CSGF and SSGF Fellows’ Poster Session
Opening Remarks

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Defense Programs Works on Problems That Matter

Overseeing the Stockpile

Nuclear and Non-Nuclear Strike Capabilities
ICBMs
Bombers
SLBMs
Active and Passive Defenses
Responsive Infrastructure
Changing Deterrence Theory

Manufacturing: “cradle-to-grave” understanding of materials

Fundamental R&D
Supporting National Security

Secure Transportation
Simulation has become an Essential Tool in Making Important Decisions

Materials Behavior

Military Aircraft

Climate Modeling

New Drugs

We need predictive tools that can be relied upon when full scale experiments can’t be performed
Our Mission Presents Many Technical Challenges

• Certifying stockpile systems without nuclear testing
  – Increased reliance on scientific understanding and simulation
  – Modeling manufacturing, design, performance, environment

• Aging stockpile
  – Need cradle-to-grave understanding of material behavior
  – Process aware models: manufacturing, aging, environmental

• Maintaining the expertise to support counter proliferation

• Maintaining the expertise to support nuclear counterterrorism

Simulation science will lead to a more reliable stockpile
We Rely on the Expertise in Our People to Carry Out Our Mission – YOU are the next generation

- **Computational Science Graduate Fellowships (CSGF)**
  - Jointly sponsored by NNSA and Office of Science
  - Able to utilize the large DOE/NNSA investments in High Performance Computing
  - Spectacular work being done in many fields of science
  - One of the major sources for the scientific and technical leadership of the future

- **Stewardship Science Graduate Fellowships (SSGF)**
  - Stresses novel experimental and theoretical work
  - Emphasis is on three scientific areas:
    - *Low Energy Nuclear Physics*
    - *Materials under Extreme Conditions*
    - *High Energy Density Physics*
  - We hope that we will attract many of you to contribute to solving important problems for the nation
Huge Scientific Opportunities Becoming Available

• Both NNSA and the Office of Science are investing in major new scientific capabilities

• We hope the nation’s science and engineering leaders of the future (YOU) will address major problems of the country including:
  – National Security
  – Fundamental Science
  – Energy Production and Availability
  – Medicine and Biology
  – ...
Cutting-edge Computational Science for Solutions to National Security Issues

Roadrunner: first to break the petaflop barrier
current #1 on TOP500

BlueGene/L: 478 teraflop
top of TOP500 2004 – 2007 (current #5)
Cutting-edge Experimental Science for Solutions to National Security Issues
Opportunities to work on complex problems that matter

**Material Science**

- Nuclear material detection

**Seismic Modeling**

- Nuclear Forensics
The Future depends on YOU

• We have made great strides in science and technology supporting our nation’s security.

• Whatever world you envision, the future is in your hands:
  – Improved international security
  – A safe, secure, reliable stockpile
  – Nonproliferation of nuclear weapons
  – A smaller stockpile
  – A nuclear weapon free world
  – Reduced dependence on foreign fossil energy
  – Advances in fundamental science and technology
  – Advances in medicine and new drug therapies