

LA-UR-

11-02904

Approved for public release;  
distribution is unlimited.

*Title:* Los Alamos National Laboratory: Charge to the Materials  
Capability Review

*Author(s):* Janet A. Mercer-Smith, Everett P. Springer, and Duncan W.  
McBranch

*Intended for:* Materials Capability Review Committee  
Los Alamos, NM, USA  
31 May, 2011



Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the Los Alamos National Security, LLC for the National Nuclear Security Administration of the U.S. Department of Energy under contract DE-AC52-06NA25396. By acceptance of this article, the publisher recognizes that the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

## **Los Alamos National Laboratory: Charge to the Materials Capability Review**

### **Presentation for the Materials Capability Review**

May 31, 2011

Janet A. Mercer-Smith, Everett P. Springer, and Duncan W. McBranch

The Laboratory mission encompasses a full spectrum of national security activities, including Nuclear Deterrence, Global Security, and Energy Security. The capabilities at Los Alamos support vital national security challenges. These capabilities are strategic areas where LANL needs to excel and are led by an Associate Director. The Capability Reviews are an important component of the science focus, because the external peer review process is used to continuously improve the quality of LANL's science, technology, and engineering. The charge for the Nuclear Engineering and Technology Capability Review is cross-cutting. The committee is asked to assess the quality of science, technology, and engineering within the Capability; evaluate the integration of this capability across Laboratory organizations; assess the relevance of the capability's science, technology, and engineering contributions to current and emerging LANL programs; assess the LDRD project "Predictive Design of Noble Metal Nanoclusters"; and advise the Laboratory Director and the Principal Associate Director for Science, Technology and Engineering on the health of the capability. Laboratory Management will use the committee's report for capability planning, and will provide it to DOE as part of LANL's annual performance plan.



# Los Alamos National Laboratory

**Duncan W. McBranch**

Deputy Principal Associate Director for Science,  
Technology and Engineering

## Charge to the Materials Capability Review

May 17, 2011



Operated by Los Alamos National Security, LLC for NNSA





## LANL Mission

***Our mission as a DOE national security science laboratory is to develop and apply science, technology, and engineering solutions to:***

- Ensure the safety, security, and reliability of the U.S. nuclear deterrent
- Reduce global threats
- Solve emerging national security challenges

**Our *vision* is to be the premier National Security Science Laboratory.**



Operated by Los Alamos National Security, LLC for NNSA

UNCLASSIFIED

Materials Capability Review 2011

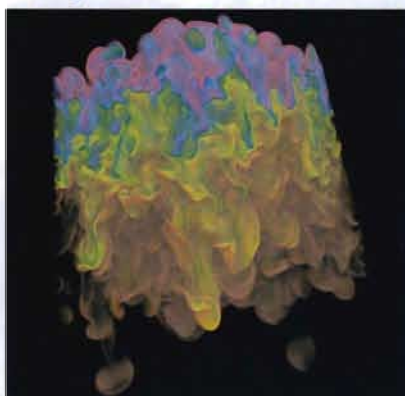




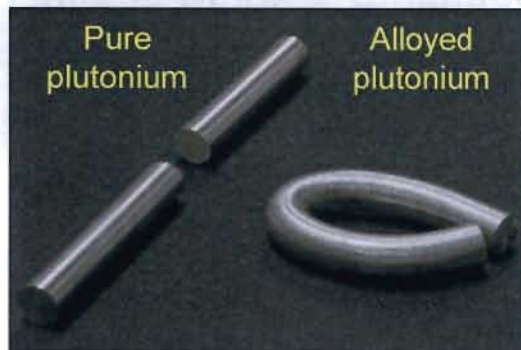


# Science at Los Alamos National Laboratory

## Stockpile Stewardship

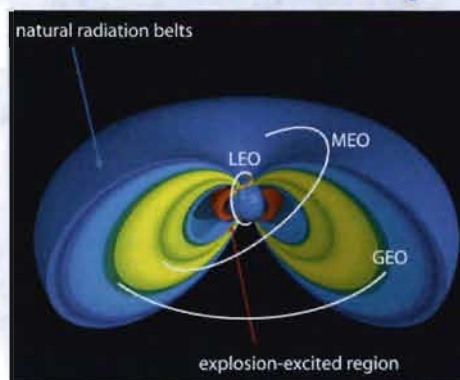


**Hydrodynamics:** Turbulence

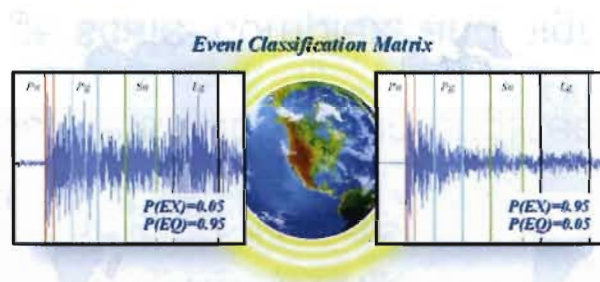


**Plutonium Science:** Metallurgy

## Global Security

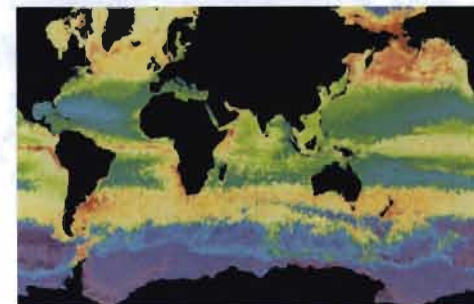


**Threats from Space:** Dynamic Radiation Environment Assimilation Model



**Seismic Detection of Nuclear Explosions**

## Energy Security



**Climate/Energy Impacts:** Measurement, simulation, prediction



**Materials:** Energy generation and transmission



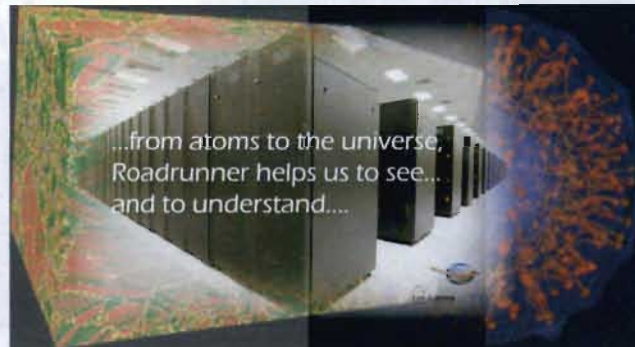
# Los Alamos Science in the 21st Century

## *The Premier National Security Science Laboratory:*

- Integrates theory, simulation, and experiments.
- Uses multidisciplinary science, technology, and engineering.
- Solves problems that are large scale, complex, and high impact.
- Utilizes unique, multifaceted, or experimental and computational facilities.
- Develops technology that is highly complex, and sensitive or classified nature.



LANSCe: proton radiography



Roadrunner supercomputer

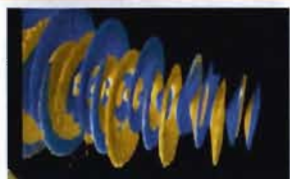


Integrated process and system models





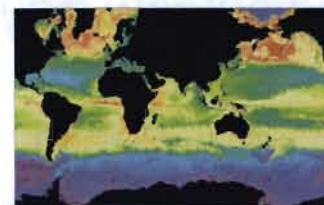
# The capabilities of the Laboratory serve program.



Computational Physics & Applied Mathematics



Accelerators & Electrodynamics



Information & Knowledge Science



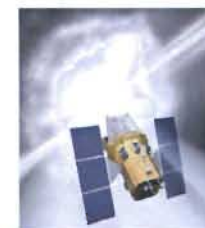
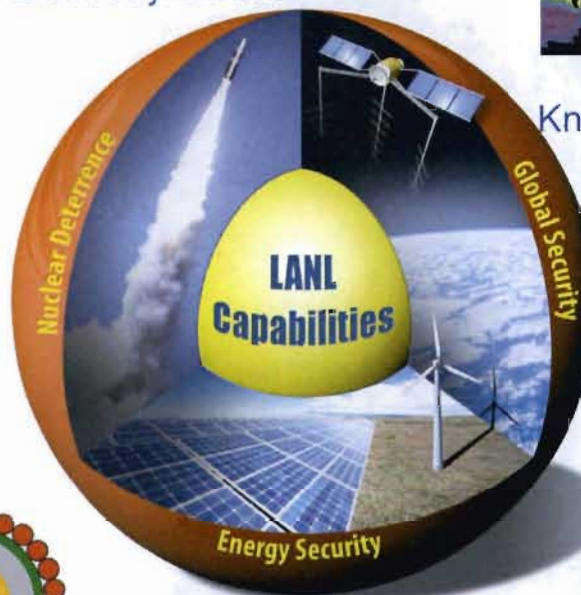
Nuclear Physics, Astrophysics & Cosmology



Weapons Science & Engineering



Computer & Computational Sciences



Sensors, Remote Sensing & Sensor Systems



Biosciences



High-Energy Density Plasmas & Fluids



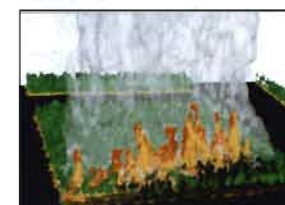
Chemical Science



Materials



Nuclear Engineering and Technology



Earth & Space Sciences



Operated by Los Alamos National Security, LLC for NNSA

UNCLASSIFIED

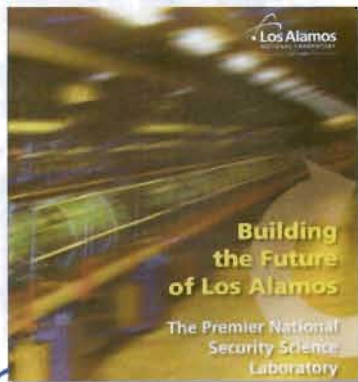
Materials Capability Review 2011





# “Science that Matters” guides LANL STE strategy.

## Materials for the Future



## Information Science and Technology for Integrative and Predictive Science



## Science of Signatures



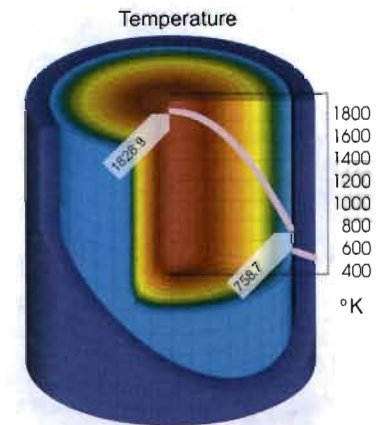
- Three “Science that Matters” pillars utilize capabilities.
- Strategic investments are aligned with the pillars.
- Capabilities are enhanced by STE strategy.



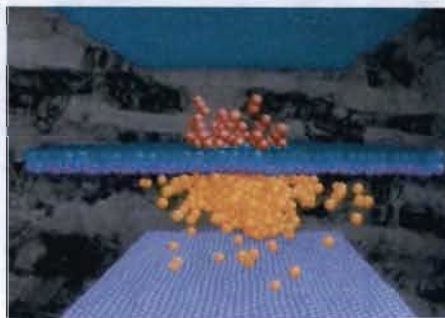


# LANL is a capabilities-based laboratory.

- Capabilities are chosen to be cross-cutting.
- Capabilities are led by an Associate Director.
- Capabilities do not reside in one organization.
- Many customers have access to the capability inventory.
- Capabilities are continually evaluated.



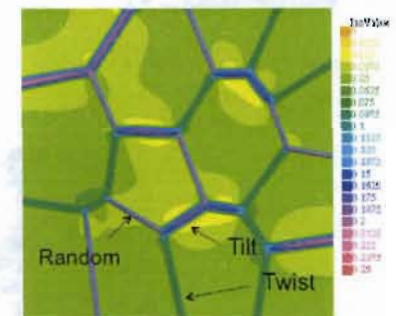
Model across scales for predictive, physics-based nuclear fuel performance



Materials by design









High performance computing and visualization



Analysis of materials behavior



# LANL Organization

	<b>Audits &amp; Ethics Director</b> Jeanette Y. Bannion
	<b>Community Programs Office</b> Kurt Steinhaus
	<b>Chief Prime Contracts</b> Steve Shook
	<b>Office of Equal Opportunity &amp; Diversity</b> Charles (CJ) Badno
	<b>Ombuds Office</b> Kirk Christensen
	<b>Comm. &amp; Gov. Affairs</b> Lisa Rosendorf

Institutional Leaders	
	<b>Michael R. Anastasio</b> Laboratory Director
	<b>Isaac E. Richardson</b> Deputy Laboratory Director
	<b>Executive Director</b> Rich Marquez
	<b>Executive Office Manager</b> Peggy Gonzales

	<b>Contractor Assurance Officer</b> Roland Knapp
	<b>Chief Information Security Officer</b> Jamil Farahchi
	<b>Chief Information Officer</b> Tom Harper
	<b>General Counsel</b> David Sosinski
	<b>Chief Financial Officer</b> Glen Kizer
	<b>LANL, LLC Executive Staff Director</b> Jerry Ethridge






	<b>Terry Wallace</b> Principal Associate Director Science, Technology & Engineering
	<b>Charles McMillan</b> Principal Associate Director Weapons Programs
	<b>William Rees, Jr.</b> Principal Associate Director Global Security
	<b>Carl Beard</b> Principal Associate Director Operations & Business
	<b>Paul Henry</b> Principal Associate Director Capital Projects

				
<b>Chemistry, Life &amp; Earth Sciences</b> Assoc. Director Nan Sauer (Acting)	<b>Engineering &amp; Engineering Sciences</b> Assoc. Director Steve Giness	<b>Experimental Physical Sciences</b> Assoc. Director Susan Seestrom	<b>Information Technology</b> Assoc. Director Carolyn Zerkle	<b>Theory, Simulation, &amp; Computation</b> Assoc. Director Alan Bishop
<b>ADLES</b> Biology	<b>ABE</b> Accelerator Operations & Technology	<b>ADEPS</b> Materials Physics & Applications	<b>ADIT</b> Departmental Computing Services	<b>ADTSC</b> Computer & Computational Sciences
<b>Chemistry</b>	<b>Applied Engineering &amp; Technology</b>	<b>Materials Science &amp; Technology</b>	<b>Network Infrastructure and Engineering</b>	<b>High Performance Computing</b>
<b>Earth &amp; Environmental Sciences</b>	<b>Prototype Fabrication</b>	<b>Los Alamos Neutron Science Center</b>	<b>Software and Applications Engineering</b>	<b>Theoretical</b>



	
<b>Plutonium Science &amp; Manufacturing</b> Assoc. Director Tim George	<b>Weapons</b> Assoc. Director Zvet Knapp
<b>ADPSM</b> Integrated Program Management	<b>ADM</b> Computational Physics
<b>Nuclear Component Operations</b>	<b>Theoretical Design</b>
<b>Manufacturing Engineering and Technology</b>	<b>Weapons Experiments</b>
<b>Nuclear Process Infrastructure</b>	<b>Weapons Systems Engineering</b>


<b>Threat Identification and Response</b> Assoc. Director Scott Gibbs
<b>PAOGS</b> Decision Applications
<b>International &amp; Applied Technology</b>
<b>International, Space, &amp; Response</b>
<b>Nuclear Nonproliferation</b>

				
<b>Business Services</b> Assoc. Director Mark Barth	<b>Environment, Safety, Health, &amp; Quality</b> Assoc. Director Chris Cantwell	<b>Maintenance &amp; Infrastructure Planning</b> Assoc. Director Jay Johnson (Acting)	<b>Nuclear &amp; High Hazard Operations</b> Assoc. Director Robert McQuinn	<b>Safeguards &amp; Security</b> Assoc. Director Michael Lansing
<b>ADBS</b> Acquisition Services	<b>ADESHQ</b> Environmental Protection	<b>ADMS</b> Infrastructure Planning	<b>ADNHQ</b> CMR Facility Operations	<b>ADSN</b> Emergency Operations
<b>Central Training</b>	<b>Industrial Hygiene and Safety</b>	<b>Maintenance &amp; Life Services</b>	<b>Engineering Services</b>	<b>Safeguards</b>
<b>Human Resources</b>	<b>CMR/Neutron Safety Office</b>	<b>Occupational Medicine</b>	<b>Environmental &amp; Waste Management Facility Operations</b>	<b>Security</b>
<b>Information Resource Management</b>	<b>Quality Assurance</b>	<b>Radiation Protection</b>	<b>Institutional Facilities &amp; Central Services Operations</b>	
	<b>Waste and Environmental Services</b>	<b>Environmental Safety Health Employed Resources</b>	<b>LANL/C Facility Operations</b>	
			<b>Operations Support</b>	
			<b>Safety Basis</b>	
			<b>Science &amp; Technology Facility Operations</b>	
			<b>Ta-21 Facility Operations</b>	
			<b>Ta-55 Facility Operations</b>	
			<b>Legacy &amp; Infrastructure Facility Operations</b>	
			<b>Weapons Facility Operations</b>	

	
<b>Environmental Programs</b> Assoc. Director Michael Graham	<b>Project Management</b> Assoc. Director John Bretzke (Acting)
<b>ADEP</b> Business & Project Services Enable	<b>ADPM</b> Site Projects
<b>Corrective Actions</b>	
<b>Engineering &amp; Technology</b>	
<b>Regulatory Management</b>	
<b>Ta-21 Closure</b>	
<b>Ta-54 Closure</b>	
<b>Waste Disposition</b>	
<b>CMSR</b>	<b>Functions</b>

05/09/11

**Los Alamos**  
NATIONAL LABORATORY  
EST. 1943

Operated by Los Alamos National Security, LLC for NNSA

Materials Capability Review 2011







## Capability Reviews

- LANL uses external reviews to measure and continuously improve the quality of its science, technology and engineering (STE).
- Capability reviews are chartered by the Director and PADSTE.
- LANL uses capability reviews to assess the STE quality and institutional integration and to advise Laboratory Management on the current and future health of the STE.
- The capability reviews are **cross-cutting** across directorates. They provide a holistic view of STE quality, integration to achieve mission requirements, and mission relevance.
- The principal product of the capability review is a report that includes the Committee's assessments, commendations, and recommendations for the capability.

***Laboratory Management will use this report for capability planning and provide it to DOE as part of LANL's annual performance plan.***



# Charter for the Materials Capability Review Committee

- **Assess the quality of science, technology and engineering** within the capability in the areas defined in the agenda. Identify issues to develop or enhance core competencies in this capability.
- **Evaluate the integration of this capability** across the Lab organizations listed in the agenda in terms of joint programs, projects, proposals, and/or publications. Describe the integration of this capability in the wider scientific community using recognition as a leader within the community, ability to set research agendas, and attraction and retention of staff.
- **Assess the relevance** of this capability's science, technology and engineering contributions to current and emerging LANL programs, including Nuclear Deterrence, Global Security, and Energy Security.
- **Advise the Laboratory Director/Principal Associate Director for Science, Technology and Engineering on the health of the capability** including the current and future (5 year) science, technology and engineering staff needs, mix of research and development activities, program opportunities, environment for conducting science, technology and engineering.
- **Assess the Los Alamos LDRD project**, "Predictive Design of Noble Metal Nanoclusters," using the criteria performance, quality, and relevance for the current status of the project. Provide advice on the future directions and opportunities for the project.





# Capability Assessment Evaluation

**Evaluation of topics in the agenda must address the following criteria:**

- **Comparison to peers:**

- State how this work compares to similar or related work conducted by others.

- **Sustainability:**

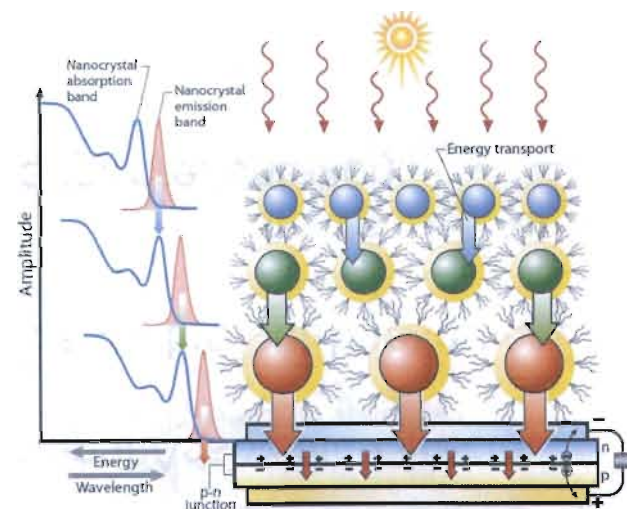
- State the extent to which the contribution strengthens or weakens LANL capabilities.
- How does this activity/contribution build core competencies or other resources that contribute to the vitality of the activity itself and the long term vigor of the Lab and its ability to meet the needs of the nation?

- **Integration:**

- Describe the interactions between organizations within the Laboratory.
- Describe the interactions between the capability and the scientific community.

- **Program relevance:**

- State the current programs that the capability supports and its effectiveness in supporting current missions.
- Identify future missions or programs that this capability can support.



**Materials for Clean Energy**



## Communicating Conclusions with Management

- An Executive Out-Brief is held for the Director and Principal Associate Directors.
- The committee must prioritize its assessment and advice for the out-briefing and the report.
- Specifically, the Committee should identify and prepare for presentation:
  - Assessment of STE topics covered in the agenda.
  - Between 3 and 7 prioritized most notable contributions observed in the review.
  - Between 3 and 7 prioritized most important “actionable” recommendations.
- The committee holds an open out-brief for the staff.
- The Committee must submit its assessment and advice via written report within 30 days of the end of the review.

***Out-brief and report templates are available for the Committee's use.***