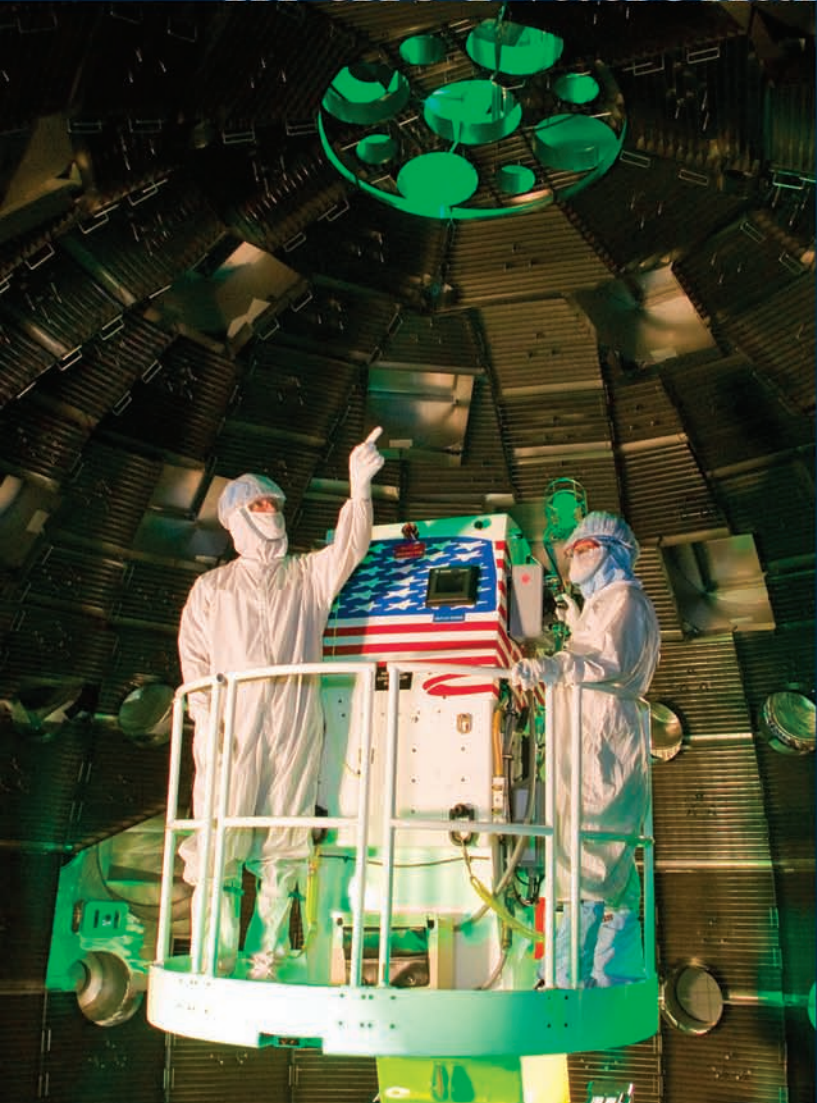


# Science in the National Interest



Lawrence Livermore National Laboratory (LLNL) is unsurpassed in its ability to harness the power of science and technology to solve critical national security challenges.

The Laboratory's long-standing tradition of innovation, excellence, and team science continues to this day with stunning accomplishments in predictive science using computer simulation, the design and construction of the world's largest laser for fusion experiments, and scientific discoveries that are shedding light on fundamental mysteries of the universe.

LLNL's science and engineering programs are supported by efficient and effective business practices and operations. We strive to ensure that all activities meet the highest standards in safety, security, fiscal accountability and environmental responsibility.

Our Laboratory has been entrusted with a critically important mission. Even as we deliver solutions to national security issues of today, we are creating the capabilities that will be required to meet the country's needs in the years ahead.



## What Makes a National Laboratory?

- An essential and compelling mission
- The ability to solve important and difficult real-world problems
- Cutting-edge capabilities in multiple areas of science and technology
- Science and technology that create spin-off applications
- Unique, large, and complex research facilities
- A committed, vital, and talented staff
- Partnerships that promote creativity
- Management, business practices, and operations that support mission goals

# Leadership in Meeting 21st-Century National Security Needs

*We advance and apply science and technology to address 21st century threats to national security and global stability.*

Ensuring the safety, security, and reliability of the nation's nuclear weapons stockpile has always required the best in science and engineering. Laboratory researchers are tackling the grand challenge of understanding the scientific details of nuclear weapon performance through nonnuclear tests and experimentally validated computer simulations. We are leveraging science and technology to help make the nation's nuclear weapons complex a smaller, safer, more secure, and more cost-effective enterprise.

Livermore is a center of innovation for new technologies and systems for protecting the nation against the proliferation of weapons of mass destruction, terrorism, and other catastrophes. We are also applying

Laboratory strengths to confront two of the greatest challenges facing mankind—the need for secure, affordable and sustainable energy technologies coupled with the scientific understanding of climate change and the influence of human activities on the environment.

## Achievements in...

### Stockpile Stewardship

First successful completion of a stockpile life extension program (W87 ICBM warhead), and development of technically rigorous stockpile assessment capabilities

Acquisition of some of the world's most powerful supercomputers and development of groundbreaking applications, used to perform the first high-fidelity 3D weapons physics simulations

Design and construction of the National Ignition Facility, the world's largest laser system with unique capabilities for investigating the thermonuclear performance of weapons

### Homeland and Global Security

Lead role in international efforts to secure at-risk radioactive sources around the world, and development of antineutrino detection as a nuclear safeguards technology

Invention of advanced biodetection instruments, including the first handheld nucleic acid analyzer and a fully autonomous "lab in a box" system

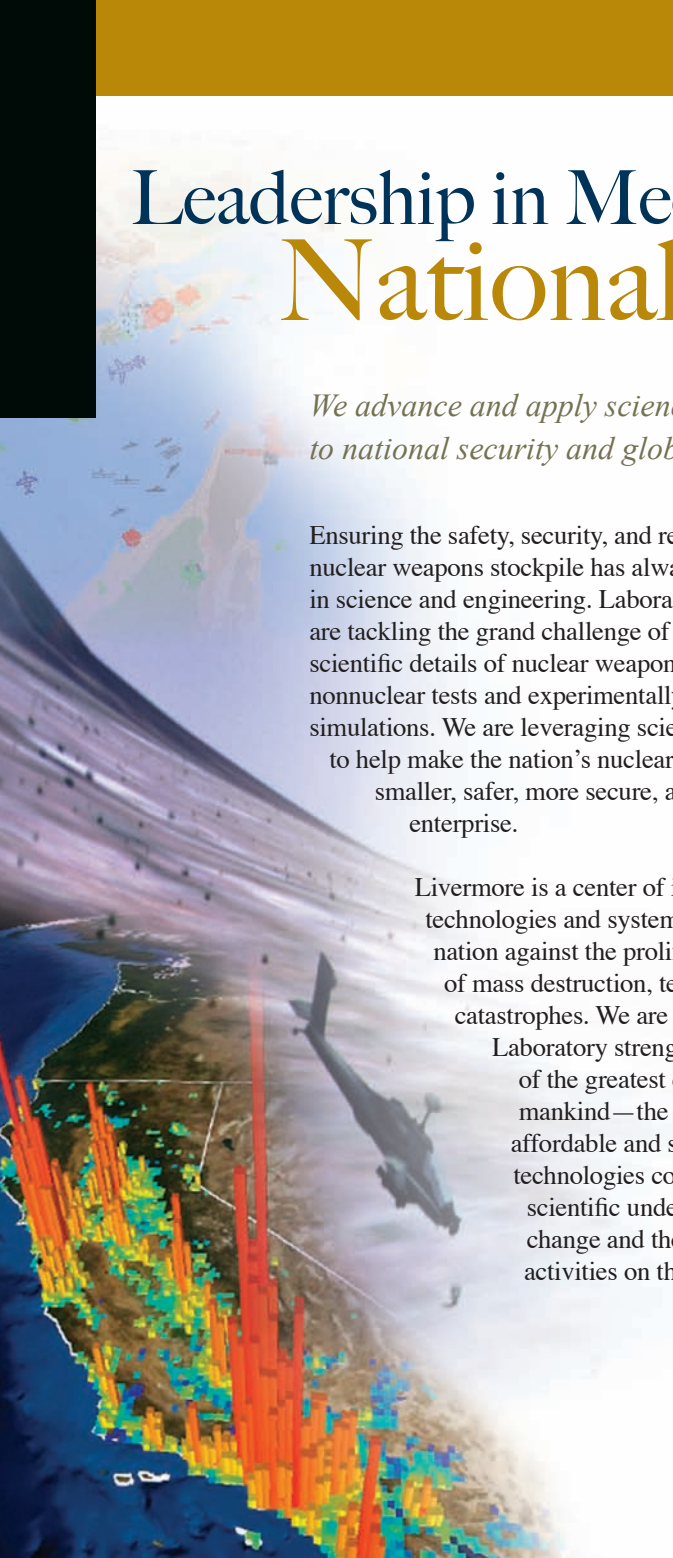
Development of state-of-the-art sensing technologies and information exploitation methods for detecting proliferation- and terrorism-related activities

### Energy and Environment

World-leading expertise in climate modeling and scientific contributions to the reports of the Intergovernmental Panel on Climate Change (co-recipient of the 2007 Nobel Peace Prize)

Demonstration of a hydrogen-powered car that set a world record for distance driven on a single tank of hydrogen fuel (650 miles)

Laser Inertial Fusion-Fission Energy (LIFE) concept for almost unlimited carbon-free energy



# Game-Changing Science and Technology

*Exceptional science and technology is the engine that sustains the Laboratory's vitality and makes it possible for Livermore to take on demanding missions and respond to national challenges as they arise.*

**Core Capabilities.** The Laboratory's distinguishing core competencies derive from its historical nuclear weapons mission, its continuing stockpile stewardship responsibilities, and its broader mission in national and global security. They include all aspects of the science and engineering involved in nuclear weapons as well as high-performance computing, micro- and nano-technology, lasers and high-energy-density science, climate modeling, detection and remote sensing, and complex systems and analysis.

**Unique Facilities.** The National Ignition Facility, Terascale Simulation Facility, and High Explosives Applications Facility are signature facilities and will serve as major user resources for years to come. We also support the National Atmospheric Release Advisory Center, Jupiter Laser Facility, Center for Accelerator Mass Spectrometry, Forensic Science Center, and Biodefense Knowledge Center, and other scientific centers that enable us to provide specialized technical assistance and analysis for homeland security, basic research, and other nationally important endeavors.

**Focused Investments.** In order to position the Laboratory to address emerging and future national security threats, we are making S&T investments in:

- Nuclear weapons science
- High-energy-density science
- Nuclear counterterrorism and nuclear forensics
- Nonnuclear threat prevention
- Energy security and climate change
- Cyber security and space security

**Outstanding Workforce.** The scientific and technical difficulty of LLNL's mission requires an exceptional workforce. Our employees are highly skilled and have expertise in a broad range of disciplines. They are widely recognized for their creativity and bring a rich diversity of perspectives to the Laboratory and its mission.

**Strategic Partnerships.** LLNL engages in partnerships with other laboratories, research universities, and high-technology industries so that the expertise and special capabilities of multiple institutions can be leveraged to solve problems of national and global importance.

**Multidisciplinary Teams.** A hallmark strength of this Laboratory is our ability to rapidly assemble multidisciplinary teams of scientists, engineers, and technical and administrative staff with the range of skills needed for a particular project. Through this team approach to scientific problem solving, we have repeatedly achieved unexpected insights, scientific breakthroughs, and technological innovations.



## Livermore's Distinguishing Capabilities

**Nuclear Science and Technology.** Understanding, at the first-principles level, all aspects of nuclear weapons performance, the nuclear fuel cycle, and nuclear forensics

**High-Performance Computing.** Leading the development of new computer architectures, predictive simulation capabilities, knowledge extraction tools and techniques, and novel algorithms and codes

**High-Energy-Density Physics.** Developing the National Ignition Facility into a premier user facility for stockpile stewardship, discovery-class science, and new approaches to clean energy

**Materials Science.** Understanding materials from the nano- to the macro-scale and engineering new materials for specific applications

**Advanced Lasers and Diagnostics.** Developing advanced lasers and sensors as well as nano-scale–picosecond diagnostics for national security missions and scientific discovery

**Engineering Development and Systems Technologies.** Integrating individual technologies and capabilities into end-to-end systems solutions for nationally and globally important problems

# Excellence in Management, Business, and Operations

*The Laboratory is committed to simultaneous excellence in science and operations. Effective management, efficient business practices, and safe, secure, and environmentally responsible operations provide the essential foundation for our mission activities.*

We draw on the expertise of the partner companies of Lawrence Livermore National Security LLC (LLNS), the managing contractor for the Laboratory, to identify and implement opportunities for increasing the effectiveness and driving down the cost of Laboratory activities.

We aim for continuous improvement in safety, security, and environmental stewardship. These considerations are explicitly designed into all Laboratory activities.

## We Value...

- Passion for mission
- Integrity and responsible stewardship of the public trust
- Personal and collective responsibility for safety and security
- Simultaneous excellence in science and technology, operations, and business practices
- Innovation balanced with disciplined execution
- Team work while preserving individual initiative
- Intense competition of ideas with respect for individuals
- Treating each other with respect
- A high-quality, motivated workforce with diverse ideas, skills, and backgrounds
- Rewarding and recognizing excellence
- Commitment to the collective success of the Laboratory



Go to [www.llnl.gov](http://www.llnl.gov) for more information about the Laboratory