SAND2007-6683P

Laboratory Directed Research and Development (LDRD) Day Symposium and Awards for Excellence

September 19, 2007

Rick Stulen
CTO and VP of ST&E SMU

LDRD
LABORATORY DIRECTED RESEARCH & DEVELOPMENT

Sandia National Laboratories

LDRD Day is an opportunity for communication and recognition

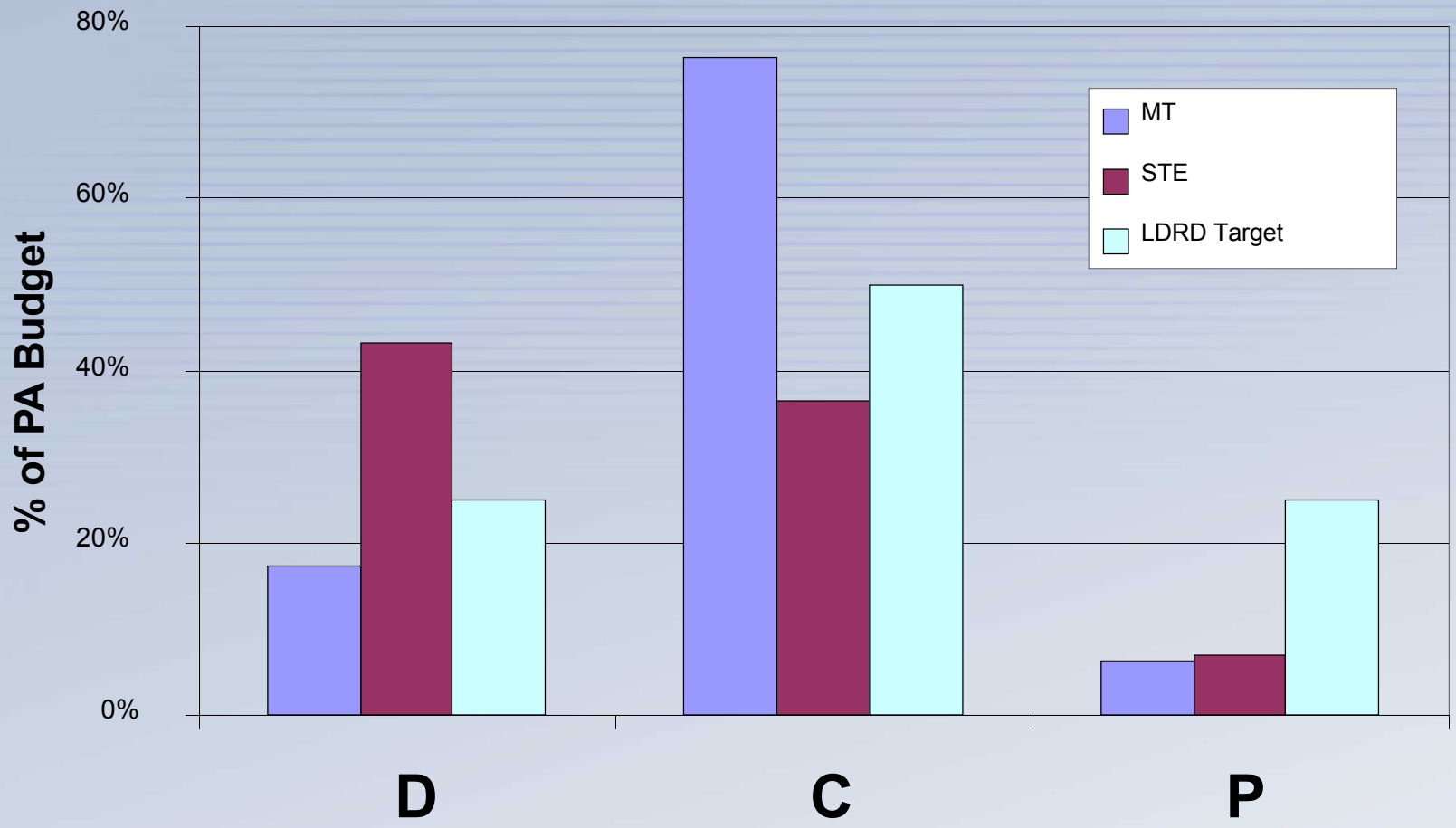
- Showcase wonderful LDRD accomplishments
- LDRD is the 'seed corn' for Sandia's S&T
  - Nurture the core
  - Support the missions
  - Drive the future
- Staff participation in LDRD is key to success
  - High technical risk R&D with potential impact
  - Innovative support of Labs' mission needs
  - Engagement with internal/external community

Last year, we articulated 3 goals for LDRD *

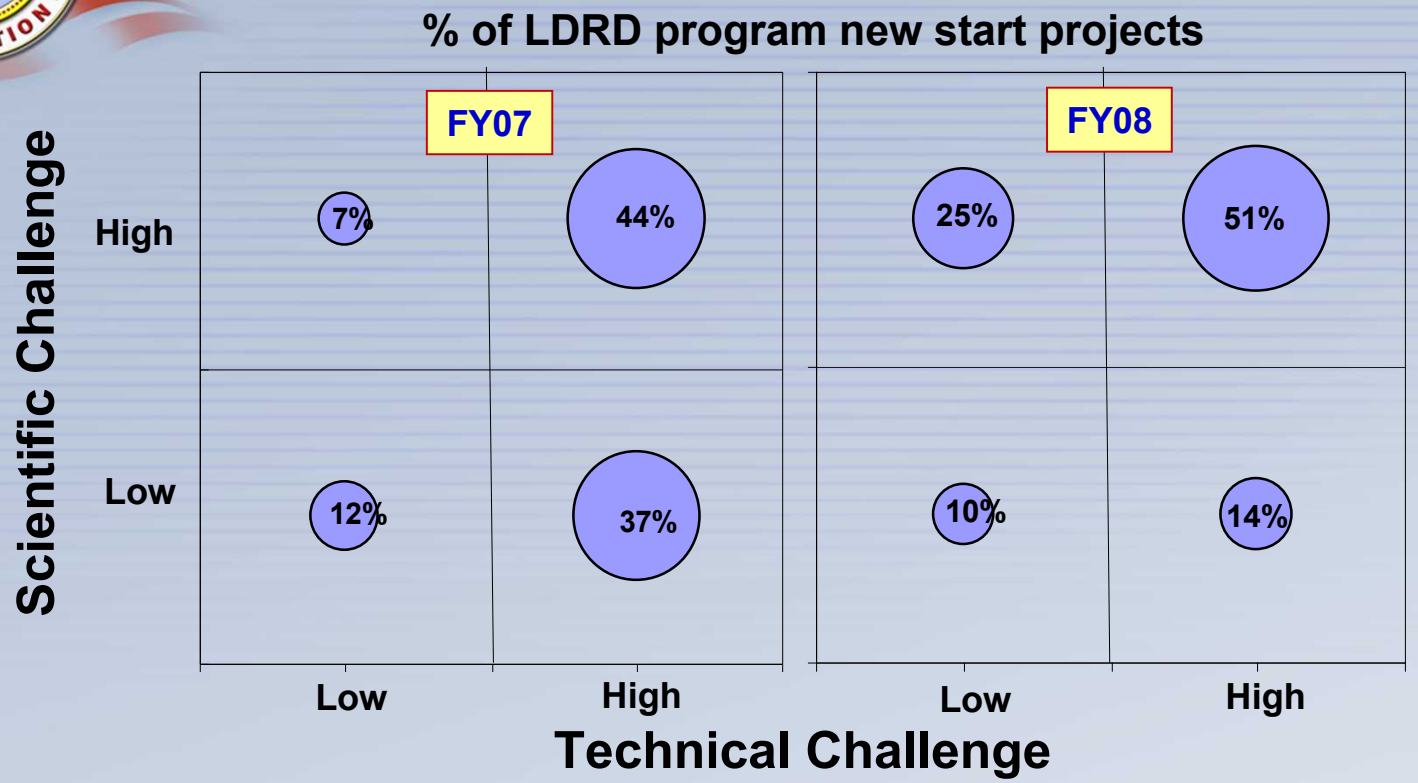
1. More creative, high-risk, leading edge R&D
   - Improve the balance across R-D-A
   - Elevate technical excellence in driving project selection
2. More effective and efficient process
   - Reduce internal stove-piping
   - Be intentional about project size and staff fragmentation
   - Reduce politics and complexity of proposal process
3. Greater external impact and innovation
   - Reputation with customers & external S&T community
   - Fully leverage R&D to mission application

* LDRD Program improvements initiated in FY06

Progress Report:
Strategic intent of new projects are evaluated



Progress Report:
LDRD is investing in high-risk, leading edge R&D



Scientific Challenge

High: Significant advance in existing or creation of a new scientific framework or field

Low : No change or incremental change in existing scientific framework or field

Technical Challenge:

High: Significant improvement of or a first ever product/technology of its kind

Low : No change or incremental refinement or customization of an existing product/technology

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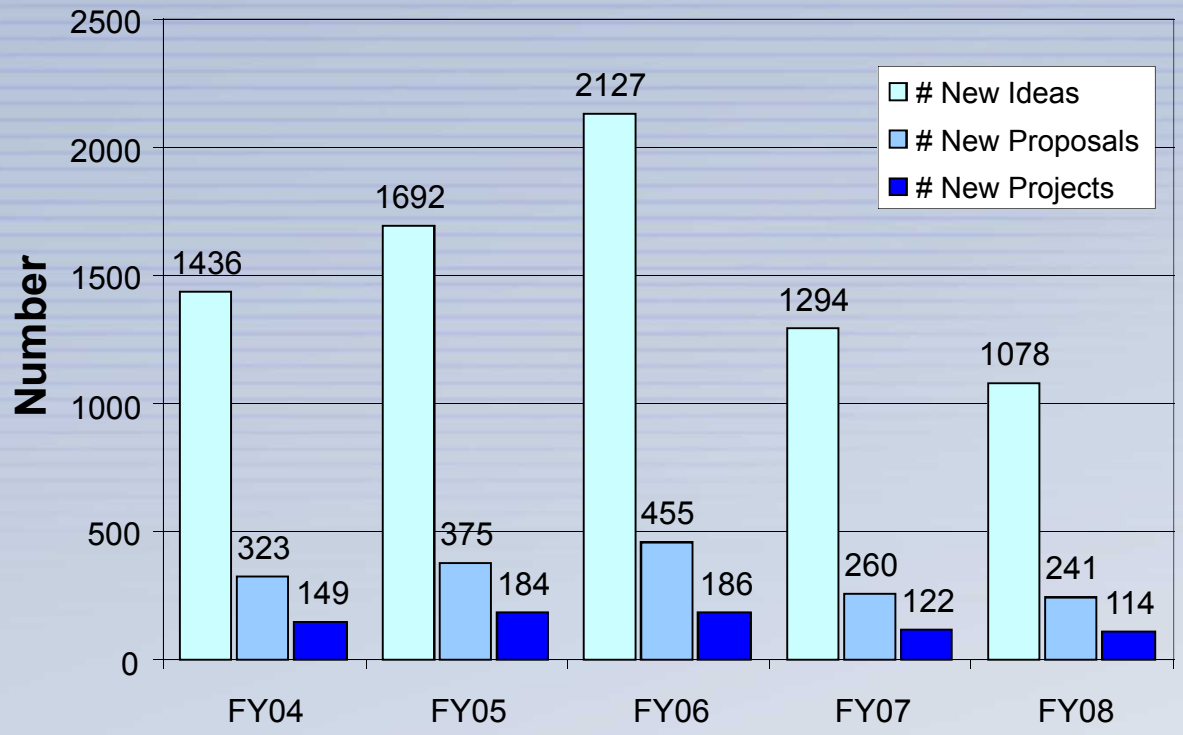
Progress Report: LDRD process is more effective and efficient

Process is reducing level of effort for both IA team and PIs



Technical excellence considered during project selection

- Inclusion of technical staff on all IAs
- Review comments provided to PI for use in oral interview

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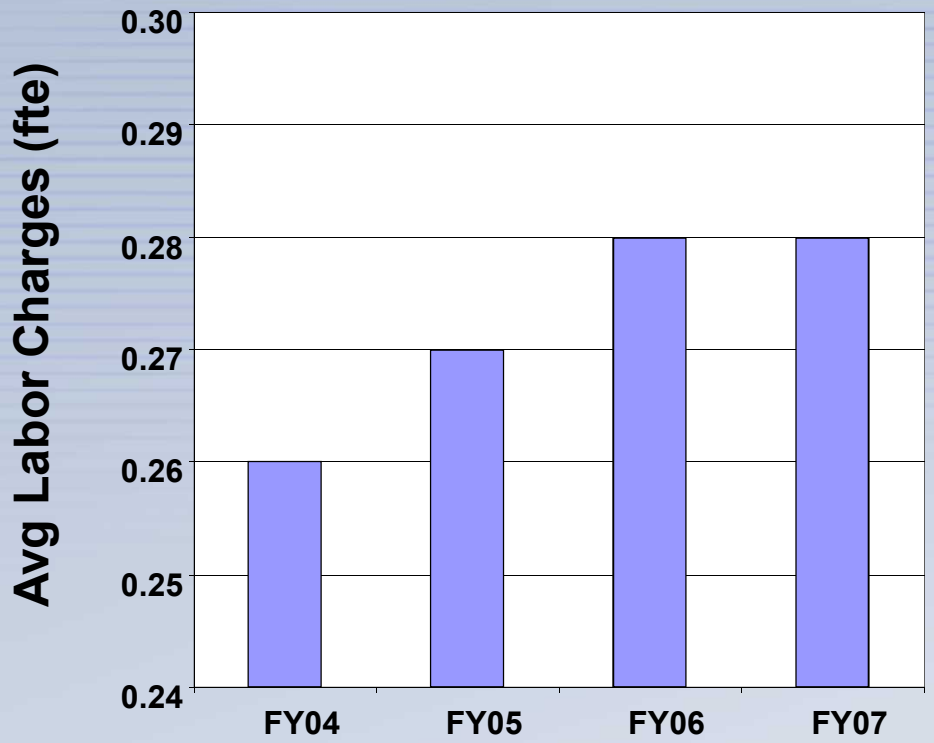
Progress Report:
PIs are devoting more time to R&D



Senior Steering Committee reduces stove piping and politics

- Integrate strategy and management
- Communication and standardization

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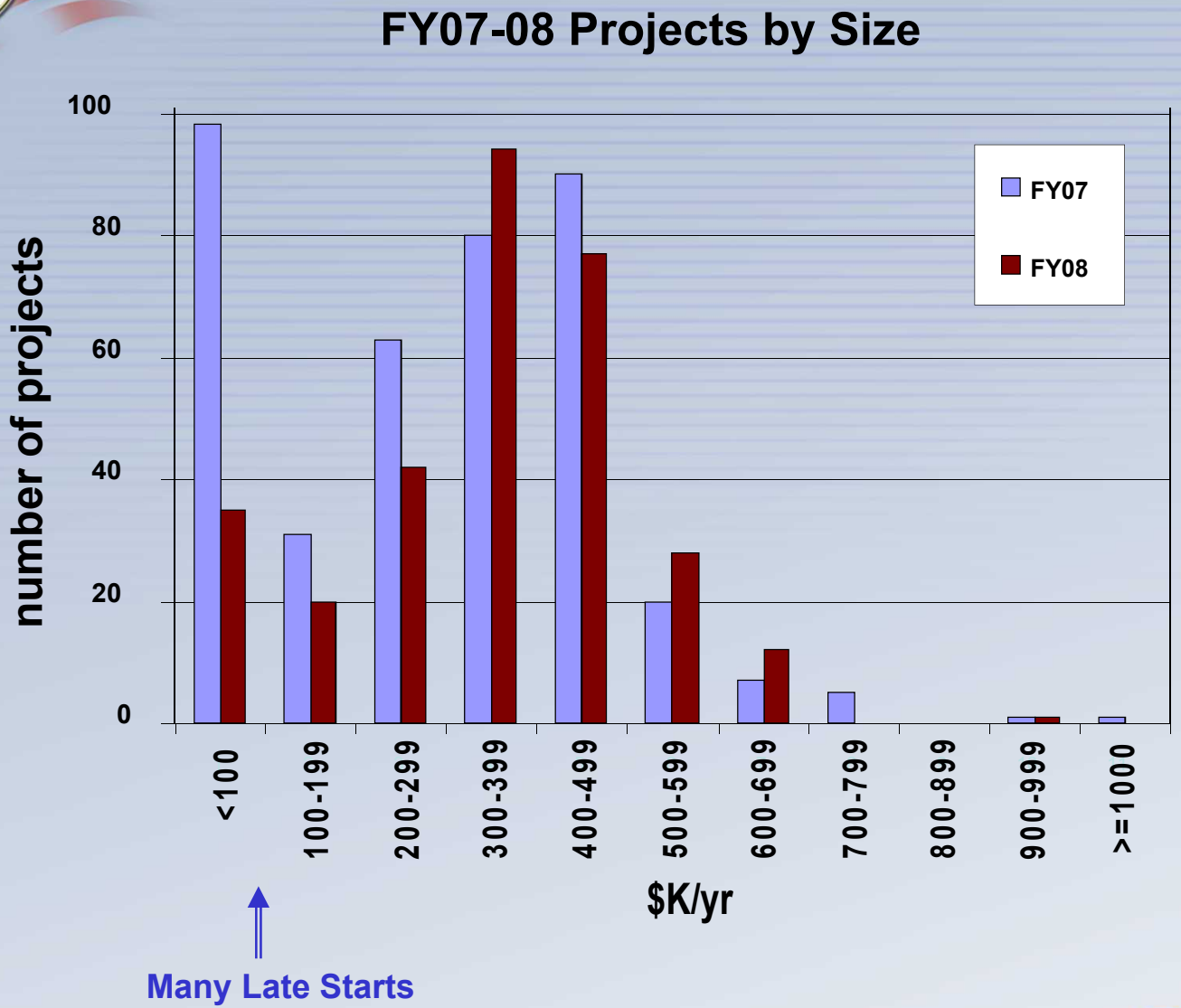
Progress Report:
LDRD budgets are uniformly distributed



Progress Report:
LDRD focuses on external impact and innovation

Publications

Five of SNL's top ten most highly cited publications in 2002-2006 were supported by LDRD

Innovation

60% of SNL's R&D 100 awards since 1992 were supported by LDRD

Managing Outcomes

- Single Project Manager for similar projects
- Annual milestone for PI to communicate results
- Annual IA review of terminating LDRD projects

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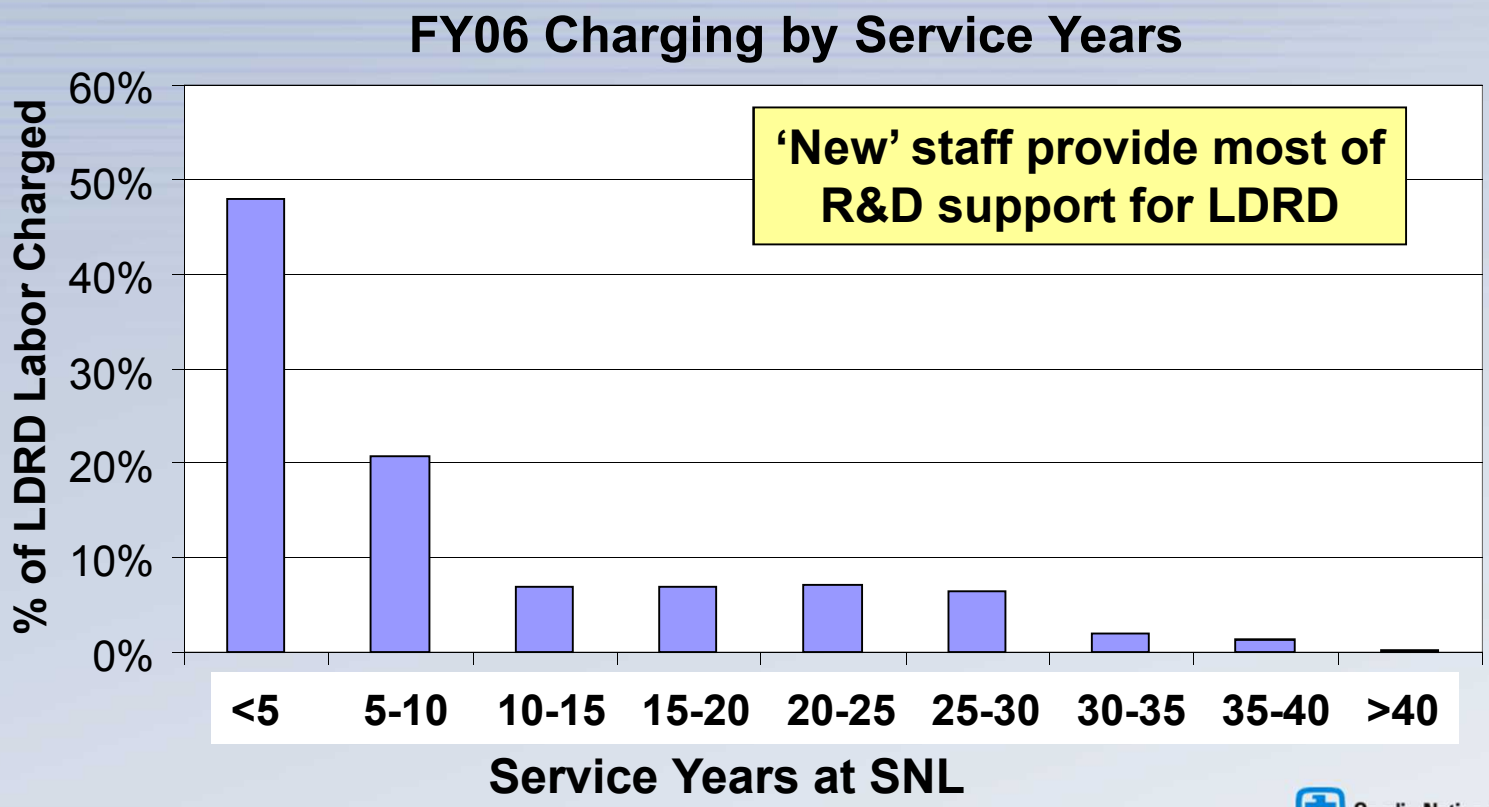
LDRD supports the Labs' future workforce

- ~50% of postdocs and ~30% of technical LTEs are supported by LDRD, which is more than any other program at SNL.
- >50% of postdocs and technical LTEs converted to full-time staff were supported by LDRD



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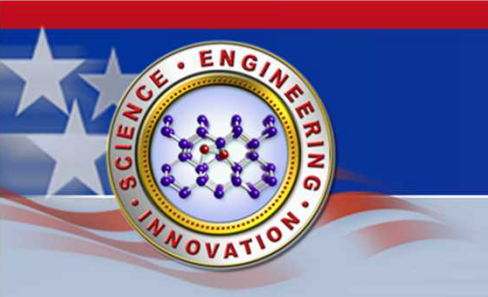
LDRD Program impact far exceeds its 8% Assessment

LDRD program is responsible for

- Over 40% of SNL's total number of technical advances
- Almost 50% of the patent applications
- About 35% of issued patents
- 80% of SNL's R&D 100 Award winners in FY07
- About 20% of SNL's refereed publications during 2002-2006
- SNL's leadership position relative to other national labs in optoelectronics, electrical engineering, and applied physics
- 50% of SNL's top-ten most highly cited papers were supported by LDRD



End of Introduction

Begin Individual Talks

LDRD Day Agenda

- **8:30-8:45AM** **Introduction** *(Hank Westrich, LDRD Program Manager)*
- **8:45-9:00AM** **LDRD Strategic View** *(Rick Stulen, CTO)*
- **9:00-9:30AM** **Fiber Laser Grand Challenge** *(Dahv Kliner)*
- **9:30-9:50AM** **Managing thermal emission w/subwavelength diffractive optics** *(Shanalyn Kemme)*
- **9:50-10:10AM** **Epitaxial growth of single crystal semiconductor materials** *(Hongyou Fan)*
- **10:10-10:30AM** **Break**
- **10:30-10:50AM** **Modeling Catastrophic Geologic Events** *(Mark Boslough)*
- **10:50-11:10PM** **Data Mining on Attributed Relationship Graphs** *(Tammy Kolda)*
- **11:10-11:30PM** **Titanium *Cholla* - Optimized, Lightweight, High Strength Structures for Aerospace Applications** *(David Gill)*
- **11:30-12:00PM** **LDRD Awards for Excellence** *(Rick Stulen, CTO)*
- **12:00-12:45PM** **Pizza Lunch**
- **12:00 - 3:30PM** **Poster Session**

LDRD Awards for Excellence

Rick Stulen

CTO and VP ST&E SMU

LDRD Award for Excellence

These Awards recognize excellence in R&D in the three LDRD project categories: Discover, Create, and Prove. The award process brings recognition to our best researchers, and a nomination for the LDRD Award is an acknowledgment of the outstanding nature of their R&D.

To be eligible for an award, an LDRD project must have finished in one of the last three fiscal years (FY2005-FY2007). Nominations are submitted by Investment Area leads, and they are evaluated for their embodiment of "National Laboratory Challenge, Risk and Creativity," and of "National Laboratory Relevance and Impact."

2007 LDRD Award for Excellence Winners

- **Nanolithography Directed Materials Growth and Self-Assembly**
  PI: Julia Hsu
  For pioneering work on controlled growth and assembly of oxide nanostructures on surfaces and for furthering the understanding of heteroepitaxial growth of dissimilar materials

- **Microwave to Millimeter Wave Electrodynamic Response and RF Applications of Semiconductor Quantum Nanostructures**
  PI: Mark Lee
  For opening a new frontier in high frequency nanotechnology by exploiting the quantum mechanical properties of semiconductor nanostructures for microwave and millimeter-wave applications.

- **Controlled fabrication of nanowire sensors**
  PI: Francois Leonard
  For developing a fundamental understanding of nanowire-based sensors: synthesis, assembly, characterization and modeling.

2007 LDRD Award for Excellence Winners

- **Just in Time Jamming of Enemy Detonation Signals**
  PI: Larry Bacon
  For developing a responsive RF jammer that selectively jams in narrow frequency range

- **Nanoporous Films for Epitaxial Growth of Single Crystal Semiconductor Materials**
  PI: Hongyou Fan
  For developing photolithographically defined and self-assembled carbon nanostructures to provide first-of-a-kind hierarchical growth templates for defect reduction in wide bandgap semiconductor heteroepitaxy.

- **Bead-based Multiplexed, Orthogonal, BW/ID BioWarfare/Infectious Disease Detection Microsystem and Technologies**
  PI: Paul Galambos
  For leading a multidisciplinary team in a high-risk, innovative approach to the simultaneous detection of chemical/biological agents and radionuclides in raw samples.

LDRD Award for Excellence Honorable Mentions

- MEMS-based Arrays of Micro Ion Traps for Quantum Simulation Scaling (Matt Blain)
- Robust Manufacturing of Gel-based Components for Nuclear Weapons (Phil Cole)
- Development of Advanced UV Light Emitters and Biological Agent Detection Strategies (Mary Crawford)
- Characterizing the Emissivity of Materials Under Dynamic Compression (Dan Dolan)
- Titanium Cholla: Lightweight, High Strength Optimized Structures (David Gill)
- Investigation of Liquid Jet Break-up and Dispersion (Richard Jepsen)
- Multiphase Dynamics of Soft Biological Tissues (Reese Jones)
- Noncontact Surface Thermometry for Microsystems (Sean Kearney)
- Novel Mechanisms of Nanomechanical Actuation (Kevin Leung)
- Thermo-physical Properties of Shocked Water for Modeling Pulsed Power Switches and Other HEDP Systems (Thomas Mattsson)
- DNA-Based Intelligent Microsensors for Genetically Modified Organisms (GMO) (Elebeoba May)
- Development of design and simulation model for large scale hydrogen production using nuclear power (Sal Rodriguez)
- Micro- and Meso-Scale Detonics of Explosives (Alex Tappan)
- Functionalized Nanoparticles for Sensor Applications (Dave Wheeler)