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Title:	Science, Technology and Engineering Overview
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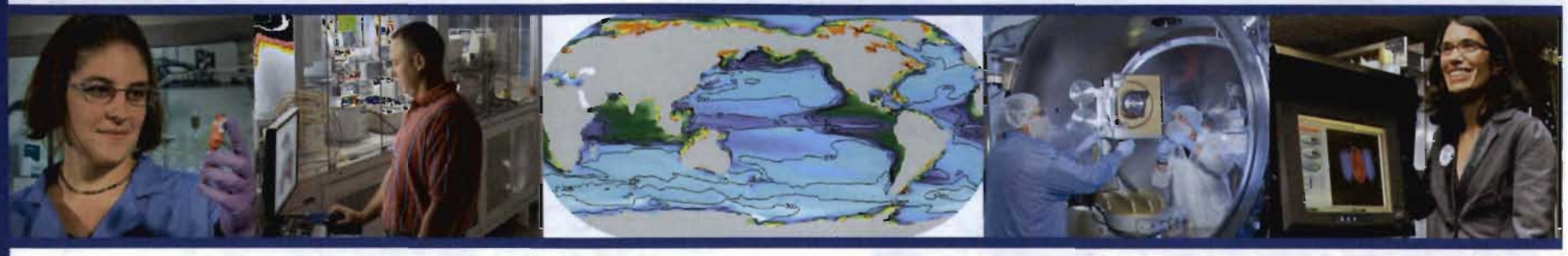
Form 836 (7/06)

Science, Technology and Engineering Overview

Terry C. Wallace, Duncan W. McBranch, and Janet A. Mercer-Smith

The Laboratory provides science solution to the mission areas of nuclear deterrence, global security, and energy security. The capabilities support the Laboratory's vision as the premier national security science laboratory. The strength of LANL's science is at the core of the Laboratory. The Laboratory addresses important science questions for stockpile stewardship, global security, and energy security. The underpinning science vitality to support mission areas is supported through the Post Doc program, the fundamental science program in LDRD, collaborations fostered through the Institutes, and the LANL user facilities. LANL fosters the strategy of Science that Matters through investments, people, and facilities.

Science at Los Alamos



Science, Technology and Engineering Overview

Terry C. Wallace
Principal Associate Director for
Science, Technology and Engineering

August 1, 2011

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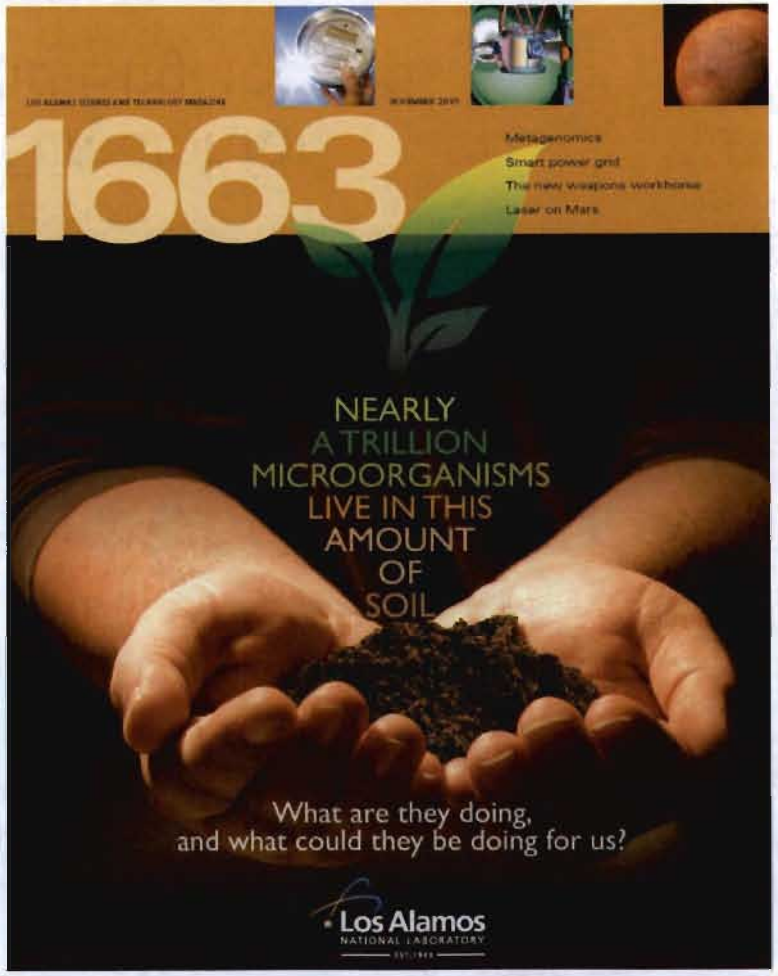
LANL Mission

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 Energy Security and other emerging national security challenges



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

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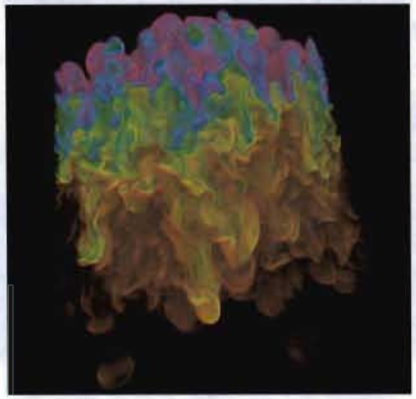
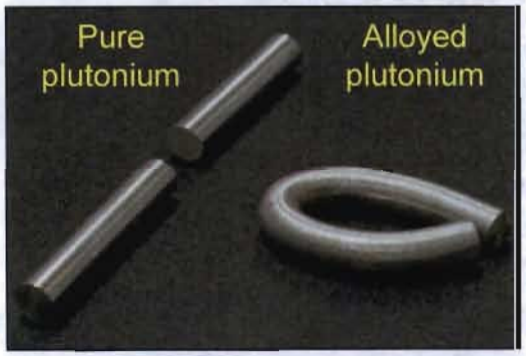
Science at Los Alamos National Laboratory

Mission Areas

Stockpile Stewardship

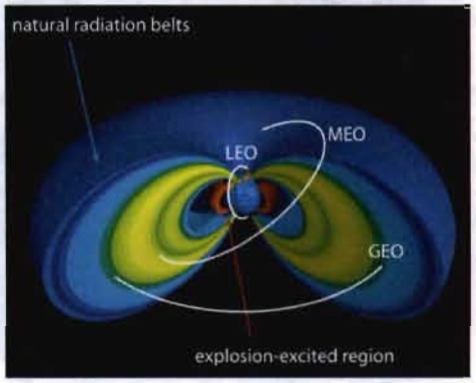


Hydrodynamics: Turbulence

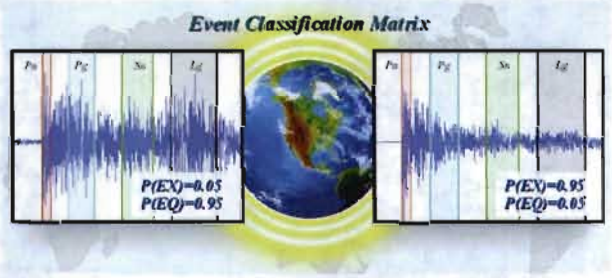


Plutonium Science: Metallurgy

Global Security

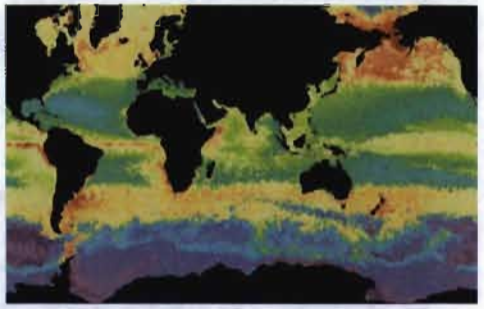


Threats from Space: Dynamic Radiation Environment Assimilation Model



Seismic Detection of Nuclear Explosions

Energy Security



Climate/Energy Impacts: Measurement, simulation, prediction

Materials: Energy generation and transmission

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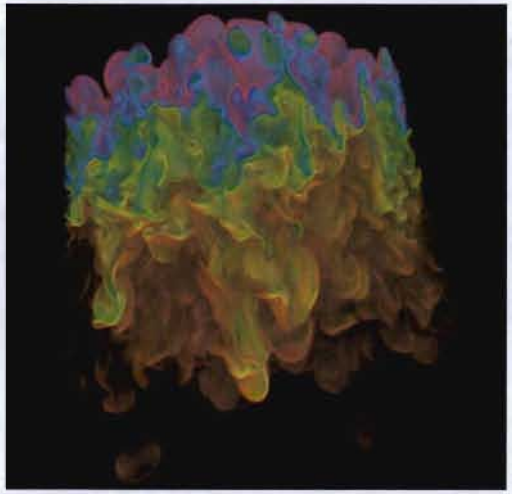
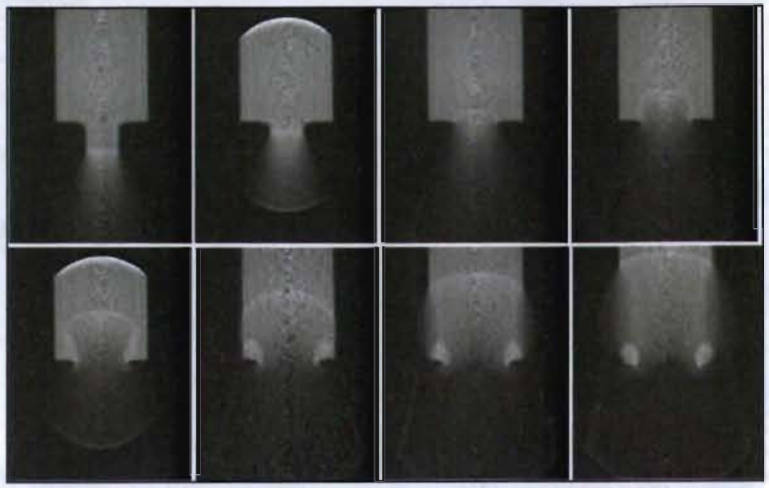
Mission: Science Questions

Ensuring a Safe, Secure and Reliable Nuclear Deterrence



Hydrodynamics: Turbulence



Proton Radiography: HE corner turning

Plutonium Science: Metallurgy

SPaSM on Roadrunner:
Materials dynamics in extreme conditions

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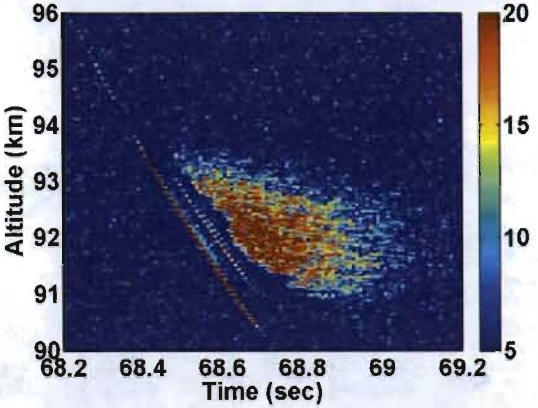
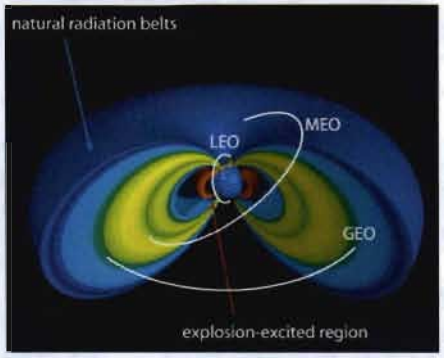
Science Questions for Global Security

Mission: Science Questions



Large interstellar dust

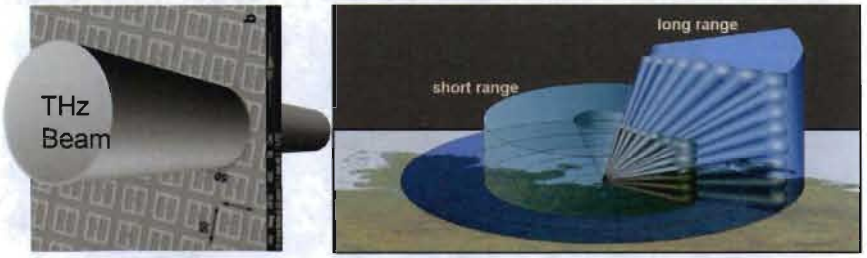


DREAM: Dynamic Radiation Environment Assimilation Model

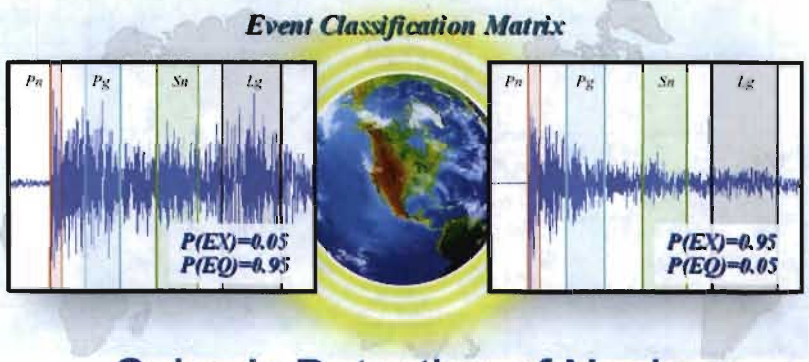
Actinide particle in soil

Space Situational Awareness: Threats from space

Nuclear Forensics: Identification & attribution



Terahertz metamaterials that modulate



Electrical and Optical Control of Materials

Seismic Detection of Nuclear Explosions

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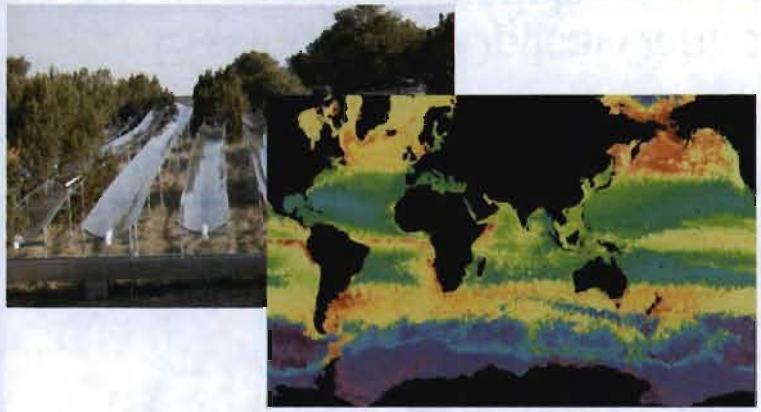
Mission: Science Questions

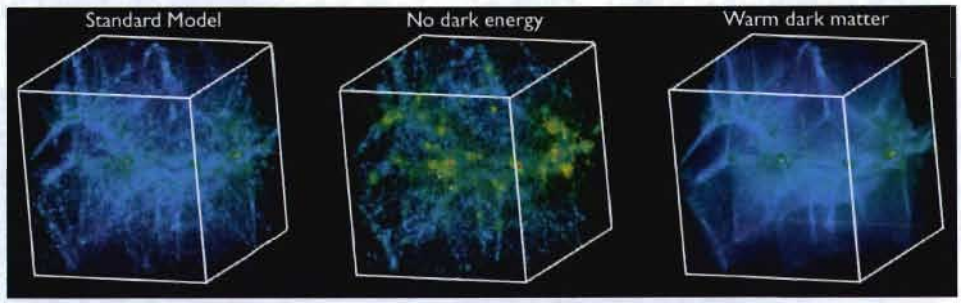
Questions for Science and Energy



Climate / Energy Impacts:
Monitoring, simulation, and prediction

Unconventional Fuels:
Extraction of energy

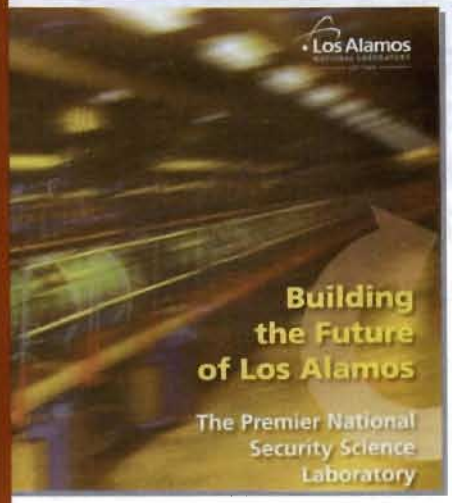
Theoretical Biology: HIV evolution
and design of "mosiac vaccines"



Simulating the universe on Roadrunner:
Interpreting the world's largest galaxy surveys

Capabilities

Capability pillars define areas we must sustain.



- Experimental science focused on materials for the future
- Information science and technology enabling integrative and predictive science
- Science of Signatures for enduring national needs

Materials for the Future

Information Science and Technology for Integrative and Predictive Science

Science of Signatures

Controlled Functionality

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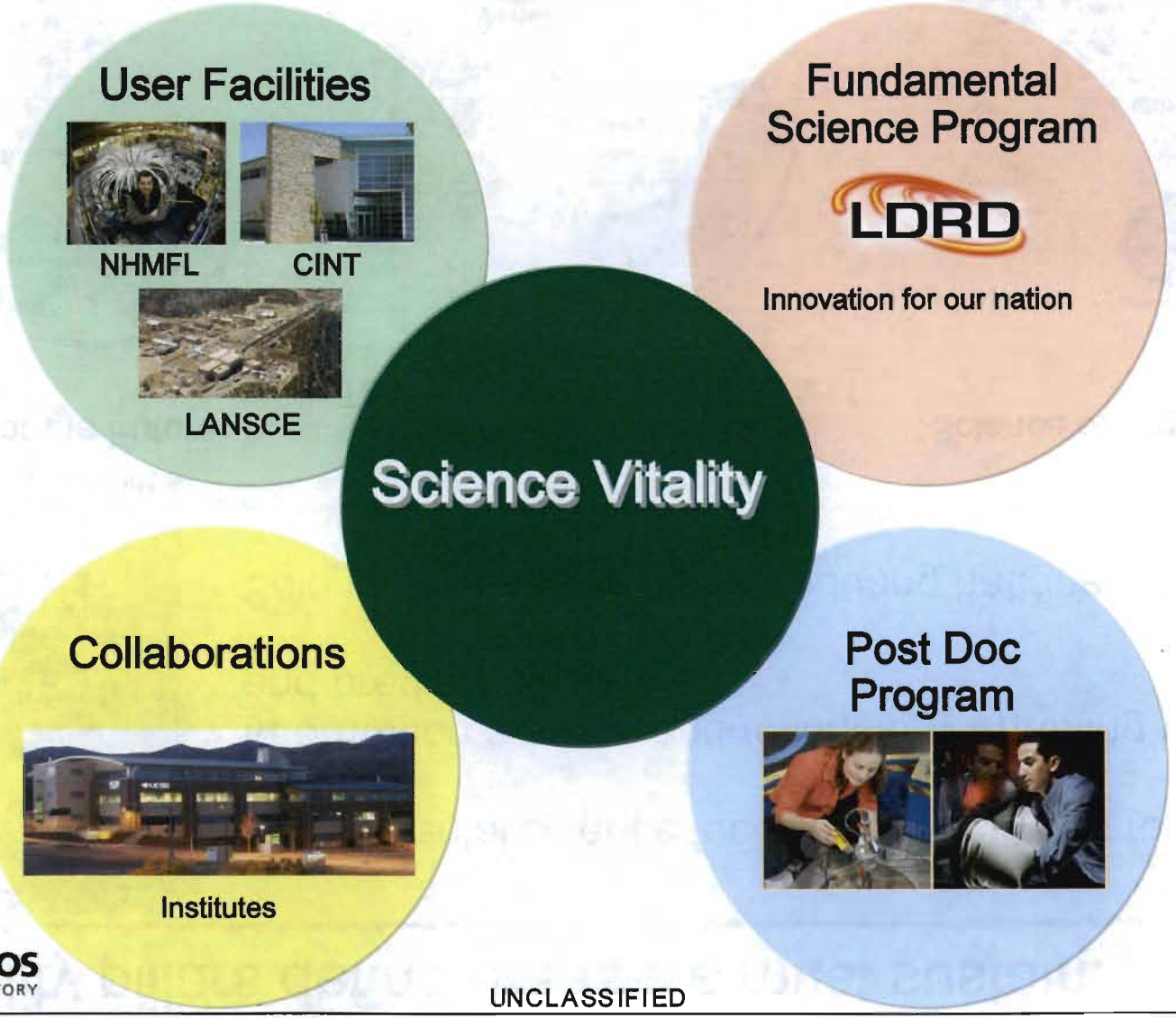
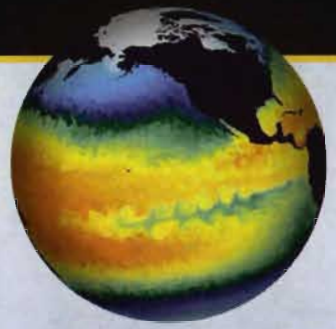
Science vitality underpins the Lab's mission areas.



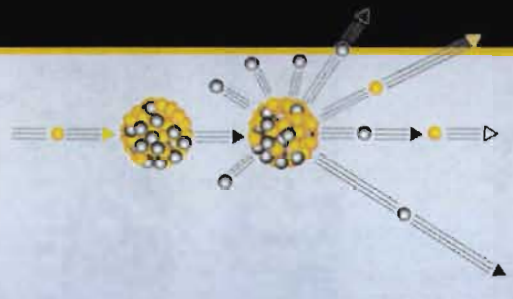
Energy

Los Alamos Energy Security Pillars



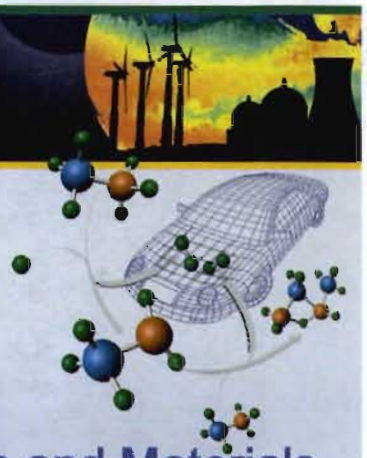
Impacts of Energy Demand Growth

- Coupled predictive models for climate, infrastructure impact analysis
- Prediction of abrupt change at multiple scales (regional to global)
- Global security and policy implications



Sustainable Nuclear Energy

- Efficient extraction of energy content from fuel
- Nonproliferation and safeguards
- Effective waste management



Concepts and Materials for Clean Energy

- Energy storage, generation, and transmission
- Revolutionary alternatives to petroleum
- Clean fossil energy

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Energy

Industrial Partnerships: strong focus on energy

Chevron CRADA

Alliance for Advanced Energy Solutions (6 years, 19 projects, $53 M funding)

New technologies to find, extract, refine conventional and unconventional fuels

Projects in deep water exploration, modeling ultra deep bore stresses, advanced well performance

Alliance projects have reached commercial success much faster than internal R&D at either organization

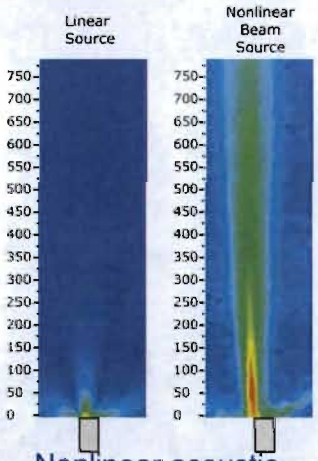
P&G Procter & Gamble CRADA

18 technical projects over 16-year history of collaborative R&D ($34 M)

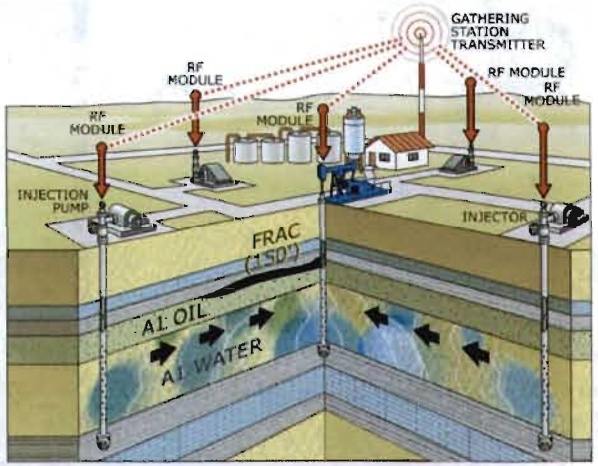
Currently: non-petroleum materials for packaging

Collaboration is credited for $1.7 B in business value to P&G to date

Trapped annular pressure prevention



Nonlinear acoustic imaging



INFICOMM: wireless data communication

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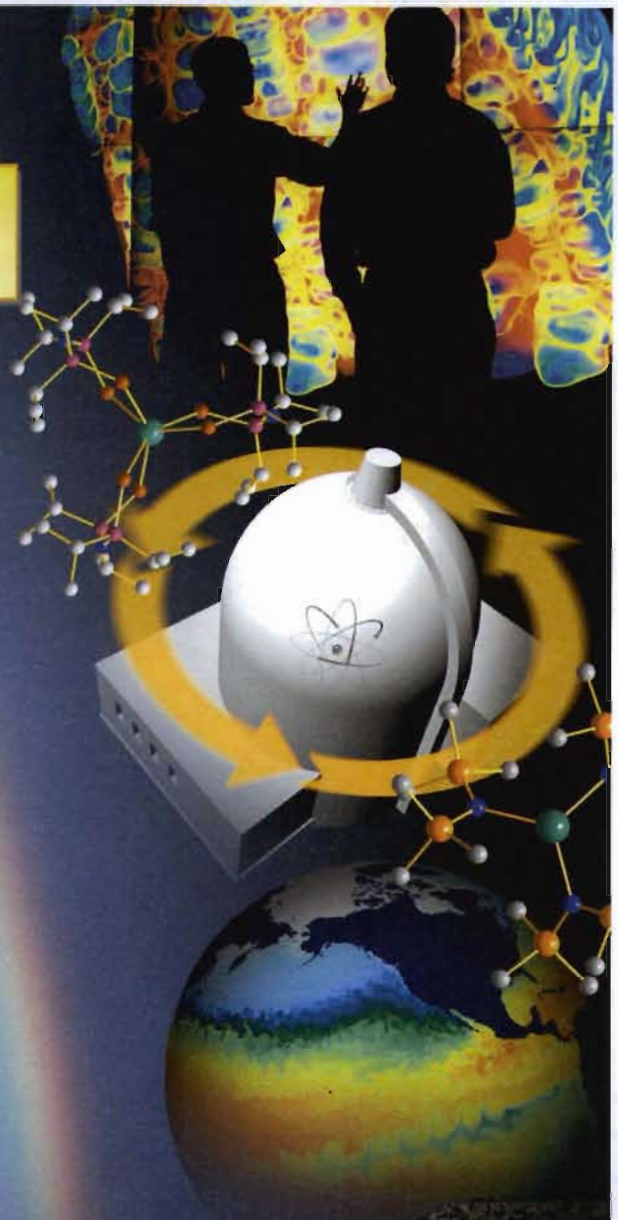
Los Alamos Science in the 21st Century

The nation's investment in Los Alamos has fostered scientific capabilities for national security missions.



As the Premier National Security Science Laboratory, Los Alamos tackles:

- Multidisciplinary science, technology, and engineering challenges
- Problems demanding unique experimental and computational facilities
- Highly complex national security issues requiring fundamental breakthroughs