

# Securing America's Future through Discovery and Innovation at the Interface of Science and Engineering

## Science, Technology and Engineering (ST&E) at Sandia National Laboratories



National Security is dependent upon differentiating ST&E. Sandia National Laboratories applies the ST&E foundations built over 60 years to solve the breadth of national security challenges facing the nation today, from fiber laser technology for remote sensing to energy efficient solid-state lighting.

### Guiding Principles

- Nurture the Core: Vibrant, creative, people and facilities on the forefront of ST&E.
- Enable the Missions: Apply that core to develop innovative approaches to national security challenges now and in the future.

### Strategic Capabilities

1. **High Performance Computing:** Leading the nation in developing and applying computational technologies and predictive simulation.
2. **Microsystems:** NNSA's sole fabrication facility develops and delivers fully custom microelectronics and microsystems that cannot or should not be made in industry.
3. **Nanotechnology:** Integrating nanostructures into the micro and macro worlds by bridging the gap from scientific discovery to engineering innovation.
4. **Extreme Environments:** Serving the nation by keeping stockpile stewardship in focus and high-yield fusion in view.

### Significant FY07 Accomplishments

1. Sandia's key contributions to the development of massively parallel computing technology have earned numerous awards and world records. Our current flagship architecture, Red Storm, has been replicated in 36 installations at 20 sites and is considered the most successful massively parallel supercomputer architecture to date for time critical applications.
2. The MESA construction project at \$462M was completed under budget and ahead of schedule. MESA is the only supplier of the Permafrost digital controller that is the brains of the W76-1 warhead life extension, for which it received another NNSA Weapon Award of Excellence in FY07. New next generation integrated microsystems, including the Chip-Scale Atomic Clock and the MicroChemLab-based sensor system, extend system functionality beyond mere digital information processing. Deliveries to the broad national security customer base totaled \$62M in FY07.
3. The National Institute for Nanoengineering (NINE) is prototyping the Labs-Universities-Industries partnerships to help develop the next generation of engineering leaders. NINE has executed an MOU with 12 university and eight industry core partners, initiated joint research projects in three theme areas, and already hosted 33 students from 14 universities.
4. The Z Refurbishment (ZR) project was completed successfully and met its goals. Prior to refurbishment the Z facility was already the most powerful and energetic laboratory x-ray source in the world. As the new operating capabilities of the Z facility are fully established, it will provide increasingly critical experimental data to the three NNSA nuclear weapons laboratories through significant increases in x-ray power, x-ray energy, radiation temperature, and material pressures.



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