

Exceptional service in the national interest



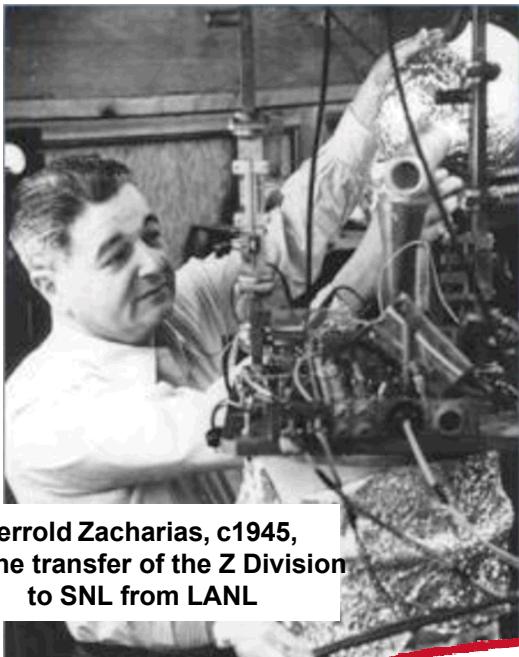
Sandia National Laboratories

J. Stephen Rottler, PhD

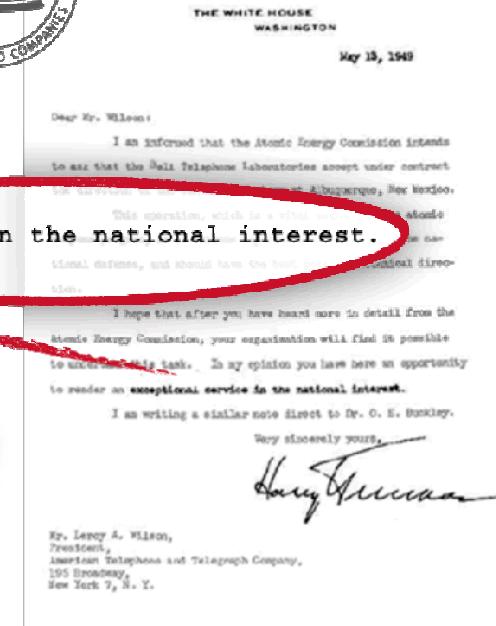
Vice President, California Laboratory

Vice President, Energy, Climate, & Infrastructure Security

Sandia's history



Jerrold Zacharias, c1945,
led the transfer of the Z Division
to SNL from LANL



Sandia's sites

Albuquerque,
New Mexico



Livermore,
California



Tonopah, Nevada



Waste Isolation Pilot Plant,
Carlsbad, New Mexico



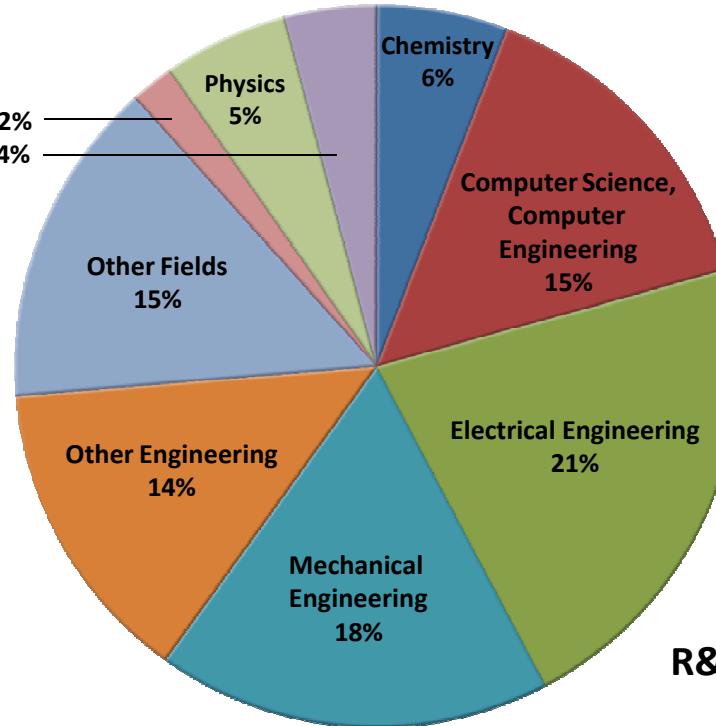
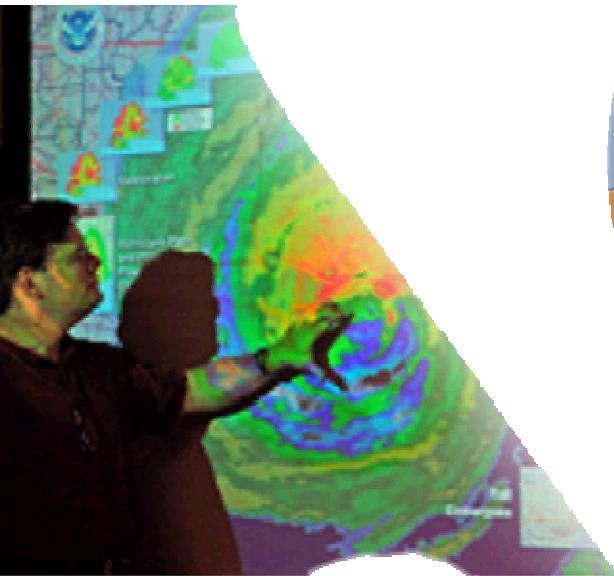
Pantex, Texas



Sandia's people and programs

(As of November, 2013)

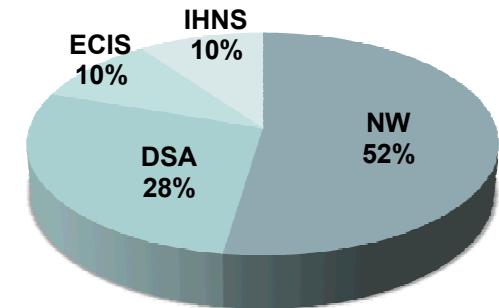
- On-site workforce: 12,002
- Regular employees: 9,841
- Advanced degrees: 5,327



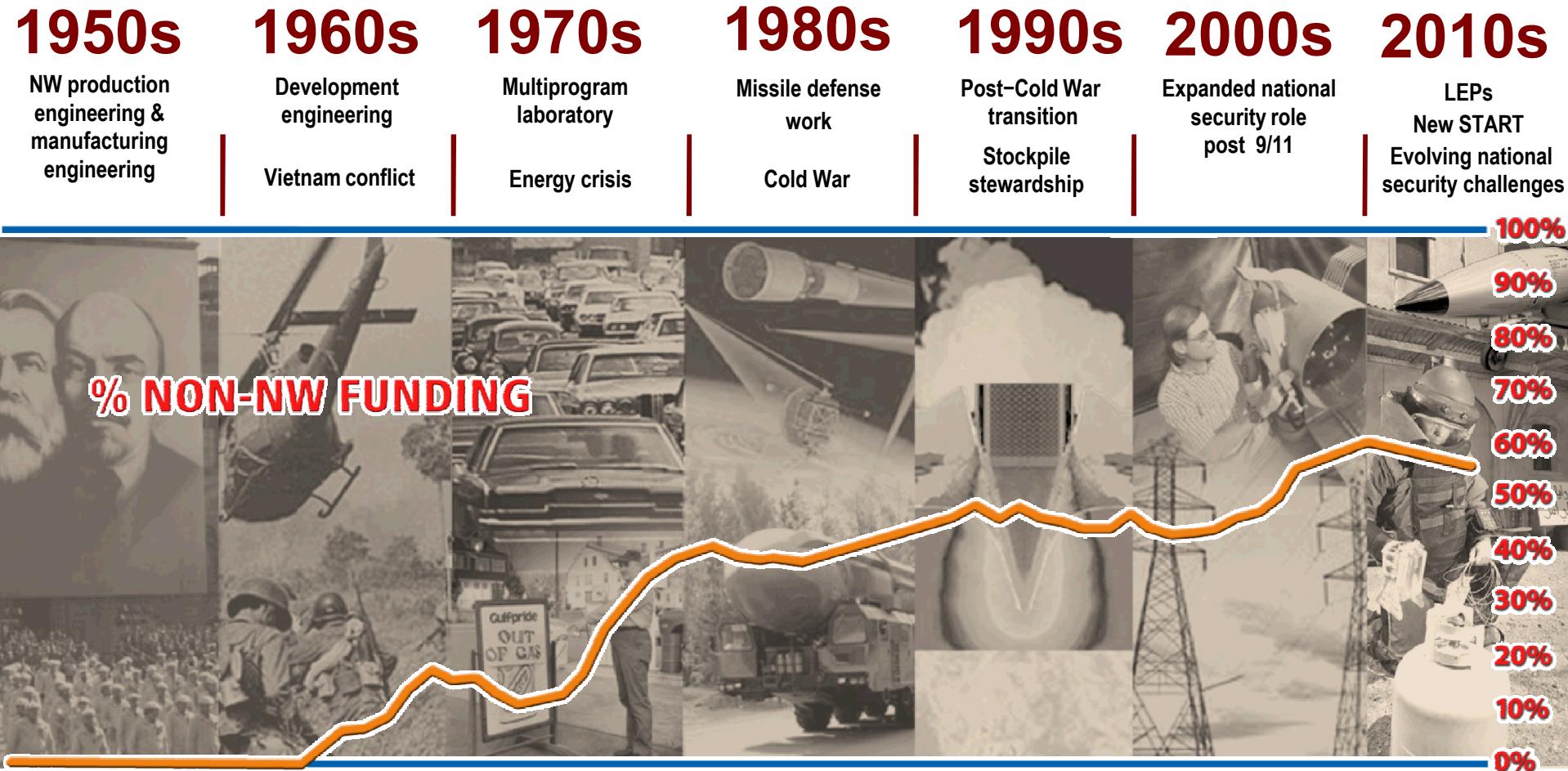
R&D staff (4,961)
by discipline

FY13 Costing by SMU

Total FY13 Direct Costing = \$2.5B
(additional \$2.0B of indirect work)



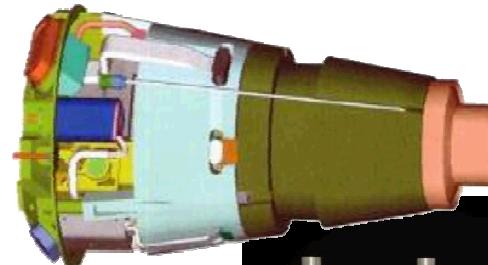
Sandia's mission work reflects the Nation's security challenges



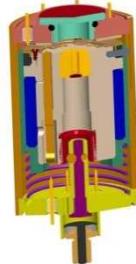
Nuclear Weapons



Integrated,
Engineered Warhead
Systems



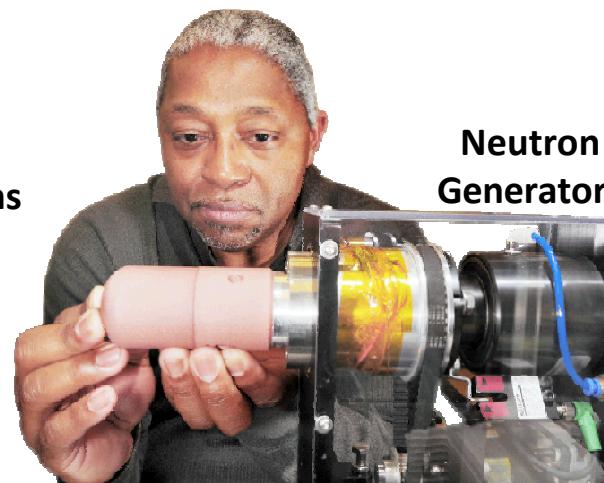
Arming, Fuzing, and
Firing Systems



Surety Systems



Gas Transfer Systems



Neutron
Generators

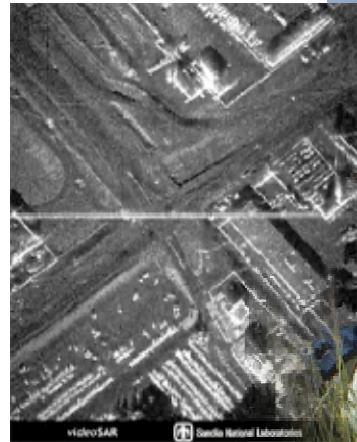
Sandia's core products for nuclear weapons
stockpile management

Defense Systems & Assessments (DSA)

Materials International Space Station Experiment

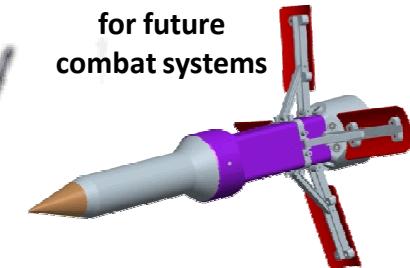


Real-time SAR images



Predator UAV with SAR

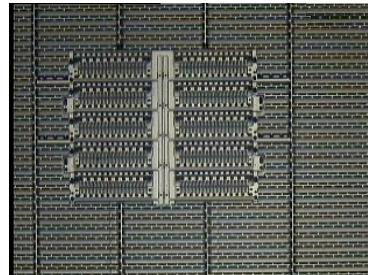
Ground sensors
for future
combat systems



Small robotic vehicle



MEMS louvers



Target launch for
Ballistic Missile Defense

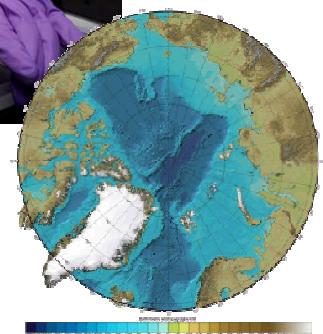


Energy, Climate, & Infrastructure (ECIS)

Energy Supply, Energy Efficiency,
& Environmental Stewardship



Safe, Secure, Reliable Energy;
Water Supply & Infrastructure



Climate Change-
Mitigate and Adapt to
Changes



International, Homeland, and Nuclear Security (IHNS)

Lab on a Chip

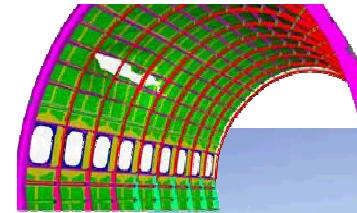


Bio/Chemical
Security

RSC Publishing | Point-of-care Microfluidic Diagnostics



Border and Maritime security



Aviation and Explosives
security



Weapon Security



Nuclear/Radiological Threat Reduction

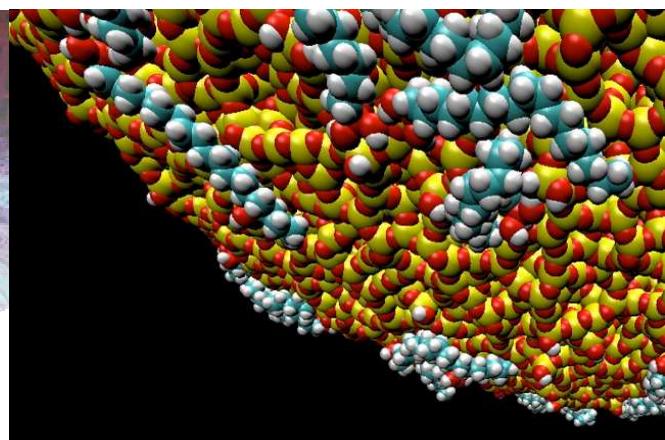


Strong Research Foundations enable mission performance

Computing Science



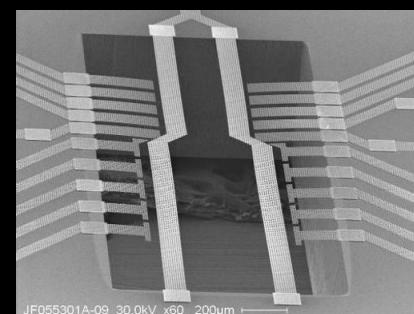
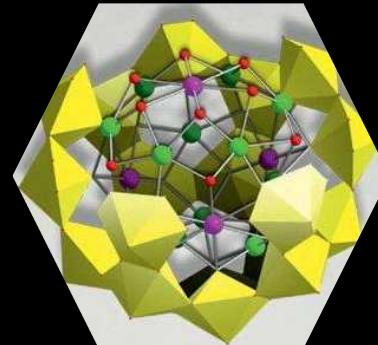
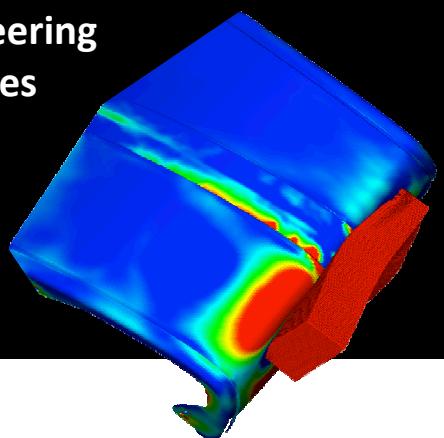
High Energy Density Physics



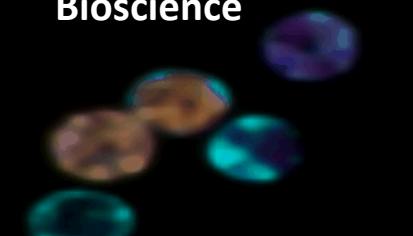
Materials

Microelectronics

Engineering Sciences



Bioscience



Geoscience

Advancing the frontiers for national security



Truman Fellow Carlee Ashley
and Sandia Fellow Jeff Brinker

One-dose killing of cancer cells through targeted drug delivery

- By melding nanotechnology and medicine, research has produced an effective strategy to target a cancerous cell and deliver a mélange of killer drugs into it
- This new delivery system results in 106-fold higher therapeutic efficacy when compared with other state-of-the-art liposomal delivery systems
- These findings promise to mitigate the side effects of conventional chemotherapy

Advancing the frontiers for national security

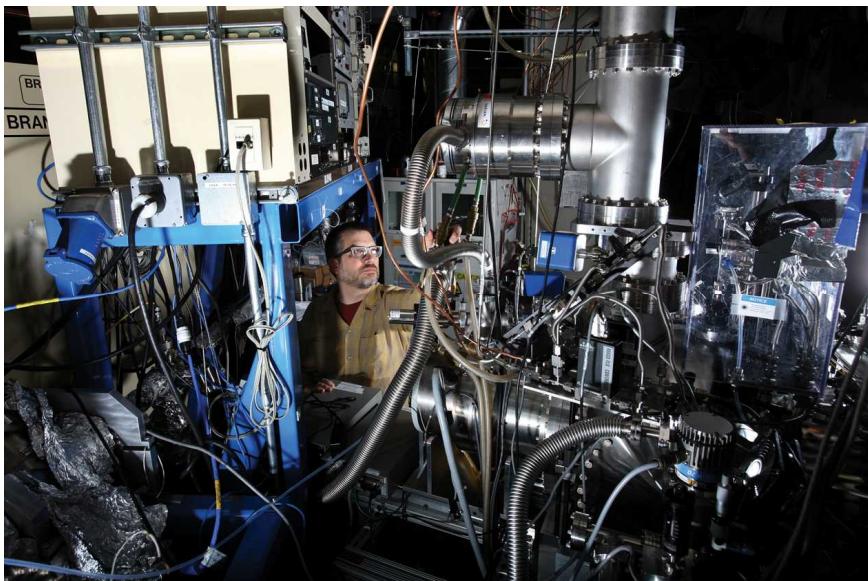
Measuring fundamental instabilities in magnetically driven Z-pinch explosions

- This research addresses the important but poorly understood phenomenon of Magneto-Rayleigh-Taylor (MRT) – the damaging instability in Z-pinch magnetic fields – and conditions that could mitigate the problem
- The results will significantly impact high energy density plasmas, inertial confinement fusion, and related fields



Dan Sinars

Advancing the frontiers for national security



Craig Taatjes

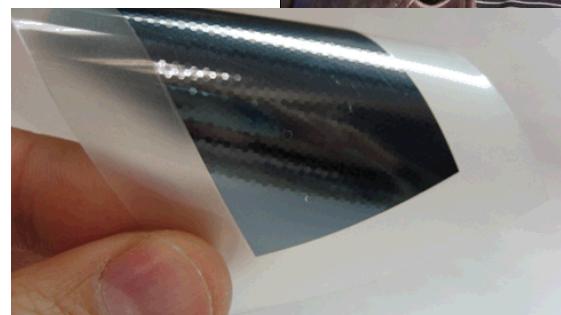
Tailoring biofuels to work with vehicles of today and tomorrow

- Biofuels being investigated are produced by a fungi that grow on cellulose and digest it, forming fuel-type hydrocarbons as a by product of their metabolic processes
- This material can be converted into compounds that are similar to those found in petroleum-derived fuels
- Combustion experts are working directly with biofuels researchers to understand from the start what will work best for existing and future internal combustion engines

Advancing the frontiers for national security

Glitter-sized photovoltaic cells

- Tiny crystalline silicon photovoltaic cells 14 to 20 micrometers thick, 0.25 to 1 mm across
- Formed on silicon wafers, etched, and released in hexagonal shapes with electrical contacts prefabricated on each piece
- Achieved 15% efficiency for 14 micron thick silicon cell
- Goal is to perform at greater than 50% efficiency



Greg Nielson

If these challenges interest you...

- Focus on academic excellence
- Obtain an advanced degree
- Seek opportunities beyond the classroom to become more well-rounded
- Obtain internships or summer positions that will allow you to experience practice of engineering



Lessons I did not learn in college

- Leadership skills ≠ management skills
- The power of good communication skills
- The importance of relationships
- The effectiveness of multi-disciplinary teaming
- The utility of a well-rounded education
- The necessity of continuous learning
- Excellence in engineering as an ethical imperative
- The satisfaction of investing in community activities



Closing remarks

- SNL has helped maintain an effective US nuclear deterrent for over 60 years
- We provide timely solutions to a vast array of national security problems
- We rely on world-class science and engineering, and the capability to develop product that meets rigid specifications
- A broad spectrum of technical talent is essential to meet national security challenges
- Sandia provides opportunities to change career fields and encourages continuing education

