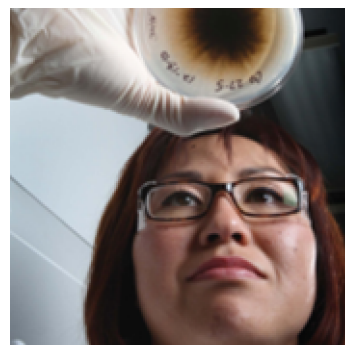


March 4, 2017

SAND2017-1933PE



# Connections: Sandia National Labs and New Mexico Tech

## *New Mexico Tech Research Opportunities Workshop*

**Paul Shoemaker**  
Senior Manager  
Acting Campus Executive



Sandia National Laboratories is a multi-mission 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 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**

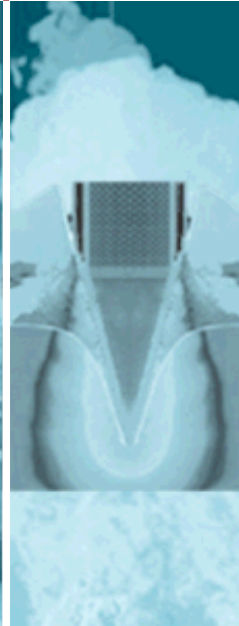
START  
Post 9/11

National security

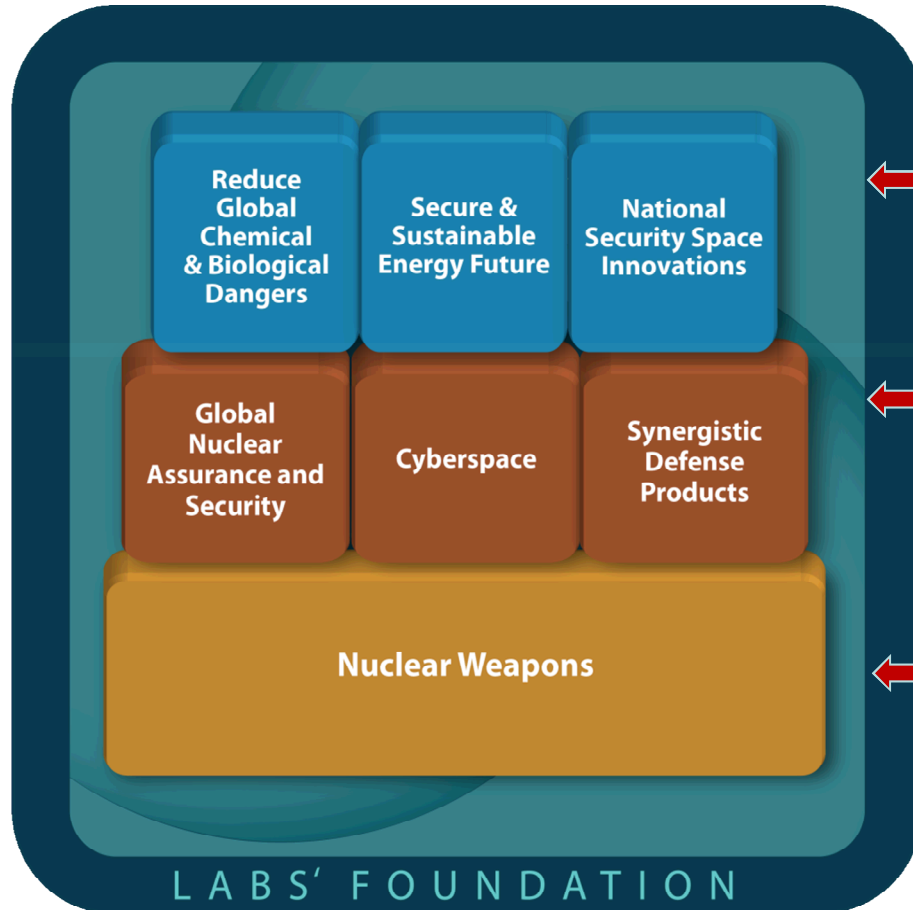
**2010s**

LEPs  
Cyber, biosecurity  
proliferation

Evolving national  
security challenges



# National Security Mission Areas

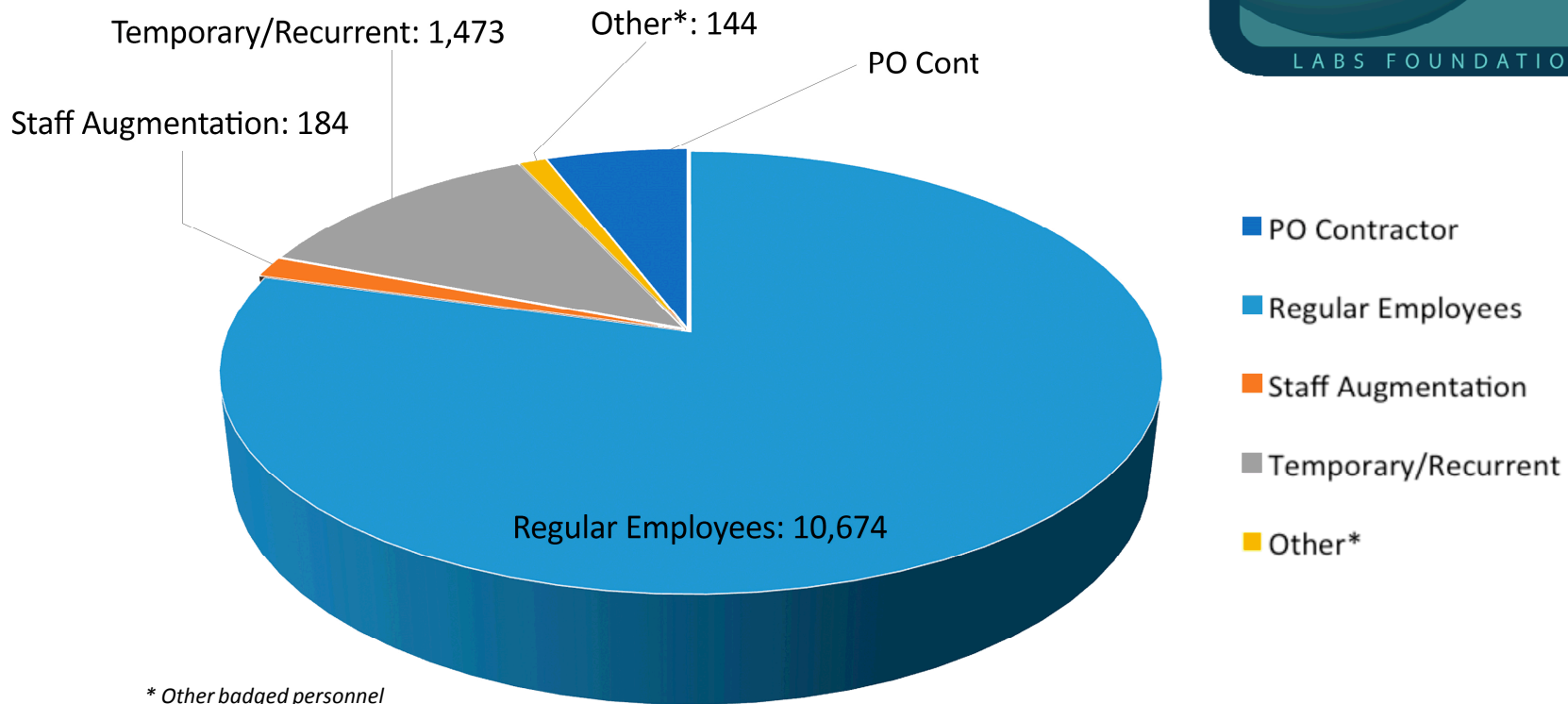


- Top row: Critical to our national security, these three mission areas leverage, enhance, and advance our capabilities.
- Middle row: Strongly interdependent with NW, these three mission areas are essential to sustaining Sandia's ability to fulfill its NW core mission.
- Bottom row: Our core mission, nuclear weapons (NW), is enabled by a strong scientific and engineering foundation.

# Our Workforce

- Total Sandia workforce: 13,332
- Regular employees: 10,574
- Advanced degrees: 6,085 (57%)

Data as of January 31, 2017



\* Other badged personnel

# Sandia's facilities and tools

*Enable differentiated scientific and engineering test and discovery*

Sandia has facilities in multiple locations:  
Albuquerque, NM; Livermore, CA;  
Carlsbad, NM; Tonopah, NV; Kauai, HI;  
Amarillo, TX.

## Example Facilities and Tools

- Major Environmental Test Facilities
- Microsystems and Engineering Sciences Applications (MESA)
- High-Performance Computing
- Explosive Components Facility
- Weapons Evaluations Test Laboratory (WETL)
- Pulsed-Power Facility
- Center for Integrated Nanotechnologies (CINT)
- Combustion Research Facility (CRF)
- Ion Beam Laboratory
- ...



# Sandia's research

*Fundamental to the success of Sandia's national security missions*

- Sandia's management framework stimulates innovation and ensures quality in our differentiating products
- Discipline-based Research Foundations
  - Bioscience
  - Computing & Information Science
  - Engineering Science
  - Geoscience
  - Materials Science
  - Nanodevices & Microsystems
  - Radiation Effects & High Energy Density Science
- Multidisciplinary Research Challenges
  - Beyond Moore Computing
  - Data Science
  - Detection at the Limit
  - Engineering Abiotic-Biotic Living Systems
  - Power on Demand
  - Resiliency in Complex Systems
  - Trusted Systems and Communications
  - ...
- R&D Investments
  - Internal Laboratory-Directed R&D
  - Customer-funded R&D



# Leveraging core capabilities to solve 21<sup>st</sup> century national security challenges

- High-reliability engineering
- Sensors and sensing systems
- Cyber technology
- Reverse engineering
- Modeling & simulation and experiment
- Natural and engineered materials
- Micro & nano electronics and systems
- Safety, risk, and vulnerability analysis



# Sandia's sites

*Albuquerque, New Mexico*



*Livermore, California*

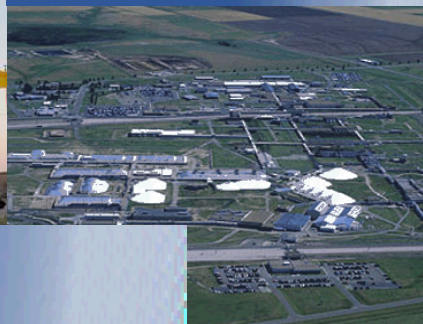


*Kauai, Hawaii*



*Waste Isolation Pilot Plant,  
Carlsbad, New Mexico*

*Pantex Plant,  
Amarillo, Texas*



*Tonopah,  
Nevada*

# Historic Intersections

*Sandia and New Mexico Tech have worked together over many years*

- Petroleum engineering, geology, hydrology (collaborations on WIPP – site selection efforts led by George Griswold, who we “borrowed” from Tech)
- Energetic materials testing, development, detection
- Training of Sandia nuclear weapons developers (Weapon Intern Program)



## News Releases



FOR IMMEDIATE RELEASE  
December 10, 2001

### Sandia signs two agreements with New Mexico Tech

ALBUQUERQUE, N.M. — In a move to accredit the Weapon Intern Program and advance the state of the art of manufacturing technologies at the Department of Energy's Sandia National Laboratories, officials from Sandia and New Mexico Institute of Mining and Technology will sign two new agreements Tuesday, Dec. 11.

One agreement will establish a master's degree program in engineering mechanics with a specialty in explosive engineering. The degree program was initiated for participants in Sandia's Weapon Intern Program.

The Dec. 11 signing ceremonies will be held at 9 a.m. at the Sandia Cooperative Monitoring Center located just outside the Eubank gate entrance to Kirtland Air Force Base.

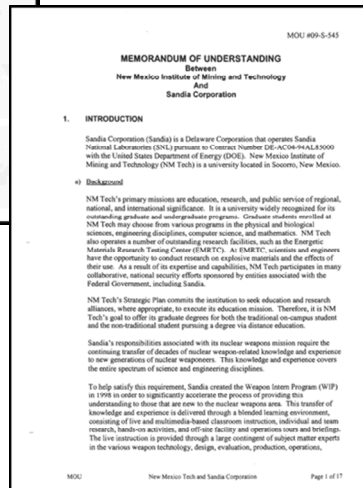
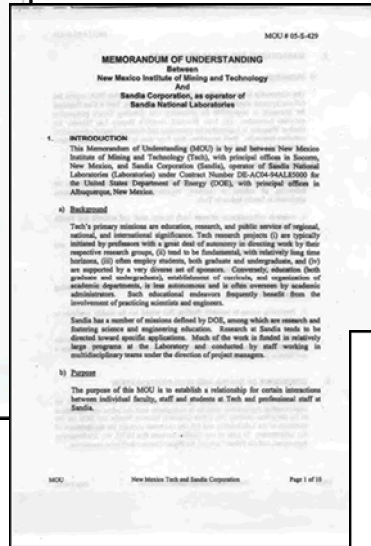
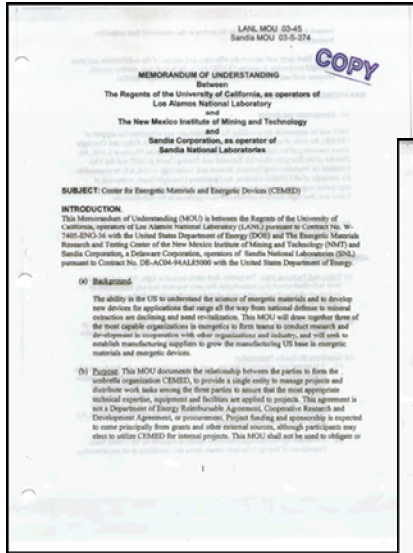
The other agreement allows the university to do new research and development in areas related to power sources manufacturing.

Signing the Weapon Intern Program agreement will be Joan Woodard, Sandia executive vice president, and Dan Lopez, president of New Mexico Tech.

Signing the power sources agreement will be Lenny Martinez, Sandia vice president for manufacturing systems, science and technology; Robert Bickes, manager of Sandia's Power Source Components Department; John Meason, director of the New Mexico Tech's Energetic Materials Research and Testing Center; and President Lopez.

# Memoranda of Understanding

*There have been at least four MOU's between Sandia and Tech*

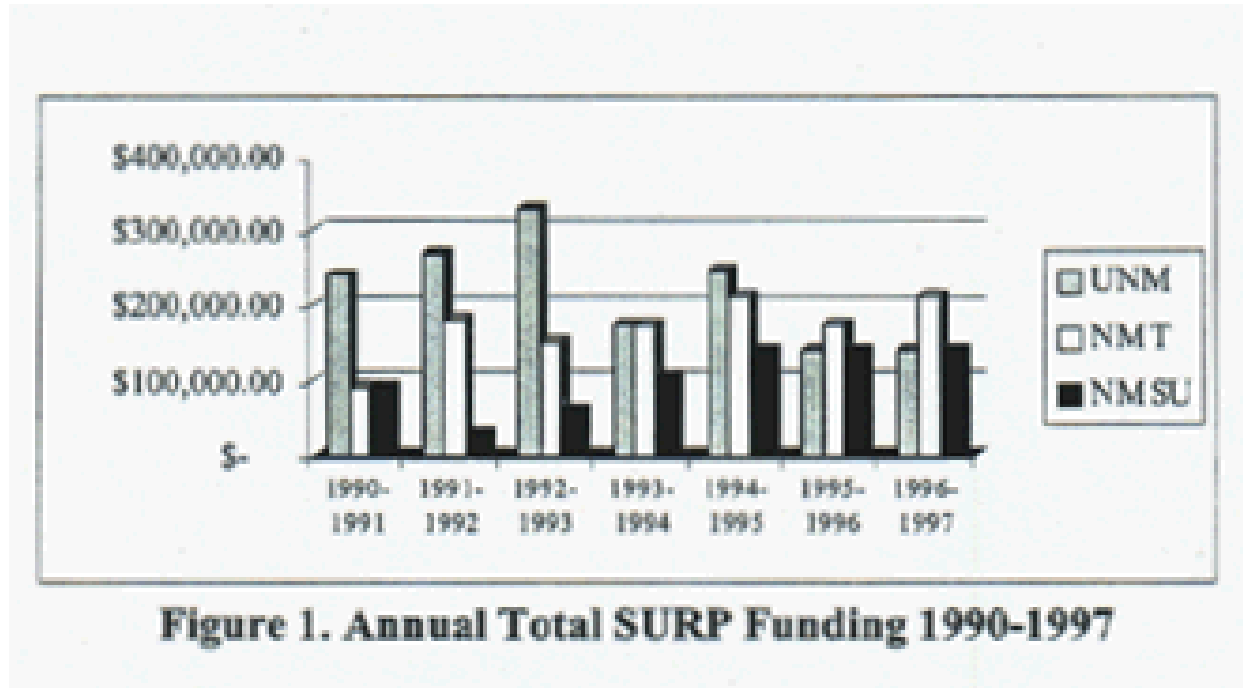


- Educational support for Sandia's Weapon Intern Program (2001 – see previous slide)
- Center for Energetic Materials and Energetic Devices (with LANL, 2003)
- General support for educational and research collaborations, including provision for joint appointments (2005)
- Continuation of support for Sandia's Weapon Intern Program (2010)

# Sandia University Research Program (SURP)

*SNL provided research funds to new faculty at New Mexico universities*

- The SURP program began in 1958 – its purpose was twofold:
  - to acquire fundamental knowledge in those technical fields which are of direct concern to Sandia National Laboratories’ programs; and
  - to create a stronger technical community at universities in New Mexico with which Sandia National Laboratories can interact through strengthening university faculties in areas of science and engineering important to Sandia National Laboratories
- Program was funded out of a Nuclear Weapons tech base sustainability account
- Toward the end of the program, projects were being funded at \$40K per year
- Program discontinued in federal FY 2009 due to reductions in Sandia’s NW tech base sustainability funding



# Campus Executive Program

*Sandia Executives serving as POCs and advocates for 23 selected universities*

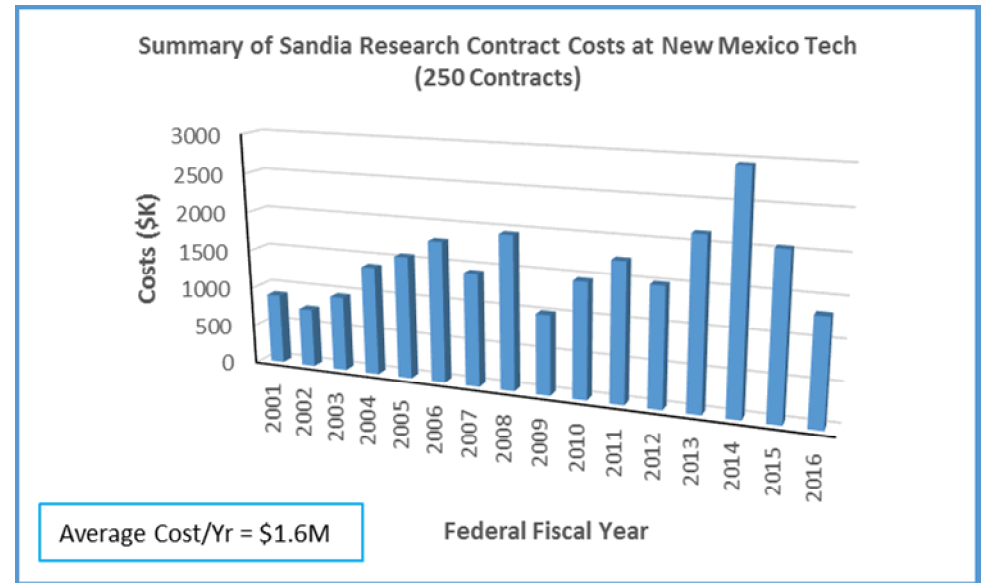


- The Campus Executive Program was established in 1997 to partner with universities
    - To conduct leading-edge science
    - Hire the most accomplished scientists and engineers
    - Develop strategic collaborations in focused research areas
  - A key element in the past was an investment of ~\$40K in two graduate “fellowships” at each school
- In FY17, Sandia instituted a new approach to Campus Executive LDRD projects
- Focus is on building and nurturing relationships between Sandia and Tech faculty members in focus areas selected by the university and supportive of research directions at Sandia; at Tech, the V. P. for Research selected the following:
  - Cyber
  - Energetics
  - Bioengineering

# Sandia Research Contracts at Tech, 2001-2016

*Costs generated by Sandia research contracts at Tech averaged \$1.6 M/year*

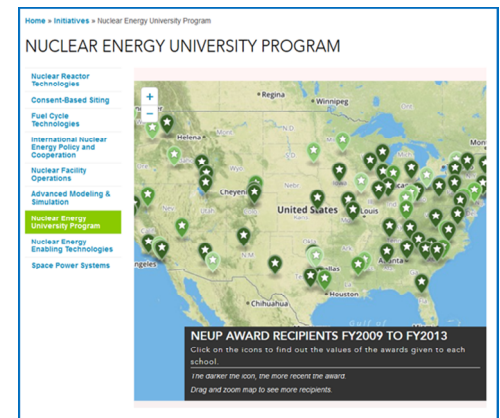
- Many of these contracts have been in the area of energetic materials, but not by no means all
- Two “Campus Executive” projects funded by Sandia’s LDRD program came to an end in September, 2016
  - Chemical Vapor into Liquid (CViL) Encapsulation of Micro-Organisms for Hazardous Agent Detection (Tartis)
  - Rocket Engine Test System for Development of Novel Propulsion Technologies (Hargather)
- Collaborations between Sandia and New Mexico Tech under the new approach to Campus Executive LDRD activities fostered involvement by Tech in two additional projects
  - Instrumentation Infrastructure for Cyber Emulations (Liebrock)
  - Advanced Diagnostics for Small Scale Detonation Testing of PETN (Hargather)



# Other Possible Partnering Mechanisms

*These mechanisms benefit faculty, students, and Sandia/university relations*

- Faculty appointments at Sandia
  - Scientists conduct short-term, joint research with university faculty on sabbatical or during the summer
  - Faculty are invited by a Sandia sponsor and can have limited-term employment at the Labs from four weeks to one academic year
- Adjunct professorships
  - Sandia staff have the opportunity to serve in various professorship roles at universities
  - The adjunct position allows a Sandia technical expert to teach courses in his/her area of expertise
- Student internships; positions are available in both technical and business areas and offer the following benefits
  - Provides students with research mentoring from top scientists and engineers
  - Offers students training and practical work experience in using state-of-the-art equipment and instruments
  - Identifies outstanding graduates for possible full-time employment
  - Helps students gain academic credit while working as co-op interns
- University-led responses to calls for proposals (e.g., DOE/NE University Partnerships Program – NEUP)





# Questions?



# Sandia Contacts

*Use these contacts to get information and to answer questions in the future*

- Sandia Campus Executive for New Mexico Tech
  - Jim Chavez ([jmchavez@sandia.gov](mailto:jmchavez@sandia.gov), 505-844-4485)
- Sandia Deputy Campus Executive for New Mexico Tech
  - Paul Shoemaker ([peshoem@sandia.gov](mailto:peshoem@sandia.gov), 505-284-2726)
- Chief Technology Officer Programs Office
  - Ben Cook ([bkcook@sandia.gov](mailto:bkcook@sandia.gov), 505-844-3795)
  - Greg Frye-Mason ([gcfrye@sandia.gov](mailto:gcfrye@sandia.gov), 505-284-9061)
- Chief Technology Officer Programs Support
  - Yolanda Moreno ([ymoreno@sandia.gov](mailto:ymoreno@sandia.gov), 505-284-2106)
- For your expressions of interest in possible collaborations in various technical disciplines
  - Energetic Materials: Jerry Stofleth ([jhstofl@sandia.gov](mailto:jhstofl@sandia.gov), 505-845-7613)
  - Materials Science: Deidre Hirschfeld ([dhirsch@sandia.gov](mailto:dhirsch@sandia.gov), 505-284-5537)
  - Computer Science: David Duggan ([dduggan@sandia.gov](mailto:dduggan@sandia.gov), 505-845-8100)

