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Title: Careers at Los Alamos National Laboratory- A brief introduction

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Intended for: STEM recruitment at Mainly Hispanic Colleges and Universities

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Los Alamos
NATIONAL LABORATORY
EST. 1943

CAREERS AT LOS ALAMOS NATIONAL LABORATORY

A BRIEF INTRODUCTION

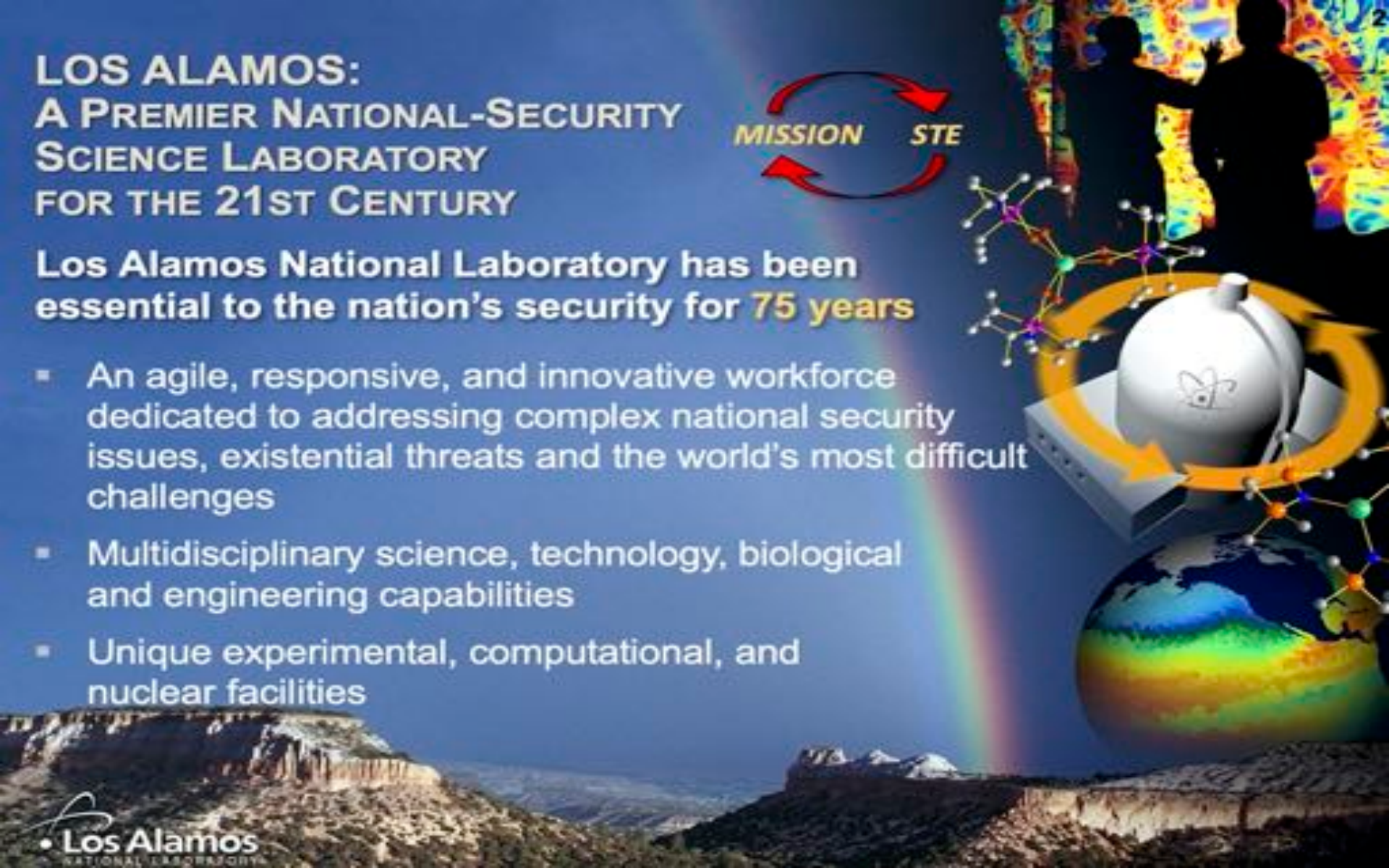
John Singleton

NNSA
National Nuclear Security Administration
Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

LOS ALAMOS:
A PREMIER NATIONAL-SECURITY SCIENCE LABORATORY FOR THE 21ST CENTURY

Los Alamos National Laboratory has been essential to the nation's security for 75 years

- An agile, responsive, and innovative workforce dedicated to addressing complex national security issues, existential threats and the world's most difficult challenges
- Multidisciplinary science, technology, biological and engineering capabilities
- Unique experimental, computational, and nuclear facilities

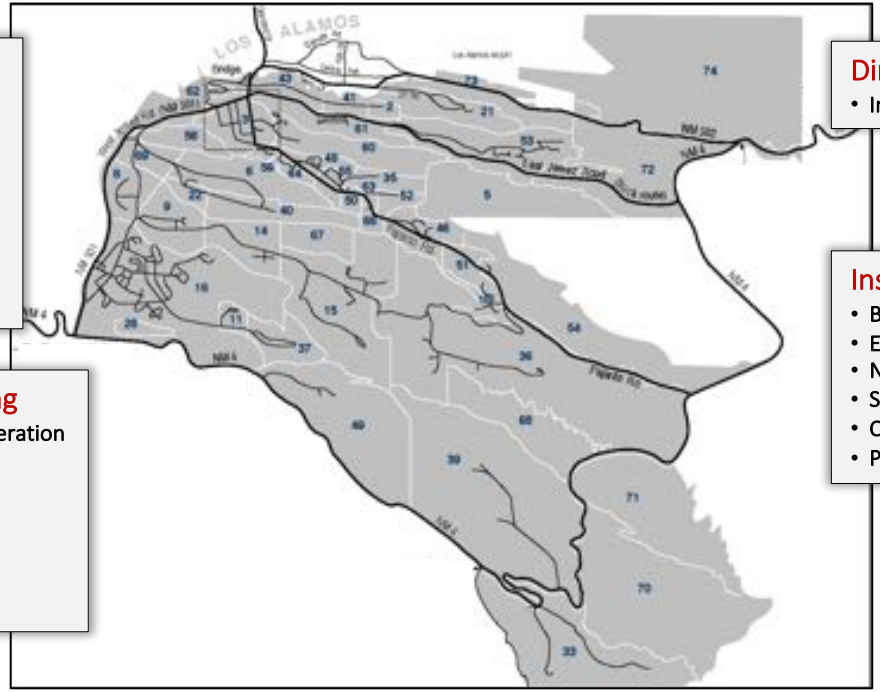


Los Alamos
NATIONAL LABORATORY

The Laboratory is a complex, dynamic system of people, facilities, materials, and services

Weapons Programs
- Weapons Physics Design and Computation
- Weapons Engineering
- High Explosives
- Plutonium
- Tritium/GTS
- Uranium, Beryllium, Salts, Metals
- Detonators
- Component Fabrication and Assembly

Science, Technology & Engineering
- Nuclear Nonproliferation & Counter-Proliferation
- Emerging Threats
- Intelligence Community
- National Defense and Homeland Security
- Chemistry, Earth and Life Sciences
- Materials and Physical Sciences
- Theoretical and Computational Sciences



Director's Office
- Institutional Management

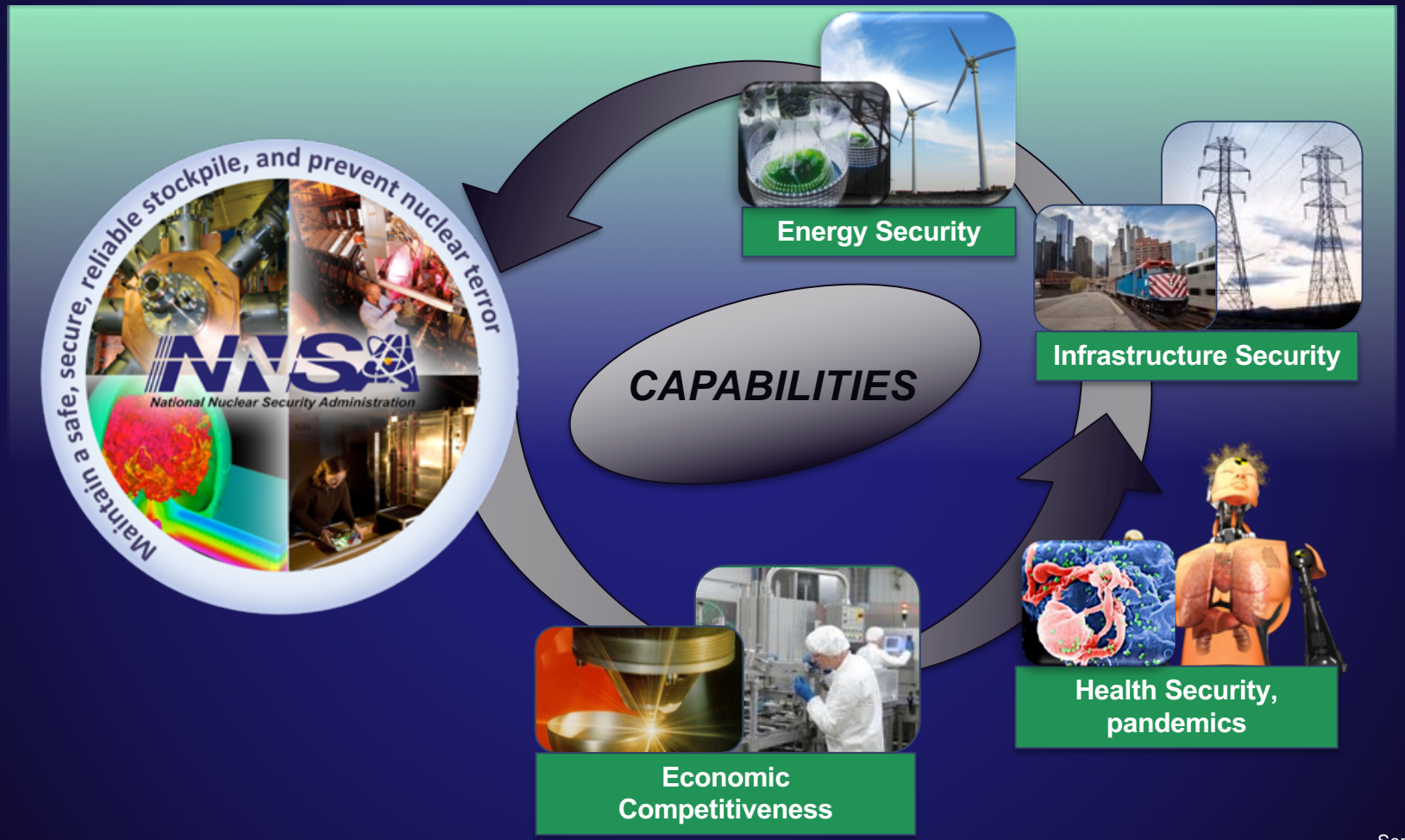
Institutional Operations
- Business Services
- Environmental, Safety, and Health
- Nuclear & High Hazard Operations
- Security and Mission Assurance
- Capital Projects
- Project Management Services

40 square miles | 47 technical areas | 1,280 buildings/9M sq ft | 11 nuclear facilities | 268 miles of roads

8,900 career employees/13,000 workers on site | 2,500 R&D staff | 1,100 veterans | 460 postdocs | 1,860 students

$2.9B budget | 11 Directorates | 60 Divisions

Our enduring STE strength provides the basis for contributing to (inter)national-scale challenges: fundamental science is a vital ingredient



Simultaneous excellence:
Balance between operations and mission

Design, produce, and certify current and future nuclear weapons and reduce global nuclear threats

Deliver scientific discovery and technical breakthroughs that support DOE & NNSA missions

Execute sustained operations that are reliable and responsive to mission needs

Sustain and enhance LANL's partnership with the community across Northern New Mexico

Los Alamos' core mission is to ensure the U.S. nuclear deterrent

- Ensure safety, reliability, and performance of U.S. nuclear stockpile
- Design agency for 4 out of 7 warhead systems constituting the nation's deterrent
  - Physics design & engineering
- Significant & growing production responsibilities: detonators, heat sources, Pu pits


Modeling & simulation


Specialized experiments


Supercomputing


DARHT – Dual axis x-ray

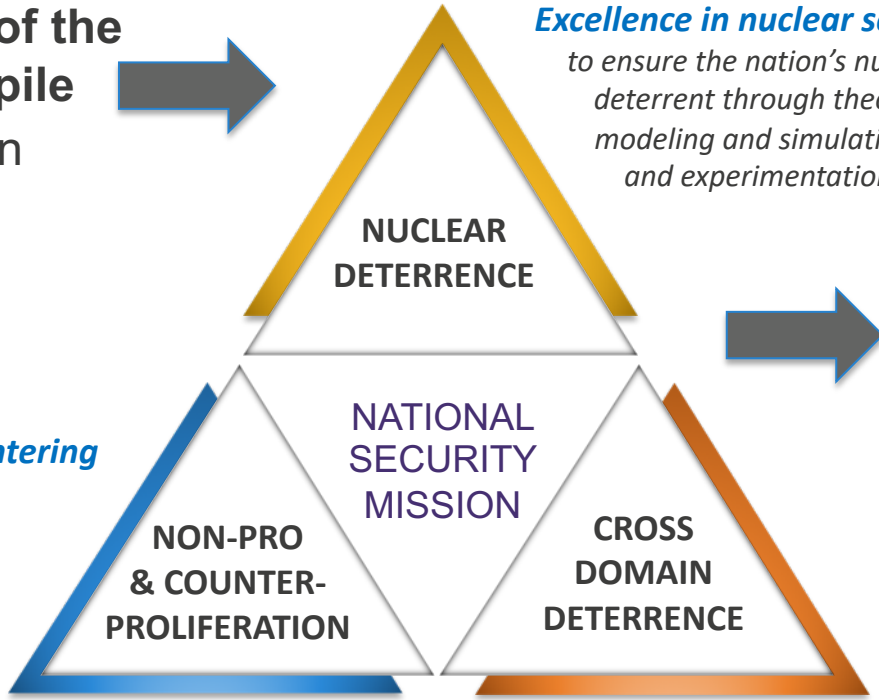
Los Alamos uses scientific assessment, experimentation & modeling to assess and certify the stockpile, which has aged significantly since it was first developed and since the conclusion of full-scale testing

Our national security mission is broad and important
— and motivates and is enabled by ST&E discovery

Ensure the safety, reliability, and performance of the U.S nuclear stockpile

- Physics & Design
- Engineering
- Production

Excellence in nuclear security *to ensure the nation's nuclear deterrent through theory, modeling and simulation, and experimentation*



Preventing and countering *efforts of proliferants to acquire, develop or disseminate materials and expertise necessary for nuclear weapons*

Energy security

- Sustainable Nuclear Energy
- Resilient Materials
- Complexity in Energy Systems

Supporting *the DoD, IC, and other national security partners to execute multidomain operations across land, air, sea, space and cyber*

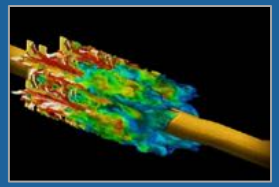
Unique science and engineering infrastructure is critical for national security work

…and more, e.g. human genome!

Our capability areas now define six key areas of science, technology & engineering in which we must lead

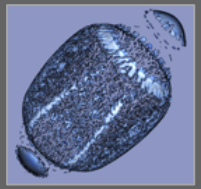
Materials for the Future

- Defects and Interfaces
- Extreme Environments
- Emergent Phenomena



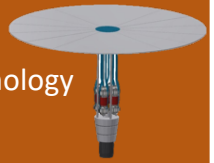
Science of Signatures

- Nuclear Detonation
- Nuclear Processing, Movement, Weaponization
- Natural and Anthropogenic Phenomena



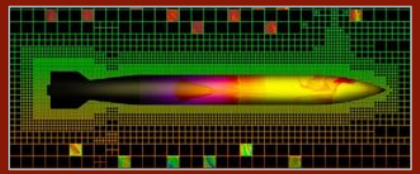
Nuclear and Particle Futures

- High Energy Density Physics & Fluid Dynamics
- Nuclear & Particle Physics, Astrophysics & Cosmology
- Applied Nuclear Science & Engineering
- Accelerator Science & Technology



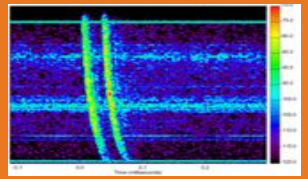
Weapons Systems

- Design
- Manufacturing
- Analysis



Integrating Information, Science, and Technology for Prediction

- Complex Networks
- Computational Co-Design
- Data Science at Scale

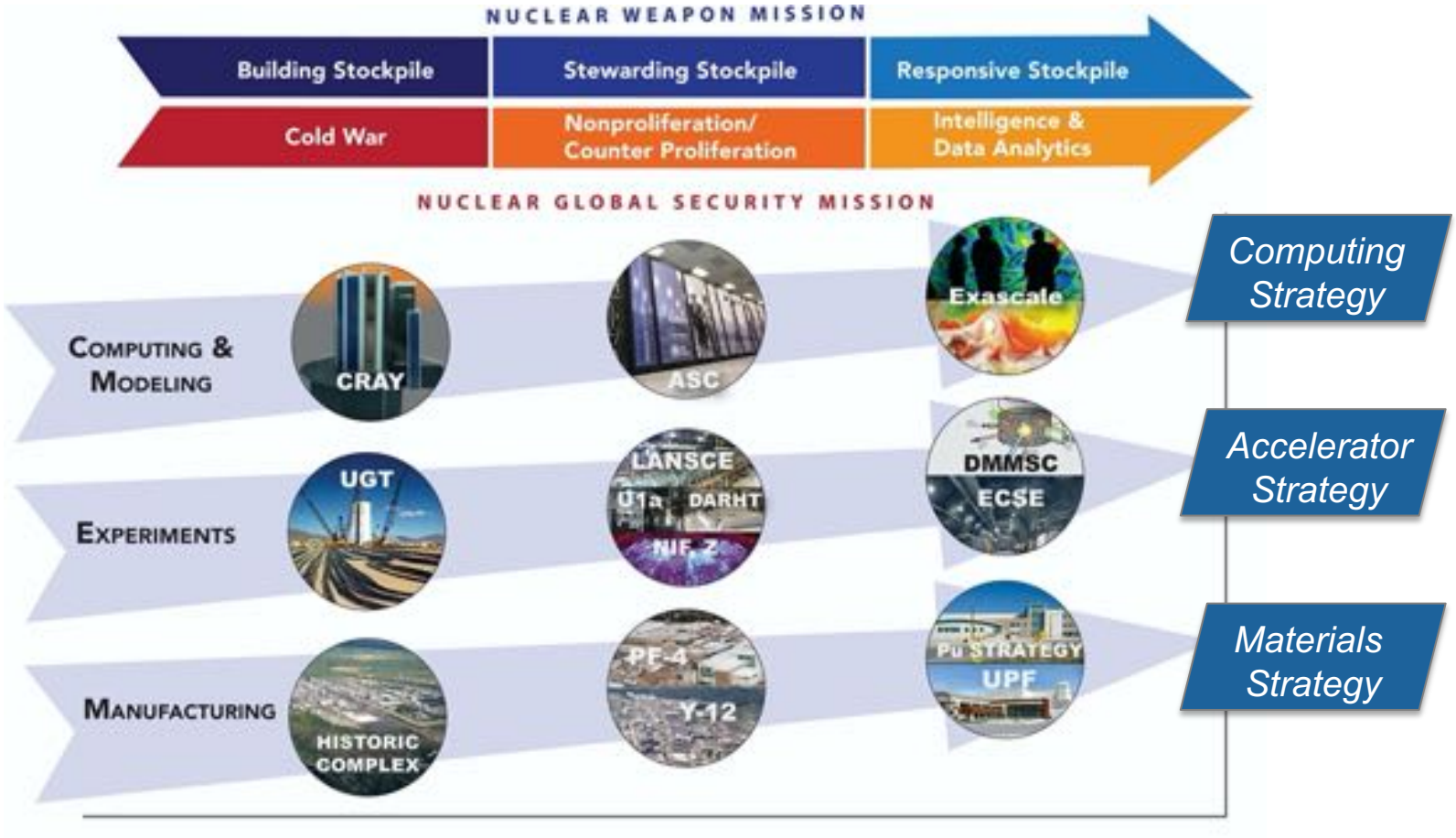


Complex Natural and Engineered Systems

- Human–Natural System Interactions: Nuclear
- Engineered Systems
- Human–Natural System Interactions: Non-Nuclear

We see an enduring future for an integrated Laboratory

— and the need for integrating assets at scale for national security



As a Laboratory, Los Alamos stewards broad and deep STE capabilities for multi-program leverage and benefit

Stockpile Stewardship

Fluids & turbulence research

Understanding fluid dynamics in extreme environments

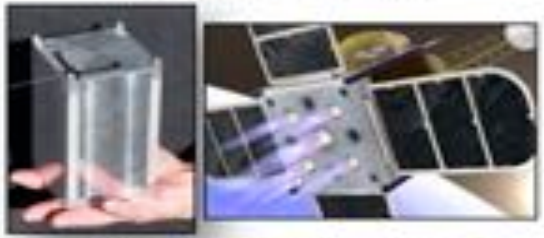
Supercomputer modeling & simulation

Kinetic plasma modeling

Global Security

Muon tomography

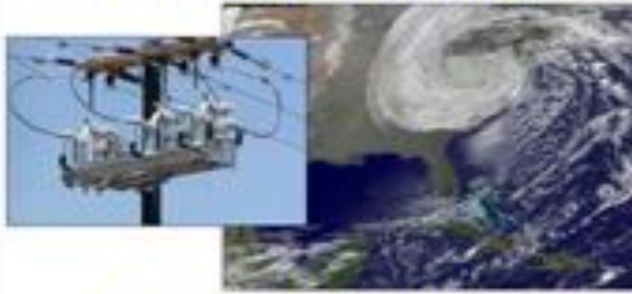
Scanner in Bahamas; Imaging Fukushima Daiichi reactors; Mapping cracks in Brunelleschi's dome, Florence



Security from space

Developing and delivering space payloads for global security, environment

Energy Security



Energy Infrastructure

Applied network science to improve response, readiness, resilience

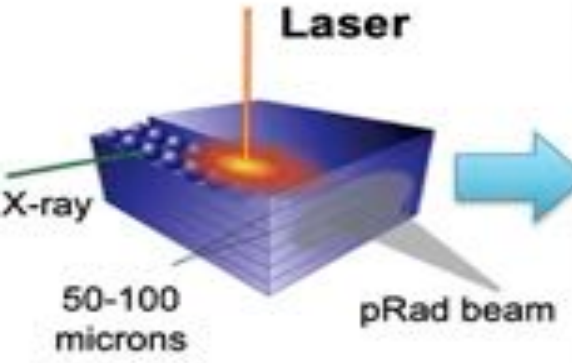
Accident tolerant nuclear fuel development

Fabrication of test pellets

R&D highlights: www.lanl.gov/science-innovation/science-highlights

A vision for Production Science: "Process to Product"

Enabling rapid and confident deployment of
new concepts and components



Additively Manufactured 316L Stainless Steel

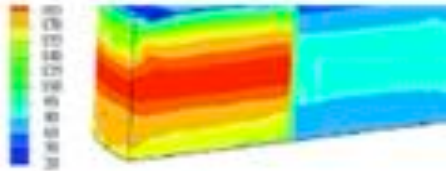
Damage under shock loading unable to coalesce leading to a more shock-resistant material

Prototype Gas Bottle

Process Modeling

Microstructure Modeling

Properties Modeling



Performance Modeling

Critical experimental data for advanced modeling and simulation to accelerate qualification for advanced manufacturing

The strength of our capabilities allows us to engage in multi-institutional consortia

National Risk Assessment Partnership (NRAP)

NRAP
National Risk Assessment Partnership

Carbon Capture Simulation for Industry Impact (CCSI²)

CCSI²
Carbon Capture Simulation for Industry Impact

Producing Algae for Coproducts and Energy (PACE)

PACE
PRODUCING ALGAE FOR COPRODUCTS AND ENERGY

Algal Biomass Yield (ABY) @ Kona Demonstration Facility (KDF)

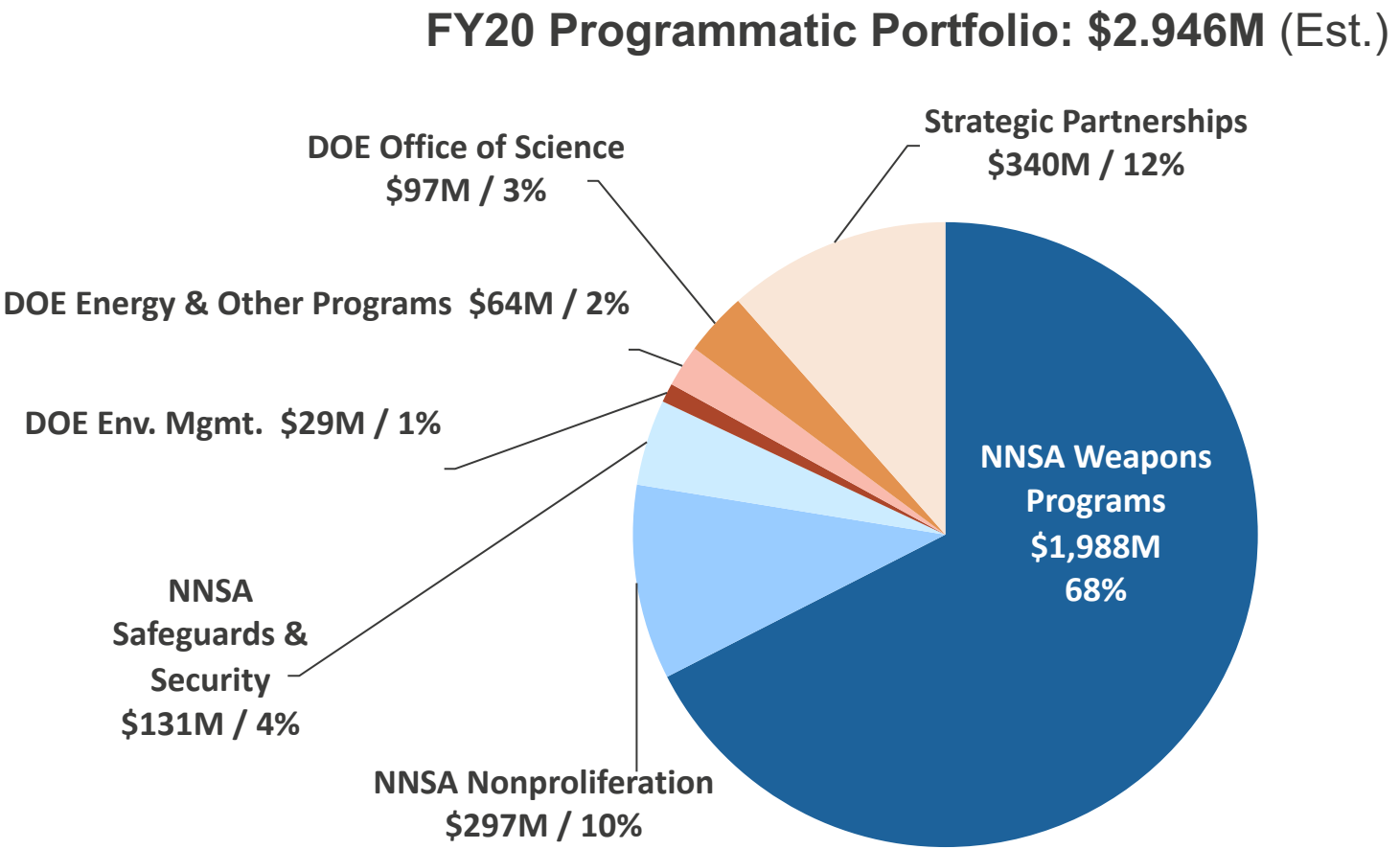
Fuel Cell Performance and Durability (FC-PAD)

FCPAD
FUEL CELL PERFORMANCE AND DURABILITY

Grid Modernization Laboratory Consortium (GMLC)

GRID
MODERNIZATION INITIATIVE
U.S. Department of Energy

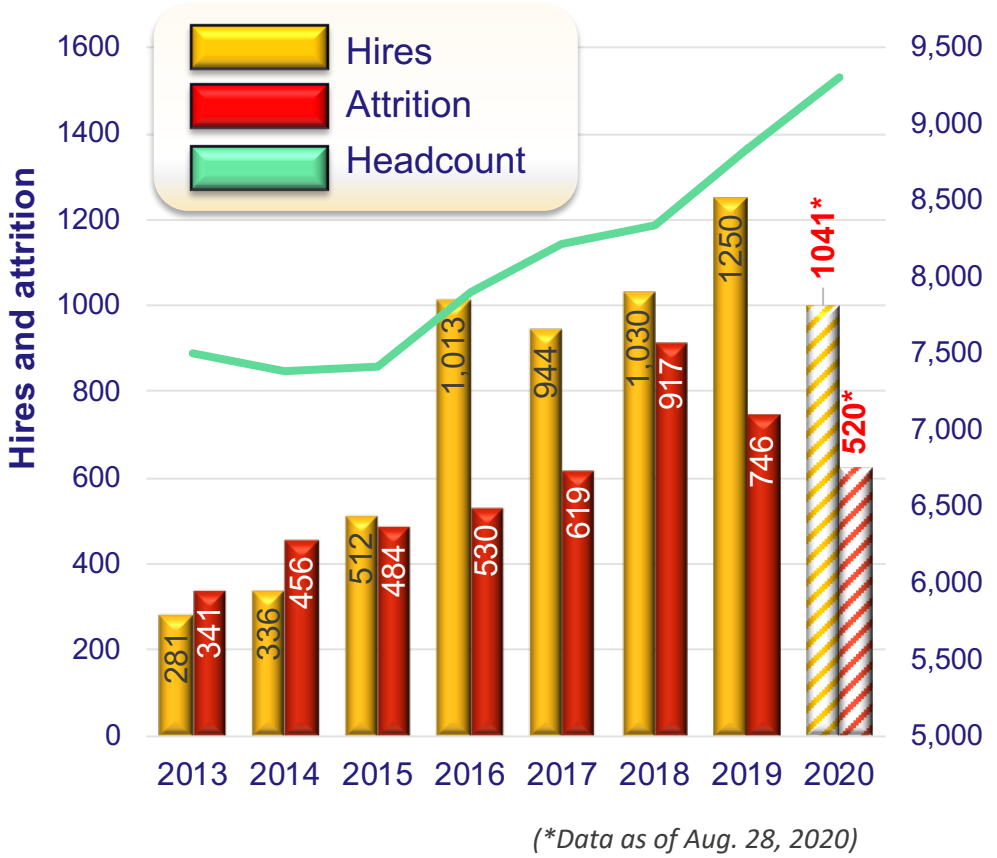
LANL has a steady/growing budget



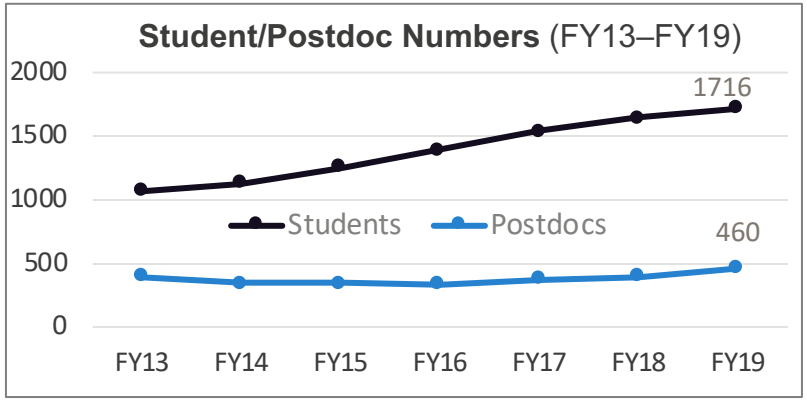
Employee numbers continue to grow

Continued commitment to student/postdoc programs, diversity initiatives

LANL Hires and Attrition: FY13-20



*(*Data as of Aug. 28, 2020)*



Postdoc Diversity*	LANL	DOE Nat'l Labs
Women	25%	24.4%
Under-represented minorities (URM)	6.4%	8.6%
Other people of color (OPC)	35.3%	36.5%

**2019 (URM: Hispanic, Black, Native American; OPC: Asian)*

Partnerships & Pipeline Office (PPO) was formed at transition to enhance our internal coordination and external outreach

Pipeline

Partnerships

Pipeline Mechanisms:

- **Student Programs:** Education opportunities for high school, undergraduate, and graduate students
- **Postdoctoral Programs:** Postdocs contribute to research efforts, enhance our STE capabilities

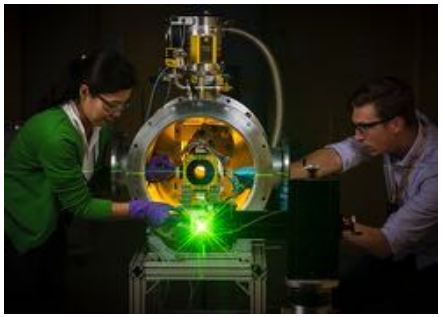
Partnership Opportunities:

- **National Security Education Center Strategic Centers:** Scientific centers of excellence with high international visibility that innovate strategic new science and education programs
- **New Mexico Consortium Coordination:** Creative mechanisms for collaboration with NM research universities through joint appointments and unique facilities
- **Feynman Center for Innovation:** From “tech transfer”’ to innovation asset stewardship with strategy driven through Innovation Asset Strategic Council

The Laboratory continues to be essential to the nation's security

Los Alamos delivers national security mission solutions

- By applying multidisciplinary science, technology & engineering capabilities, in unique experimental, computational, and nuclear facilities
  - With an agile, responsive, and innovative workforce
    - Dedicated to addressing complex national security issues and the world's most difficult challenges



Information at www.lanl.gov