SAND2013-5601C

Exceptional service in the national interest

Sandia National Laboratories



Education Leading to a Career at a National Laboratory

Leslie M. Phinney

July 16, 2013

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Quotes

Prediction is very difficult, especially if it's about the future.

Niels Bohr

Engineers build for the future, not merely for the needs of men, but for their dreams as well. Thus, inherently, the engineers work is a fearless optimism that life will go forward, and that the future is worth working for.

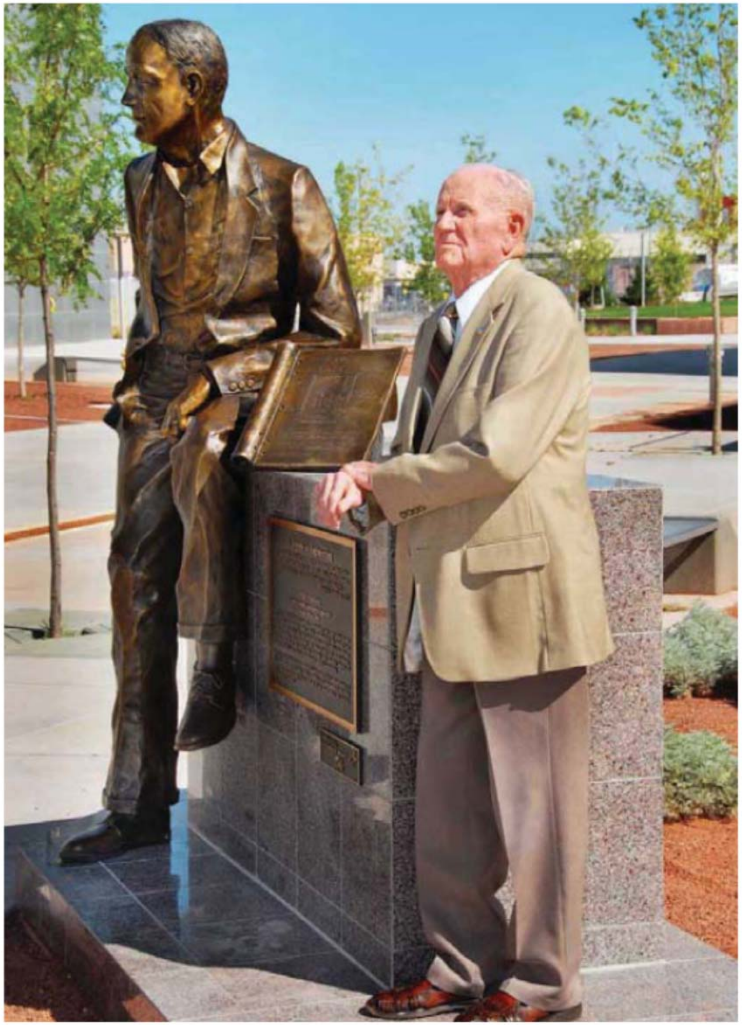
Dwight D. Eisenhower, 1951

Pictures from Wikipedia

Willis Whitfield

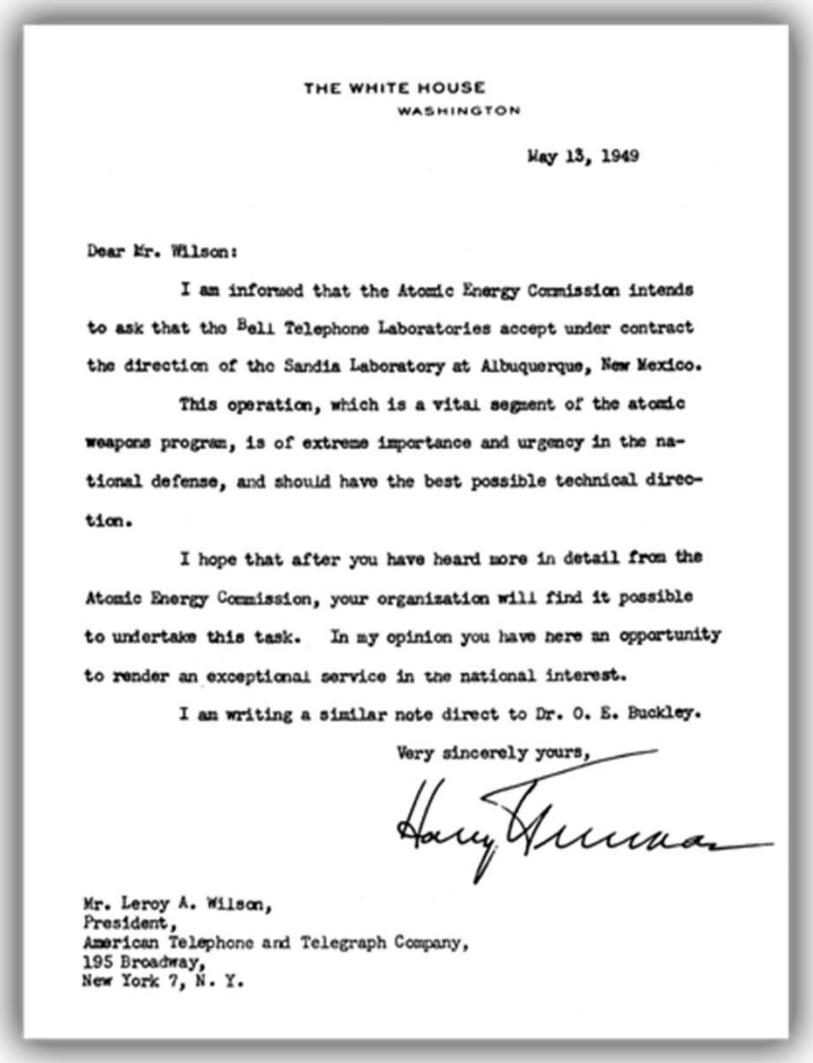
Sandia National Laboratories

- Inventor of the laminar-flow in the early 1960s to keep dust off of mechanical components for weapons
- More than 1,000 times improvement in cleanliness
- Within a few years, $50 billion of clean rooms had been built world wide
- Revolutionized manufacturing in electronics and pharmaceuticals, made hospital rooms safer, and helped further space exploration
- Worked at SNL from 1954 to 1984



Sandia's History

Sandia National Laboratories



THE WHITE HOUSE
WASHINGTON

May 13, 1949

Dear Mr. Wilson:

I am informed that the Atomic Energy Commission intends to ask that the Bell Telephone Laboratories accept under contract the direction of the Sandia Laboratory at Albuquerque, New Mexico.

This operation, which is a vital segment of the atomic weapons program, is of extreme importance and urgency in the national defense, and should have the best possible technical direction.

I hope that after you have heard more in detail from the Atomic Energy Commission, your organization will find it possible to undertake this task. In my opinion you have here an opportunity to render an exceptional service in the national interest.

I am writing a similar note direct to Dr. O. E. Buckley.

Very sincerely yours,

Harry Truman

Mr. Leroy A. Wilson,
President,
American Telephone and Telegraph Company,
195 Broadway,
New York 7, N. Y.

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National Security Challenges

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1950s	1960s	1970s	1980s	1990s	2000s	2010s
Nuclear weapons	Development engineering	Multiprogram laboratory	Missile defense work	Post–Cold War transition	Post 9/11	Life Extension Programs START
Production and manufacturing engineering	Vietnam conflict	Energy crisis	Cold War	Stockpile stewardship	National security	National security challenges

Nuclear Weapons

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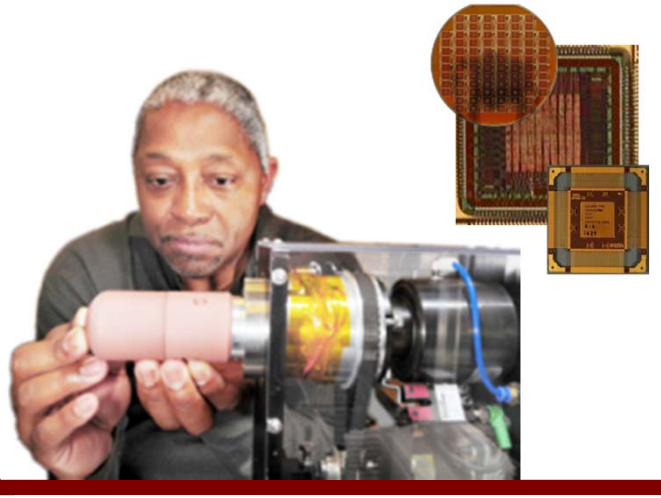
Pulsed power and radiation effects sciences

Design agency for nonnuclear components

- Neutron generators
- Arming, fuzing and firing systems
- Safety systems
- Gas transfer systems

Warhead systems engineering and integration

Production agency



Defense Systems and Assessments

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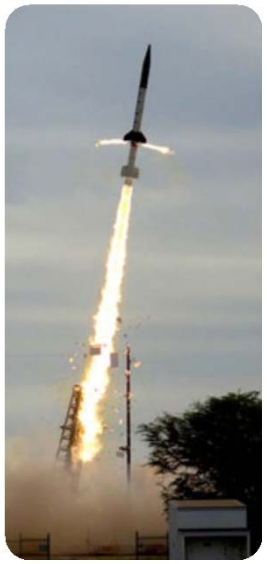
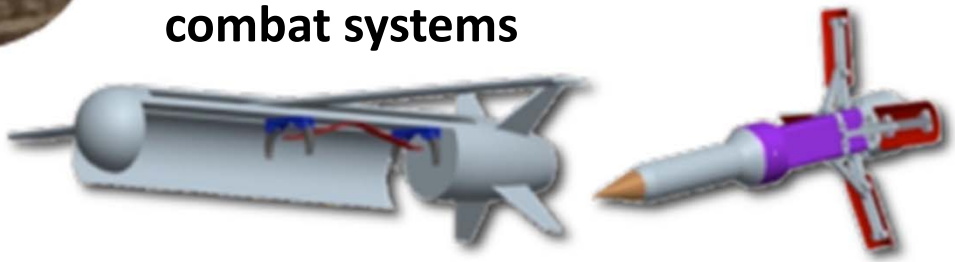
Synthetic aperture radar

Support for NASA

Support for ballistic missile defense



Ground sensors for future combat systems



Energy, Climate, and Infrastructure Security

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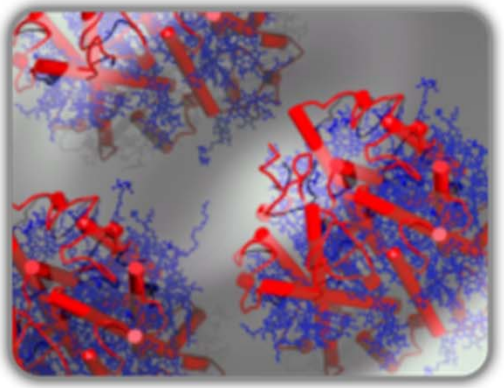
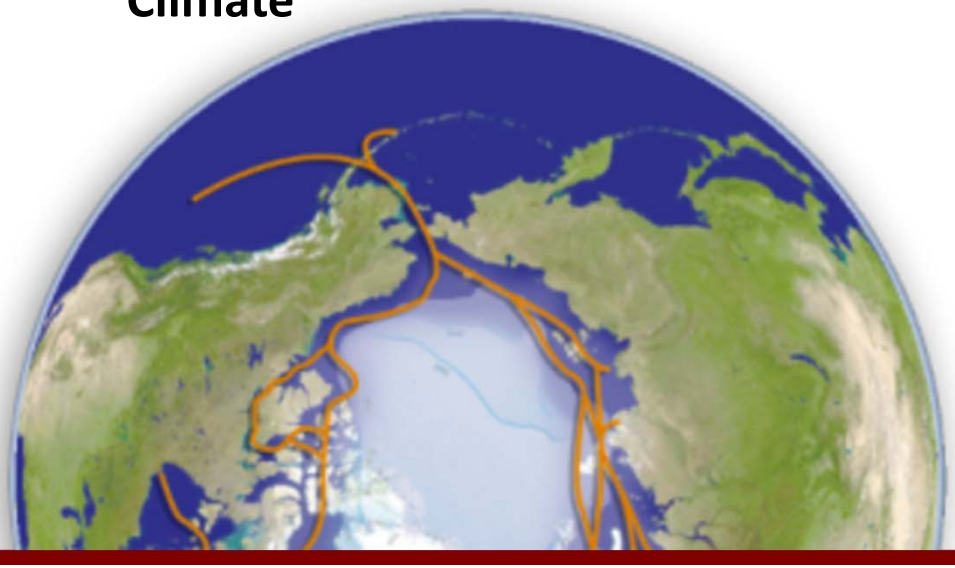
Energy

Infrastructure

Crosscuts and enablers



Climate



jbei
Joint BioEnergy Institute

International, Homeland, and Nuclear Security

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Critical asset protection

Homeland defense and force protection

Homeland security programs

Global security

Science and Engineering Foundations

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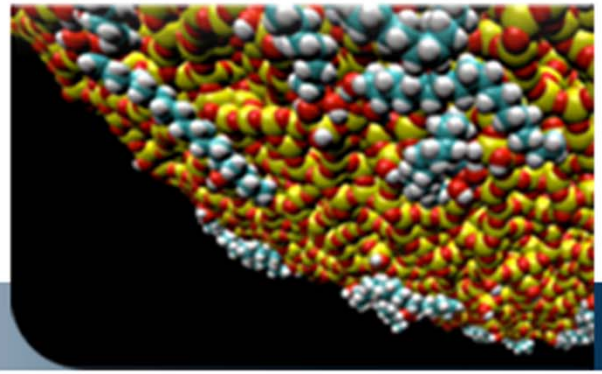
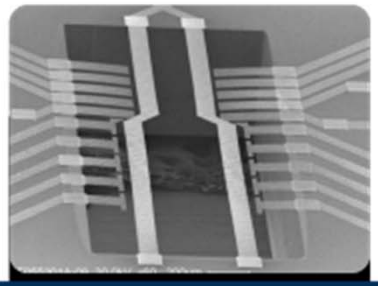
Computing and information science

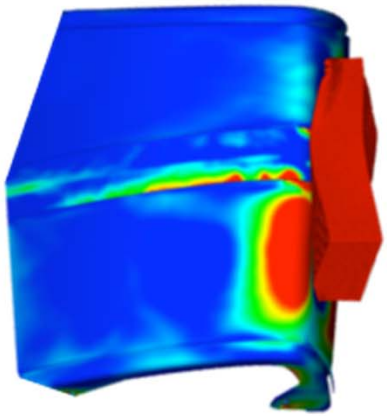
Materials science



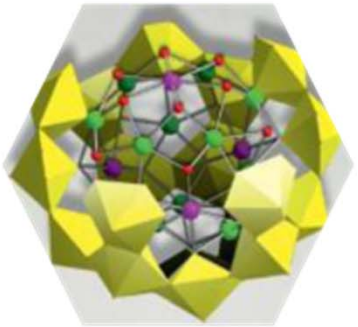
Nanodevices and microsystems



Engineering sciences

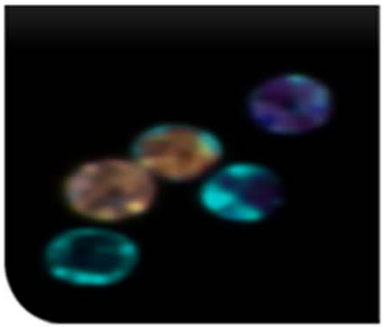


Geoscience



Radiation effects and high-energy density science

Bioscience

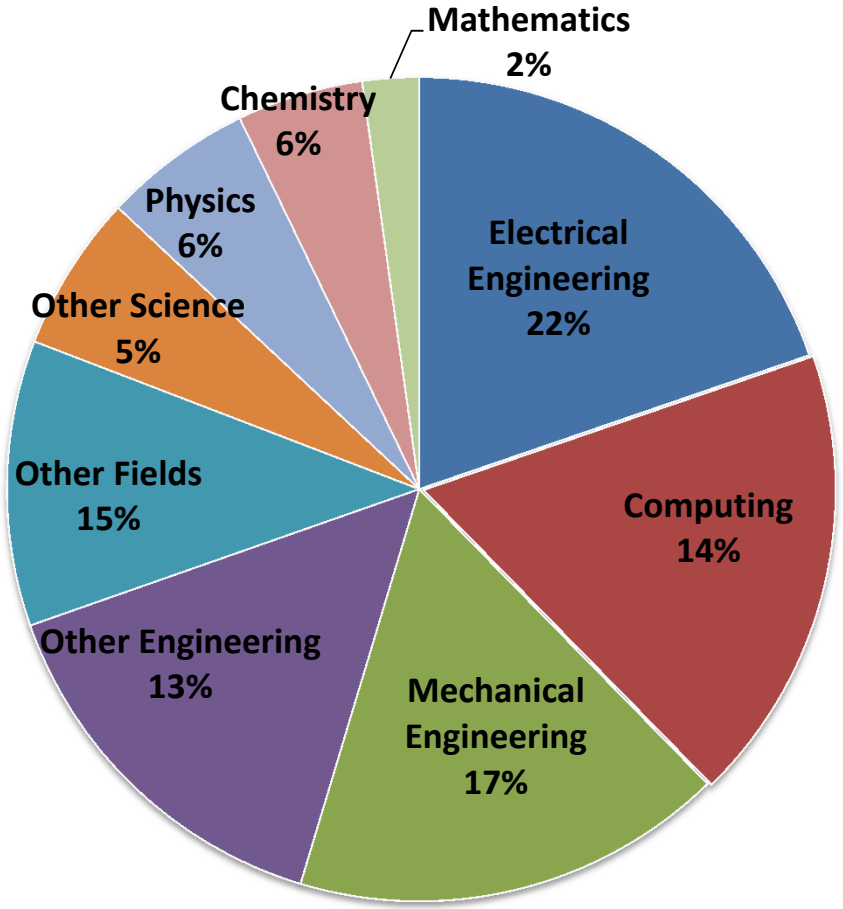


Our Workforce

- On-site workforce: 11,711
- Regular employees: 9,494
- Gross payroll: ~$1.046 billion

Data as of April 12, 2013

R&D staff (4,799) by discipline



Influences on Engineering Education

Sandia National Laboratories

- Globalization
- Interdisciplinary, multidisciplinary problems
- Advances in online education
  - MOOCs (massive open online courses)
  - edX, Coursera, Udacity, Khan Academy
- Diversity and inclusion

Future of Heat Transfer Education

- *Mechanical engineering will develop engineering solutions that foster a cleaner, healthier, safer, and sustainable world.*
  2028 Vision for Mechanical Engineering, ASME
- Multicultural, multidisciplinary perspective (T-shaped)
- Science basis for heat transfer
- Life long learning
- Project based activities

Final Quote

It is not the most intelligent that survives.
It is the one that is able to adapt.