STEM: Transforming our Communities via a Career in Science & Technology

SAND2011-1863C

NSBE 37th Annual National Convention

March 23rd – 27th, 2011
St. Louis Convention Center
St. Louis, Missouri

Engineering the Gateway to Success
ST. LOUIS 2011

TECHNICAL TALKS
Session #5 : STEM Transforming Our Communities

Jonathan D. Madison, Ph.D.[1]

[1]SNL, Computational Material Science & Engineering, Albuquerque, NM

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Sandia National Laboratories

About the Speaker

Jonathan D. Madison, Ph.D.

Sandia National Laboratories, Senior Member of Technical Staff
Org. 1814 – Computational Materials Science & Engineering
Direct Hire – Feb. 8th, 2010

B.S. Engineering Science – Clark Atlanta University, Atlanta, GA (2003)
M.S. Materials Science & Engineering – University of Michigan, Ann Arbor, MI (2007)
Ph.D. Materials Science & Engineering – University of Michigan, Ann Arbor MI (2010)

Research Interests & Current Efforts

Classical Metallurgy, Solidification, Microstructural Characterization, Visualization of Strain Micro-Heterogeneity, Electron-backscattered Diffraction (EBSD), 3-Dimensional Reconstructions, Microstructural Evolution Modeling via kinetic Monte Carlo (kMC)

Sandia Involvement Beyond the Laboratory

SNL's Hands-On, Minds-On Technology (HMTech) – Volunteer
SNL's University Relations Campus Recruiting Team – Targeted Diversity Lead

HMTech
Hands-On, Minds-On Technologies

LOCKHEED MARTIN

Sandia National Laboratories

"To Transform"

According to the Oxford American Dictionary:

TRANSFORM = trans·form, (trănz-fôrm'), *v.*
"to make a thorough or dramatic change in the form, appearance, or character of"

To TRANSFORM our communities through science, technology, engineering & mathematics (STEM), we must:

- *Expand your definition of "community" and engage that community*
- *Be involved in leading, emerging and developing STEM fields & arenas*
- *Acquire the resources to sustain oneself while working through change*
- *Thoroughly understand the opportunities available*

Outline

- Federally Funded Research & Development Centers
  - A brief description
  - Examples by sponsor
- Sandia National Laboratories
  - History
  - Mission Evolution
  - People & Budget
  - Disciplines & Capabilities
  - National Security Thrusts
- Trends:
  - Normalized Education Values
  - Median Income by Race
  - Personal Income by Education
- Select Salaries by FFRDC
- A Quote to Consider

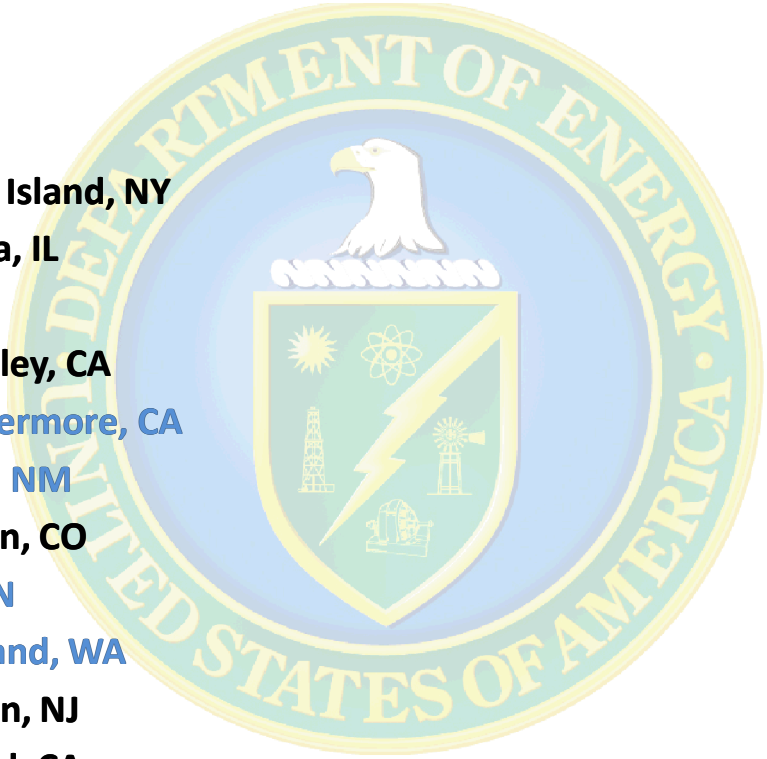
Federally Funded Research & Development Centers

- "FFRDCs enable agencies to use private sector resources to accomplish tasks that are integral to the mission and operation of the sponsoring agency…"
- "FFRDCs are operated, managed, and/or administered by either a university, consortium of universities, a not-for-profit, or an industrial firm, as an autonomous organization…"
- "Long-term relationships between the Government and FFRDCs are encouraged in order to provide the continuity that will attract high quality personnel to the FFRDC…."

National Science Foundation
FFRDC General Guidelines
http://www.nsf.gov/statistics/ffrdclist/gennotes.cfm#note1

Federal Acquisition Regulation (FAR) effective 1 February 2010
https://www.acquisition.gov/far/current/html/Subpart%2035_0.html#wp1085198

DoE (Energy)
Federally Funded Research & Development Centers



- **Ames Laboratory – Ames, IA**
- **Argonne National Laboratory* – Argonne, IL**
- **Brookhaven National Laboratory – Upton, Long Island, NY**
- **Fermi National Accelerator Laboratory – Batavia, IL**
- **Idaho National Laboratory* – Idaho Falls, ID**
- **Lawrence Berkeley National Laboratory – Berkeley, CA**
- **Lawrence Livermore National Laboratory* – Livermore, CA**
- **Los Alamos National Laboratory* – Los Alamos, NM**
- **National Renewable Energy Laboratory – Golden, CO**
- **Oak Ridge National Laboratory* – Oak Ridge, TN**
- **Pacific Northwest National Laboratory* – Richland, WA**
- **Princeton Plasma Physics Laboratory – Princeton, NJ**
- **SLAC National Accelerator Laboratory – Stanford, CA**
- **Sandia National Laboratories* – Albuquerque, NM**
- **Savannah River National Laboratory – Aiken, SC**
- **Thomas Jefferson National Accelerator Facility – Newport news, VA**

http://www.nsf.gov/statistics/ffrdclist/start.cfm

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DoD (Defense) – Air Force
Federally Funded Research & Development Centers

- **Aerospace Federally Funded Research and Development – El Segundo, CA**
- **Lincoln Laboratory – Lexington, MA**
- **Project Air Force – Santa Monica, CA**

DoD (Defense) - Army
Federally Funded Research & Development Centers

- **Arroyo Center – Santa Monica, CA**
- **Software Engineering Institute – Pittsburgh, PA**

DoD (Defense) - Navy
Federally Funded Research & Development Centers

- **Center for Naval Analyses – Alexandria, VA**

http://www.nsf.gov/statistics/ffrdclist/start.cfm

DoD (Defense) – National Security Agency Federally Funded Research & Development Centers

- **Centers for Communications and Computing – Alexandria, VA**

DoD (Defense) – Office of the Secretary of Defense Federally Funded Research & Development Centers

- **C3I Federally Funded Research and Development Center – Bedford, MA & McLean, VA**
- **National Defense Research Institute – Santa Monica, CA**
- **Studies and Analyses Center – Alexandria, VA**

DoHS (Homeland Security) – Under Secretary for S&T Federally Funded Research & Development Centers

- **Homeland Security Studies and Analysis Institute – Arlington, VA**
- **Homeland Security Systems Engineering and Development Institute – McLean, VA**
- **National Biodefense Analysis and Countermeasures Center – Frederick, MD**

http://www.nsf.gov/statistics/ffrdclist/start.cfm

DoHHS (Health & Human Services) – NIH
Federally Funded Research & Development Centers

- **National Cancer Institute at Frederick – Frederick, MD**

DoT (Transportation) – FAA
Federally Funded Research & Development Centers

- **Center for Advanced Aviation Systems Development – McLean, VA**

National Science Foundation
Federally Funded Research & Development Centers

- **National Astronomy and Ionosphere Center – Arecibo, PR**
- **National Center for Atmospheric Research – Boulder, CO**
- **National Optical Astronomy Observatories – Tucson, AZ**
- **National Radio Astronomy Observatory – Charlottesville, VA**
- **Science and Technology Policy Institutes – Washington, DC**

http://www.nsf.gov/statistics/ffrdclist/start.cfm

DoTr & VA (Treasury & Veterans Affairs) – IRS Federally Funded Research & Development Centers

- **Center for Enterprise Modernization – McLean, VA**

National Aeronautics and Space Administration Federally Funded Research & Development Centers

- **Jet Propulsion Laboratory – Pasadena, CA**

Nuclear Regulatory Commission Federally Funded Research & Development Centers

- **Center for Nuclear Waste Regulatory Analyses – San Antonio, TX**

http://www.nsf.gov/statistics/ffrdclist/start.cfm

Sandia National Laboratories

Sandia's History

AMERICAN TELEPHONE & TELEGRAPH CO
BELL SYSTEM
AND ASSOCIATED COMPANIES

exceptional service in the national interest.

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 [illegible] at Albuquerque, New Mexico.

This operation, which is a vital [illegible] atomic [illegible] con- tional defense, and should have the best [illegible] technical direc- tion.

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.

Sandia National Laboratories

The Mission Has Evolved for Decades

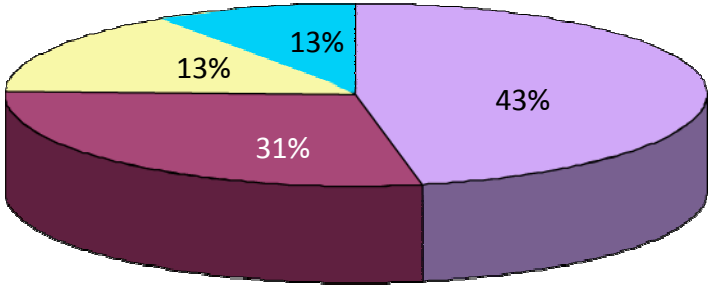
1950s	1960s	1970s	1980s	1990s	2000s
Production engineering & manufacturing engineering	Development engineering	Multiprogram laboratory	Research, development and production	Post-Cold War transition	Broader national security challenges

Sandia National Laboratories

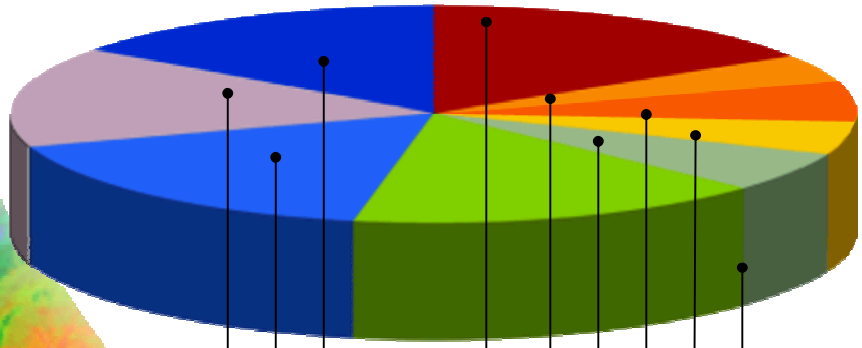
People and Budget (As of 10.15.2010)

- On-site workforce: 11,677
- Regular employees: 8,607
- Gross payroll: ~ $898.7 million

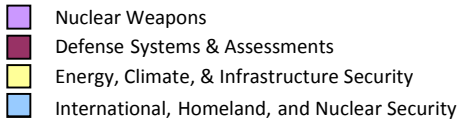
FY10 operating revenue
$2.3 billion

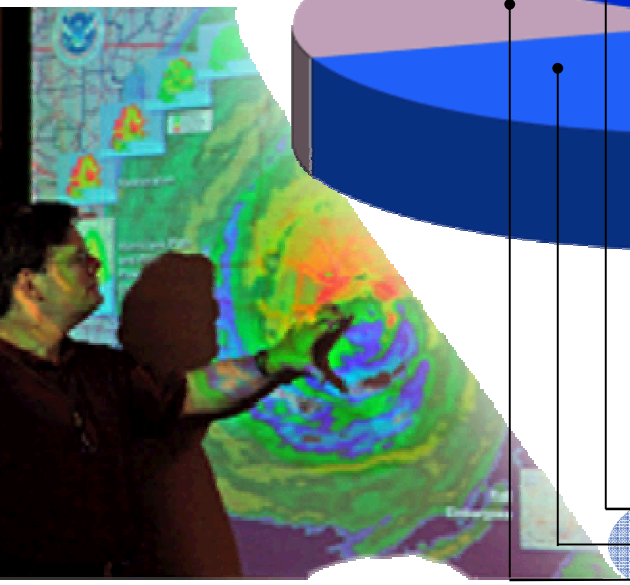


Technical staff (4,277) by discipline:



(Operating Budget)





Computing 16%
Math 2%
Chemistry 6%
Physics 6%
Other science 6%
Other fields 12%

Electrical engineering 21%
Mechanical engineering 16%
Other engineering 15%

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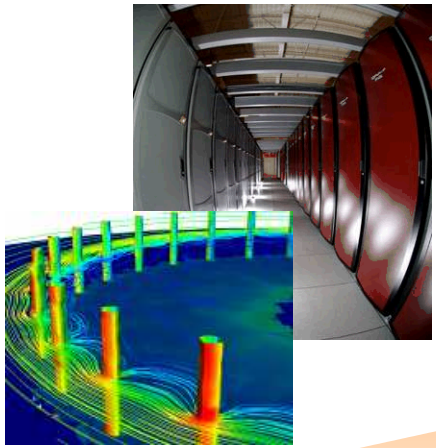
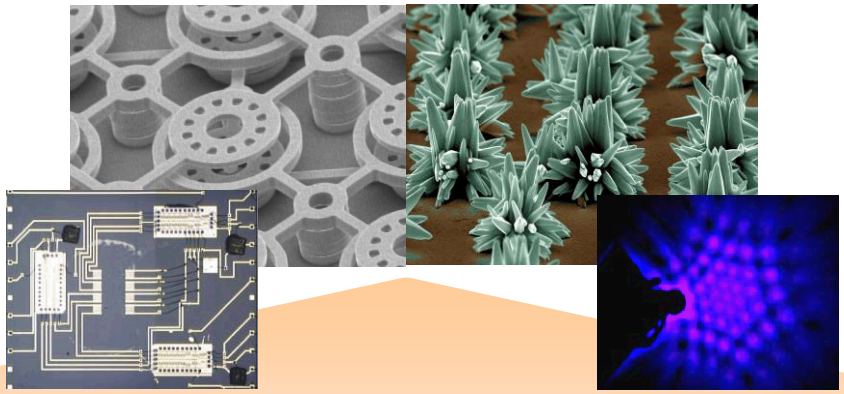
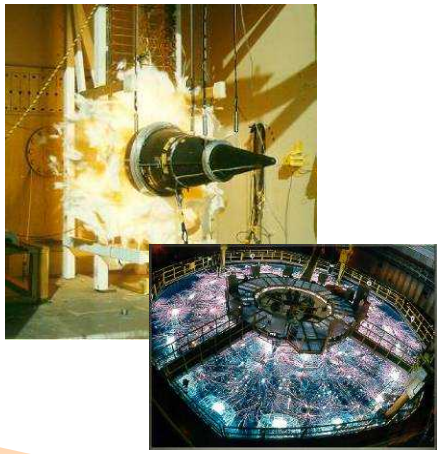
Research Disciplines Drive Capabilities





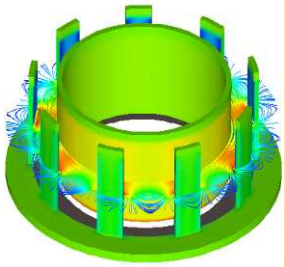


High Performance Computing

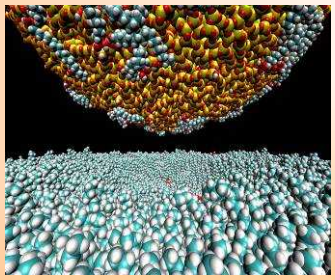
Nanotechnologies & Microsystems

Extreme Environments

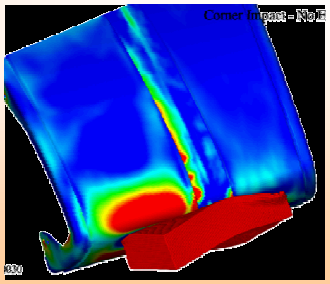
Computer Science



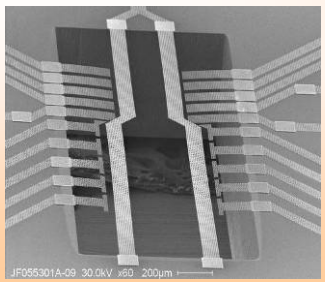
Materials



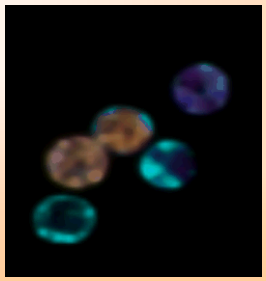
Engineering Sciences



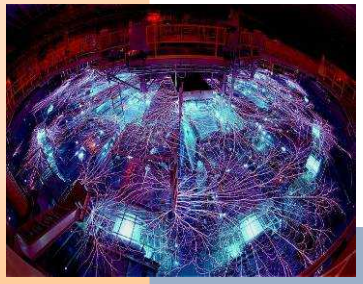
Micro Electronics



Bioscience



Pulsed Power



Research Disciplines

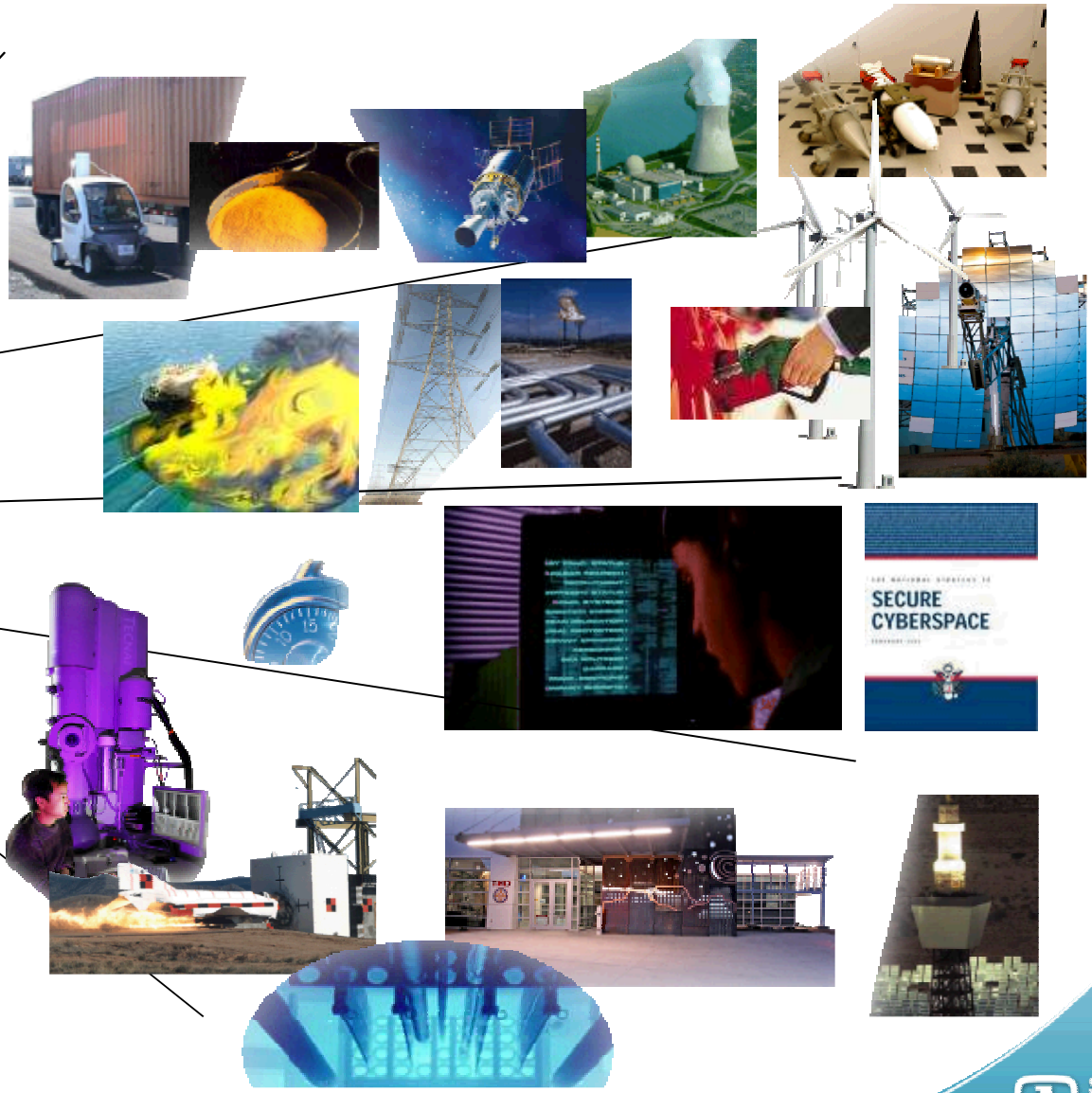
Emerging National Security Thrusts

Nuclear

Energy

Cyber

Science & Technology



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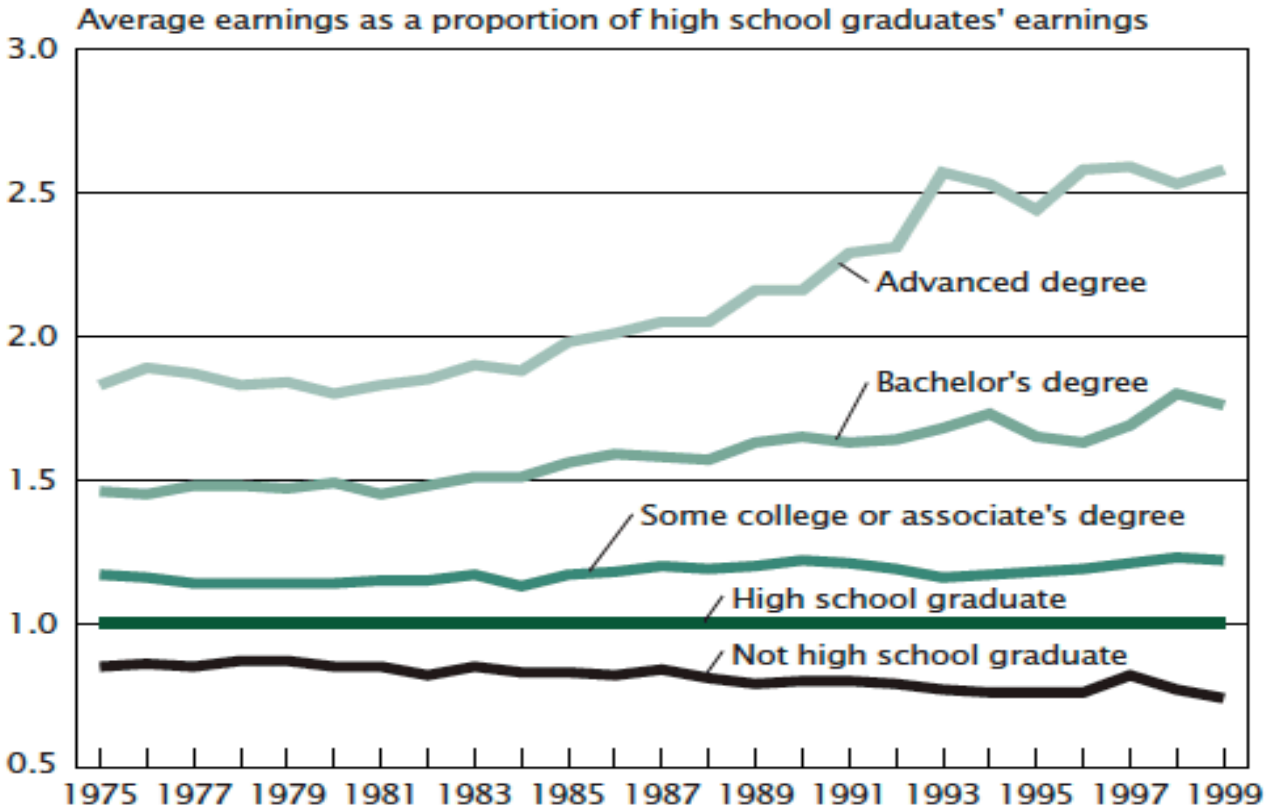
Resources

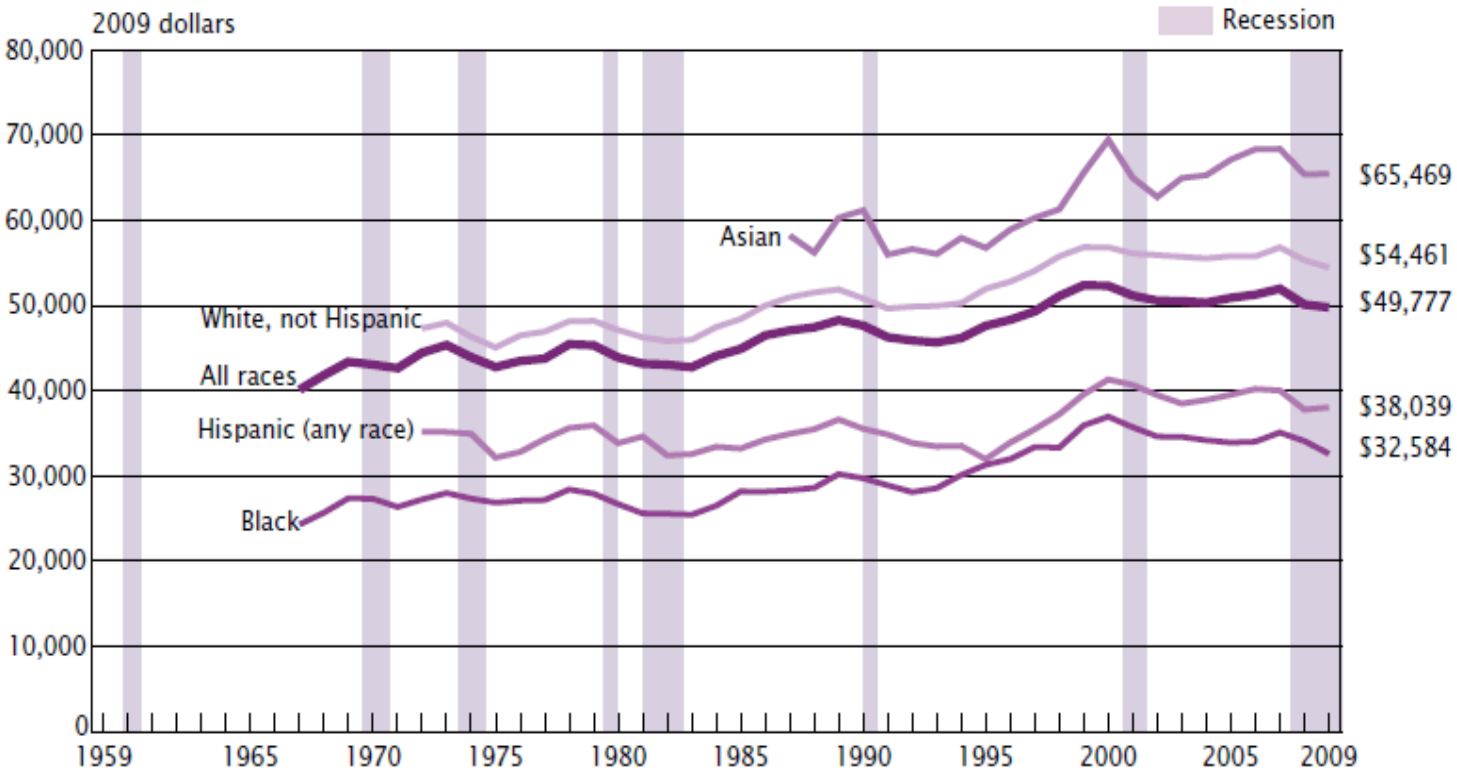
- Money isn't the only resource to consider
- BUT, LET'S BE REAL … IT'S A BIG PART ! ! !

Value of Education



Average Earnings as a Proportion of high school graduates' earnings
Data from U.S. Census Bureau, Current Population Surveys, March 1976 to 2000
Graph: J. C. Day & E. C. Newburger, *"The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings"*, US Census Bureau: Special Studies, July 2002

Income by Ethnicity



Median household income by ethnicity, 1959 – 2009
Data from U.S. Census Bureau, Current Population Survey, 1968 to 2010
Graph: C. DeNavas-Walt, B. D. Proctor, J. C. Smith, *"Income, Poverty and Health Insurance Coverage in the United States: 2009"*, US Census Bureau: Current Population Reports, Consumer Income, September 2010

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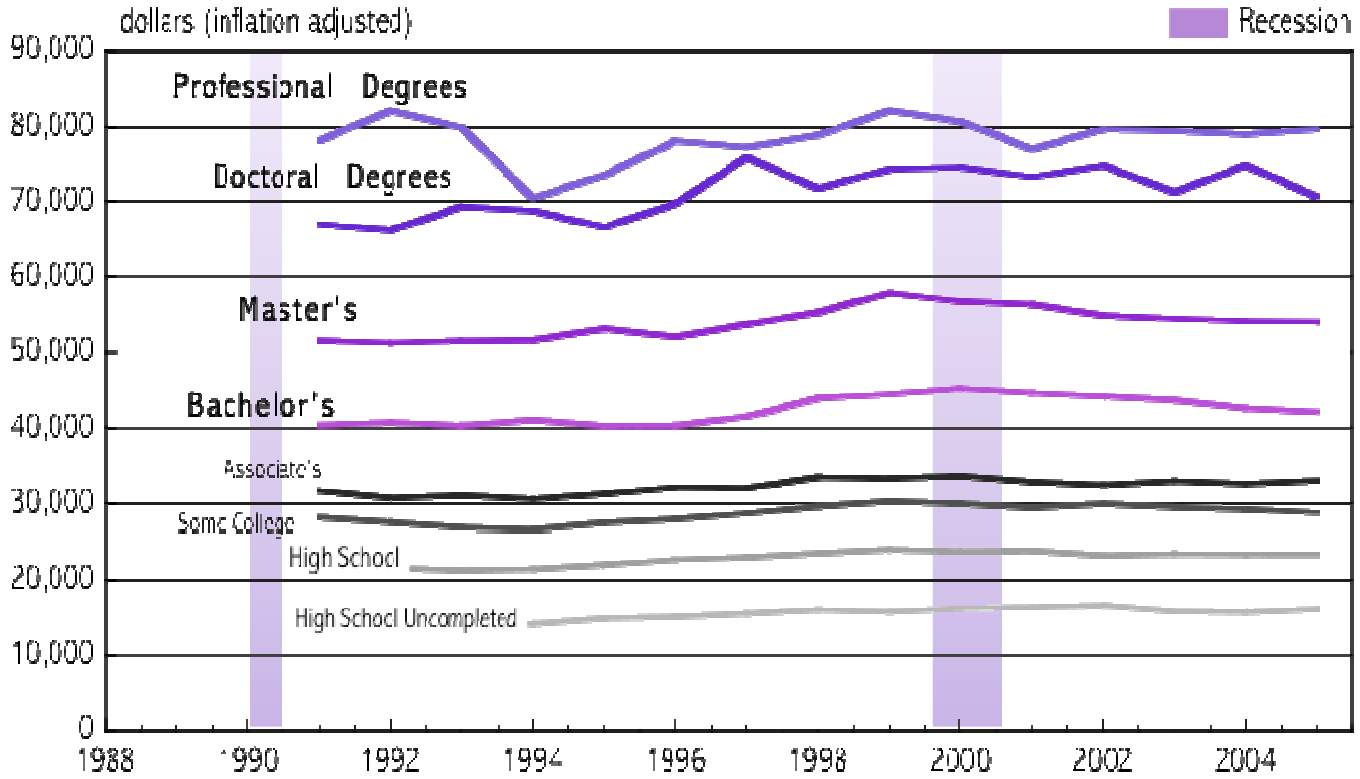
Income by Degree



Historical median personal income by education, 1991 – 2005
Data from U.S. Census Bureau, Current Populations Survey, 1991 – 2005
Dollars adjusted for inflation.

Select Salaries by DoE FFRDC Site

DoE FFRDC Site	Post-Doc (Ph.D.)	Staff Scientist (Ph.D.)
Lawrence Livermore	--	$104,000
Los Alamos	$71,028	$111,926
Sandia National Laboratories	$68,400	$114,000
Argonne National Laboratory	$61,033	$76,883
Idaho National Laboratory	--	$107,927
Oak Ridge National Laboratory	$60,678	$80,000
Pacific Northwest National Laboratory	$56,500	$114,200

http://www.payscale.com/research/US/

Updated 2011

A Quote to Consider

"Man has opened the secrets of nature and mastered new powers. If he uses them wisely, he can reach new heights of civilization. If he uses them foolishly, they may destroy him. Man must create the moral and legal framework for the world which will insure that his new powers are used for good and not for evil. "

President Harry S. Truman,

State of the Union Address
3 months following the establishment of Sandia National Laboratories
[Jan. 4, 1950]

How to Apply

Visit us online.

Go to http://sandia.gov/careers to learn about out locations, careers, campus recruiting schedule, and resume submittal process. Using our online resume submittal gives you the opportunity to express interest in specific positions.

Or, leave your resume/CV with a Sandia representative!

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Questions