs

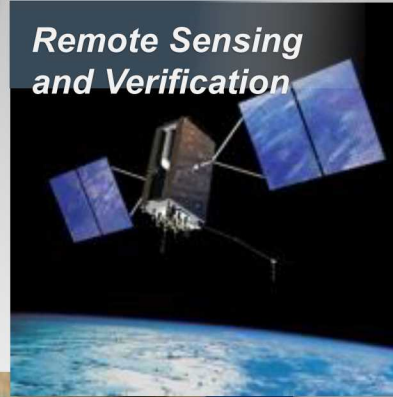
Information Operations



Surveillance & Reconnaissance



Remote Sensing and Verification



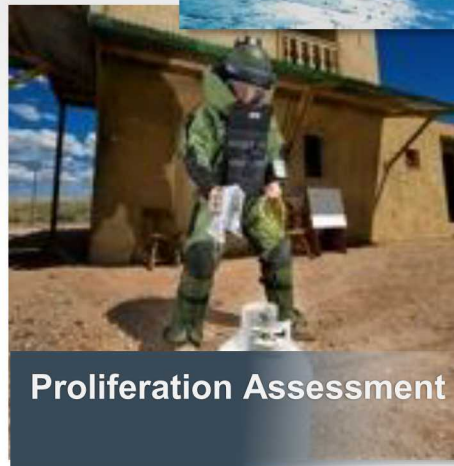
Space Mission



Science & Technology Products



Proliferation Assessment



Integrated Military Systems



# Energy



## Energy Research

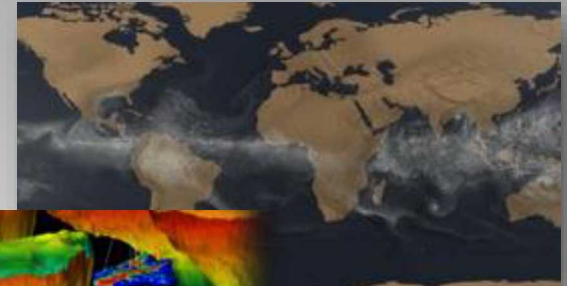
ARPAe, BES Chem Sciences, ASCR, CINT, Geo Bio Science, BES Material Science

## Climate & Environment

Measurement & Modeling, Carbon Management, Water & Environment, and Biofuels

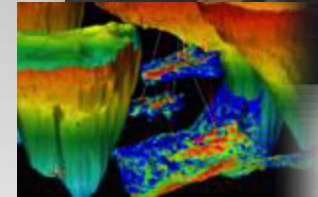
## Nuclear Energy & Fuel Cycle

Commercial Nuclear Power & Fuel, Nuclear Energy Safety & Security, DOE Managed Nuclear Waste Disposal



## Renewable Systems & Energy Infrastructure

Renewable Energy, Energy Efficiency, Grid and Storage Systems

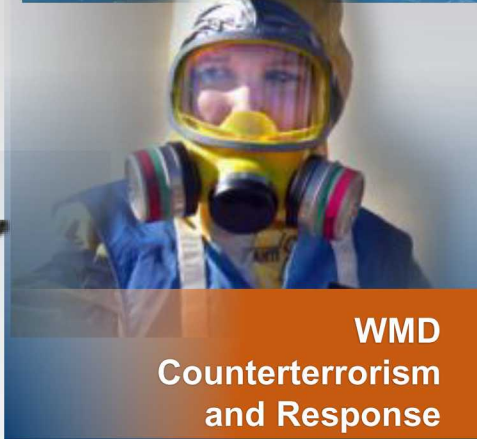
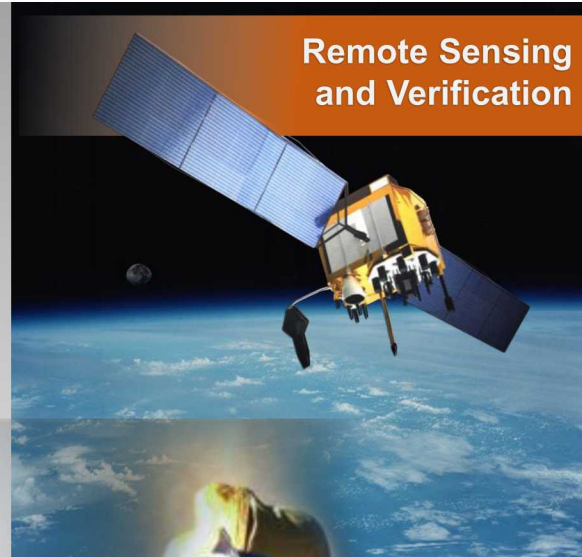


## Transportation Energy & Systems

Vehicle Technologies, Biomass, Fuel Cells & Hydrogen Technology



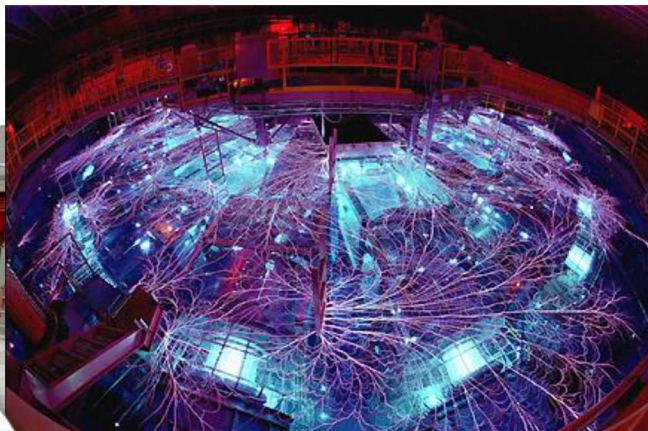
# Global and Homeland Security



# Our Research Framework

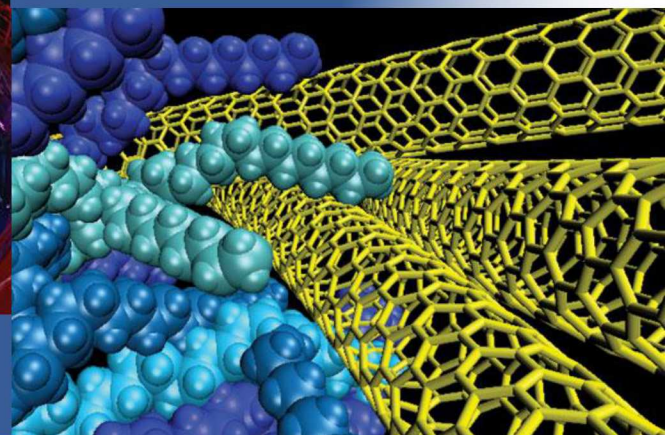
*Strong research foundations play a differentiating role in our mission delivery*

## Computing & Information Sciences

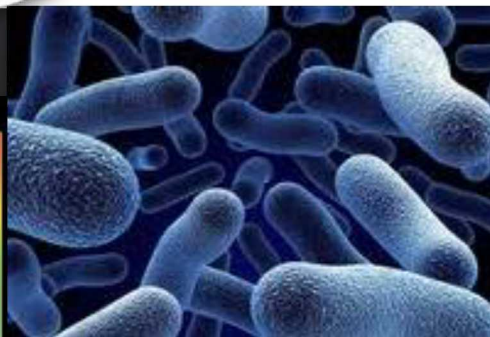
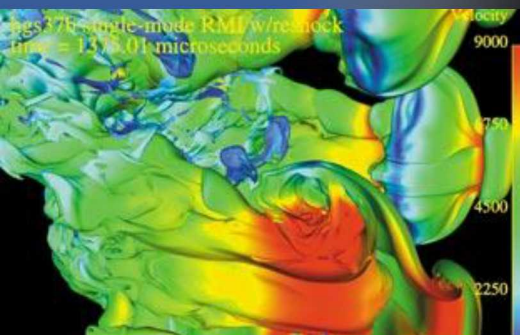


## Radiation Effects & High Energy Density Science

## Materials Sciences

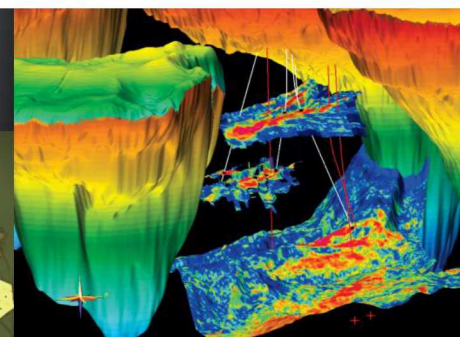
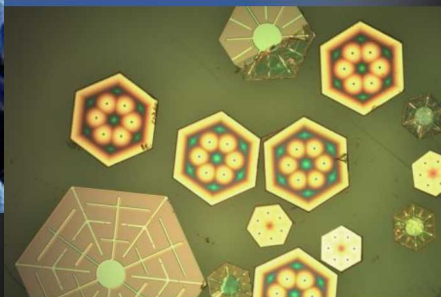


## Engineering Sciences



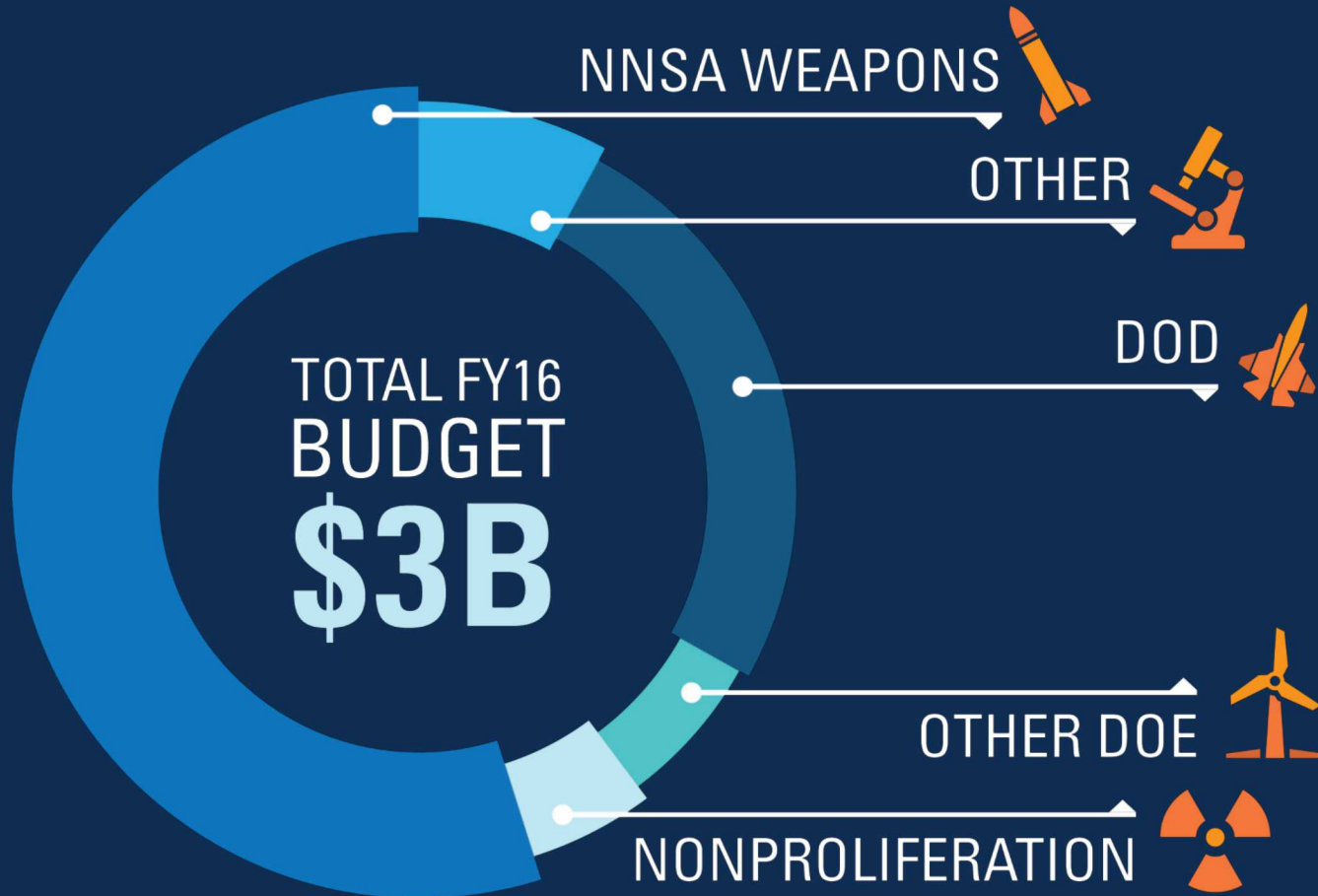
## Bioscience

## Nanodevices & Microsystems



## Geoscience

# Sandia's FY 2016 Budget



# Sandia National Laboratories is an FFRDC

*Federally Funded Research and Development Centers (FFRDC) operate autonomously in the public interest with objectivity and independence, maintain core competencies in missions of national significance and remaining free from organizational conflicts of interest*

## Key characteristics

- Attract and maintain high-quality personnel
- Maintain expertise in specific fields
- Meet special long-term, large-scale R&D needs
- Operate objectively and independently, in the public interest

## Importance to the nation

- Comprehensive knowledge of sponsors' needs
- Objectivity and independence
- Long-term continuity
- Broad access to sensitive government and commercial proprietary information
- Quick response capability
- Anticipation of national needs

# Lab Operating System

LOS is a set of tools and processes that enhance the way we think, behave and approach work to get better every day.

## How

Six enablers comprise the Lab Operating System. Each enabler includes tools, processes, and behaviors that can be applied to our work.

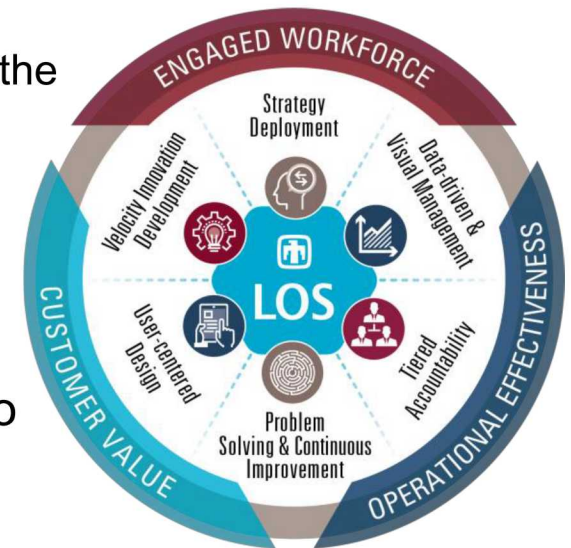
- Tools: generate a new approaches and thinking
- Processes: the way work gets done and connects across the organization
- Thinking: how we approach the work
- Behaviors: the way we act



## Why

Increase our capacity to learn, innovate, and respond to rapidly changing environment

- We always ask what is best for the Lab
- We have shared goals
- We value a common way more than our own way
- We have standard processes and systems



# Benchmarking to Inform our Work for LOS

There are many external places to look to for best practices.  
 Believe we are the first government / lab entity implementing such an operating system.

	Honeywell	Intel	Boeing	Goodyear
Compelling Reason	Become more competitive in marketplace	Supply Chain efficiency (cost, cycle time); Prod Dev time	Change in military contract pricing (circu '90s): To remain competitive	Financial loss 2001- 03; 4 month strike
Metrics of Success	Order to Cash (Revenue / margin)	Reduced leadtime for better customer response, cost savings/ avoidance	Cost and cycle time	On Time Delivery
Leadership Engagement	Role-Modeled from CEO down	Role-Modeled from SVP of Mfg/ Supply Chain down (~65% of workforce)	From Executive office. Extended visits to Japan for direct observation.	CTO Sponsored; from the top down
Methodology of Building a Lean Operating System	Started with Six Sigma teachings, tied directly to business drivers and expanded to all businesses	Create a shared experience via 1 week workshop. All sr leaders first, then waterfall down. Expectation for engagement in annual review	Lean Leadership Training for executives. Formal training for all 100,000 employees taught by managers	Training for all (lean101,201); more advanced avail: 301/401.

### Common Themes:

- Shared leadership engagement: investment in learning significant and then leaders expected to teach and role model application.
- Metrics of success tie directly to the business needs.
- All use consultants and go-and-see events to bring an outside perspective and push when there will be inevitable resistance.

The day to day work needs to change to realize sustainable results

# FY18 – 20 Destination Postcards

## FY18 Destination Postcard

*There are many positive examples of working cross-division to address high-impact improvements utilizing LOS tools and processes.*

- LOS infrastructure in place for early adopters.
- Demonstrated pockets of success across multiple organizations.
- Rich portfolio of bright spots and key learnings from those practicing LOS concepts to drive desired outcomes.
- Divisions are practicing 2 enablers: TA plus one other leading to resolution of pain points.

## FY19 Destination postcard

*LOS behaviors and thinking leads to measurable results achieved in operational challenges with cross-division collaboration.*

- Improve multiple processes (outside Division 10K) impacting most of the lab
- Divisions highlight LOS leading to quantifiable results.
- Organizations leverage a rich portfolio of bright spots and key learnings to scale learning.
- PS & CI widely used across lab with validated results documented in the CI tool.
- Applying LOS through Coalitions.

## FY20 Destination postcard

*All levels of the workforce feel a sense of ownership and accountability for improving our effectiveness through PS & CI and creating, acquiring and sharing knowledge across the lab.*

- Reward and recognition system is centered around positive behaviors and organizational results.
- Fully deployed self-serve knowledge base.
- Clear alignment from staff to Lab objectives and goals.
- Accelerated learning cycles for new products and research.

# Strategy to Action: Developing and Deploying LOS

## Strategy

**FY18 Destination Postcard**

There are many positive examples of working cross division to address high impact improvements utilizing LOS tools and processes.

- LOS infrastructure in place for early adopters.
- Demonstrated pockets of success across multiple organizations.
- Rich portfolio of bright spots and key learnings from those practicing LOS concepts to drive desired outcomes.
- Divisions are practicing 2 enablers to plan and deliver leading to resolution of pain points.

**FY19 Destination postcard**

LOS behaviors and thinking leads to measurable results achieved in operational challenges with cross division collaboration.

- Improve multiple processes (update Division 50K) impacting most of the lab.
- Divisions highlight LOS leading to quantifiable results.
- Organizations leverage a rich portfolio of bright spots and key learnings to scale.
- PS & CI widely used across lab with validated results documented in the CI tool.
- Applying LOS through Co-Enablers.

**FY20 Destination postcard**

All levels of the workforce feel a sense of ownership and accountability for improving our effectiveness through PS & CI and creating, acquiring and sharing knowledge across the lab.

- Reward and recognition system is centered around positive behaviors and organizational results.
- Fully deployed self-serve knowledge base.
- Clear alignment from staff learning.
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- Accelerated learning cycles for new products and research.

*Destination Postcards*

*3-year Road Map for milestones*

## Annual

*Project-Specific Action Plans*

*Enabler Action Plans*

## Quarterly

*3 quarter Look-a-head*

*3 quarter Look-a-head*

*Quarterly Planning, Retrospective, and Review*

## 2 Weeks and Daily

*Sprint Planning, Retrospective, and Review*

*Daily Standups*