

NINE Industrial Needs Workshop Agenda

Albuquerque, NM November 12 & 13, 2007



Monday, November 12, 2007	
6:30 pm	NINE Dinner at Bravo Cucina Italiana on 2220 Louisiana Blvd. (2 blocks from Homewood Suites)
Tuesday, November 13, 2007	
7:45 am to 8:10 am	Continental Breakfast
8:10 am to 8:25 am 8:25 am to 8:45 am	Welcome/introductions – Justine Johannes, Senior Manager NINE Vision – Rick Stulen, Vice President for Science, Technology and Research Foundations, Sandia National Laboratories
8:45 am to 9:10 am	NINE Status and Plans – Regan Stinnett, NINE Program Manager
9:10 am. to 11:30 am Corning ExxonMobil Goodyear Intel Lockheed Martin Monsanto Nat. Sci. Foundation	Industry Interests Presentations - Industry partners will share the nano-engineering interests of their companies. Each member will have 20 minutes. The goal of this session is provide enough information to enable NINE to incorporate these interests into the structure and priorities of its technical and educational programs.
11:30 am to 12:50pm	Lunch and Poster Session on NINE Technical Projects, opportunities for involvement by industry in these projects
12:50-1:30 pm	Wrap-up discussion of overall industry nano-engineering perspectives and interests, and ways to incorporate them into NINE priorities.
1:30 pm to 3:15 pm	Discussion of the NINE structure, value proposition, roles and responsibilities of industry members including engagement, governance, and contributions.
3:15 pm to 4:15 pm	Discuss new NINE programs to begin in 2008. Theme Area Workshops (Jan-Feb), Summer Program, Industry Intern Program, Teacher's Program. Get industry and university perspectives and guidance.
4:15 pm to 5:00 pm	Discuss next steps to address governance, funding, and development of a DOE Discovery Science and Engineering Innovation Institute proposal in 2008. Final thoughts and wrap up.

NINE Status and Plans



Regan Stinnett, Justine Johannes, Duane Dimos
Sandia National Laboratories
 (rwstinn@sandia.gov)
 Albuquerque, NM USA

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94AL85000.



We've Come A Long Way!

**NINE
DSEII**

2007 Summer Program
July 9-20, 2007
33 students, 14 univer.

Research
Experiences,
Mentoring



- 2008 Program**
- Tech Projects
 - Summer program
 - Industry Interns
 - Teacher program

NINE Education Workshop
June 11-13, 2007



2007 Technical Projects
45 Undergrad & Grads
working on 17 Nano-
Engineering Projects



Specialty classes
and programs



Gathering
Storm report
Dec 2006

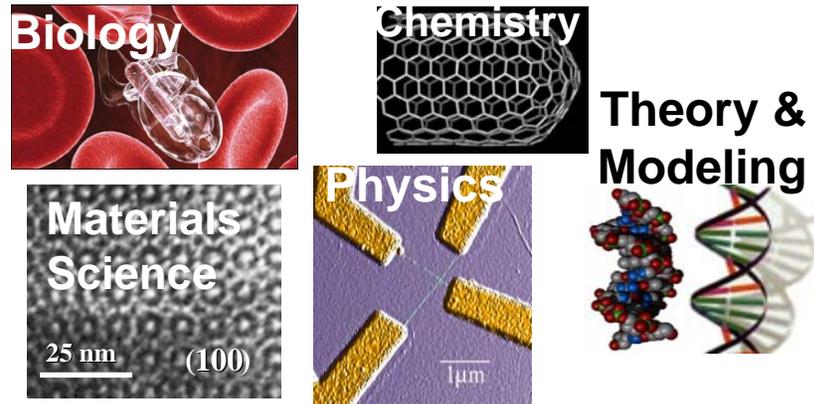
Accelerating Engineering Innovation Summit
May 31st - June 2nd, 2006



Prototyping the Innovation Institute Concept: *The National Institute for Nano-Engineering*



Nano-engineering will be a critical competitive hinge for the U.S.



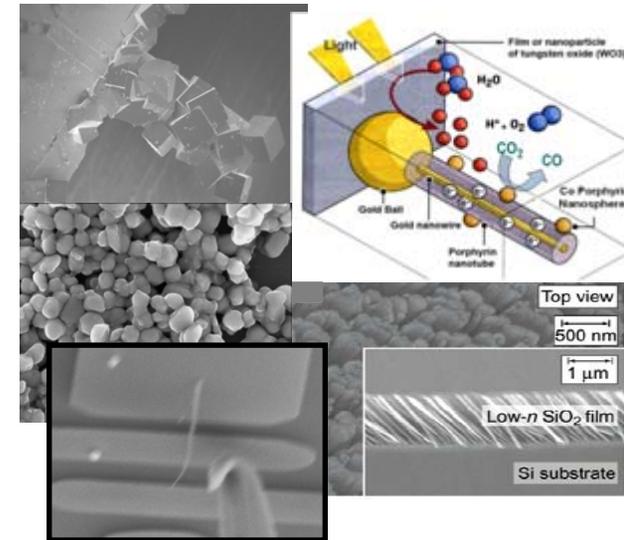
- Nano electronics – beyond Si
- High-performance materials
- Sensors, Optics
- Catalysts
- Energy applications
- ...

NINE Technology Theme Areas:

- Nanoelectronics & Quantum Info. Processing
- Nanomaterials Synthesis and Manufacturing
- Nanotechnologies for Energy

Why choose these?

- Matches NINE partner strengths
- Supports DOE program interests
- Differentiating supporting facilities

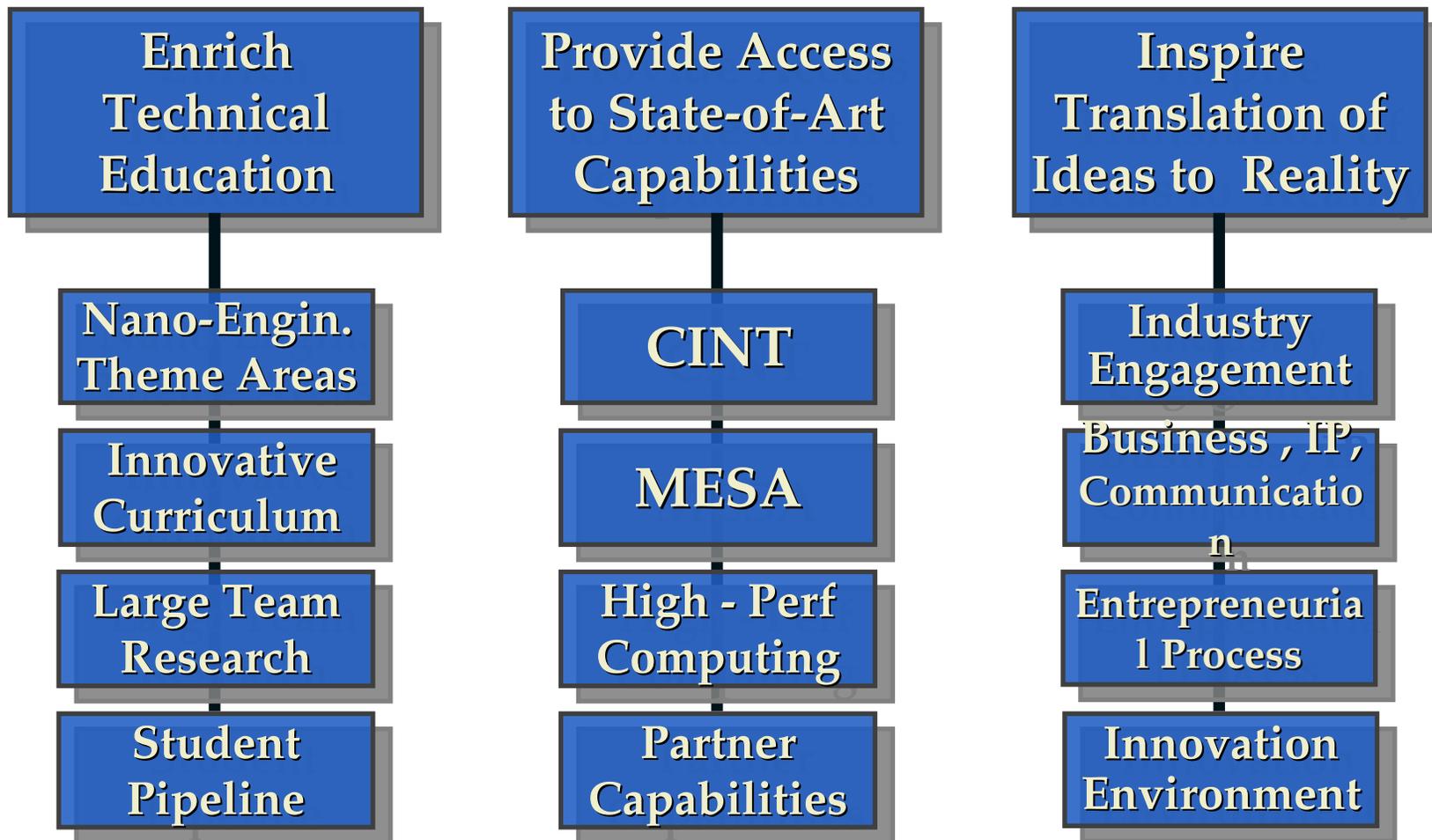


Nano-Engineering is a critical U.S. topic for education & workforce preparation, innovation and technology transfer. PCAST report on Nanotechnology R&D, May 2005



NINE Program Goals and Elements

Develop Tomorrow's Innovators & Innovations in Nano-Engineering through a Unique Gov-Univ-Industry Partnership



Industry engagement in all of these areas is key

Sandia Has Provided \$7.5M to enable NINE to begin projects in its theme areas



➤ **Nanoelectronics and Quantum Information Processing**

- ✓ Nano-electronics and photonics for the 21st Century
- ✓ Atom Chip Device Engineering for Cold Atom Quantum Information Science and Technology
- ✓ Self-assembly to direct manipulation of nanostructures on length scales from atoms to microns

➤ **Nanomaterials Processing & Manufacturing**

- ✓ Nanocomposite Materials Design: Understanding and Control of Rheology, Assembly & Functionality
- ✓ Phase Imprint Lithography for Large Area 3D Nanostructures
- ✓ Nano-Engineering by Optically Directed Self Assembly
- ✓ Stress-Induced Chemical Detection Using Flexible Nanoporous Metal Organic Frameworks
- ✓ Electrostatic Microvalves Utilizing Conductive Nanoparticles for Improved Speed, Lower Power, and Higher Force Actuation
- ✓ Interfacial Property Control of Elastomeric Nanocomposites

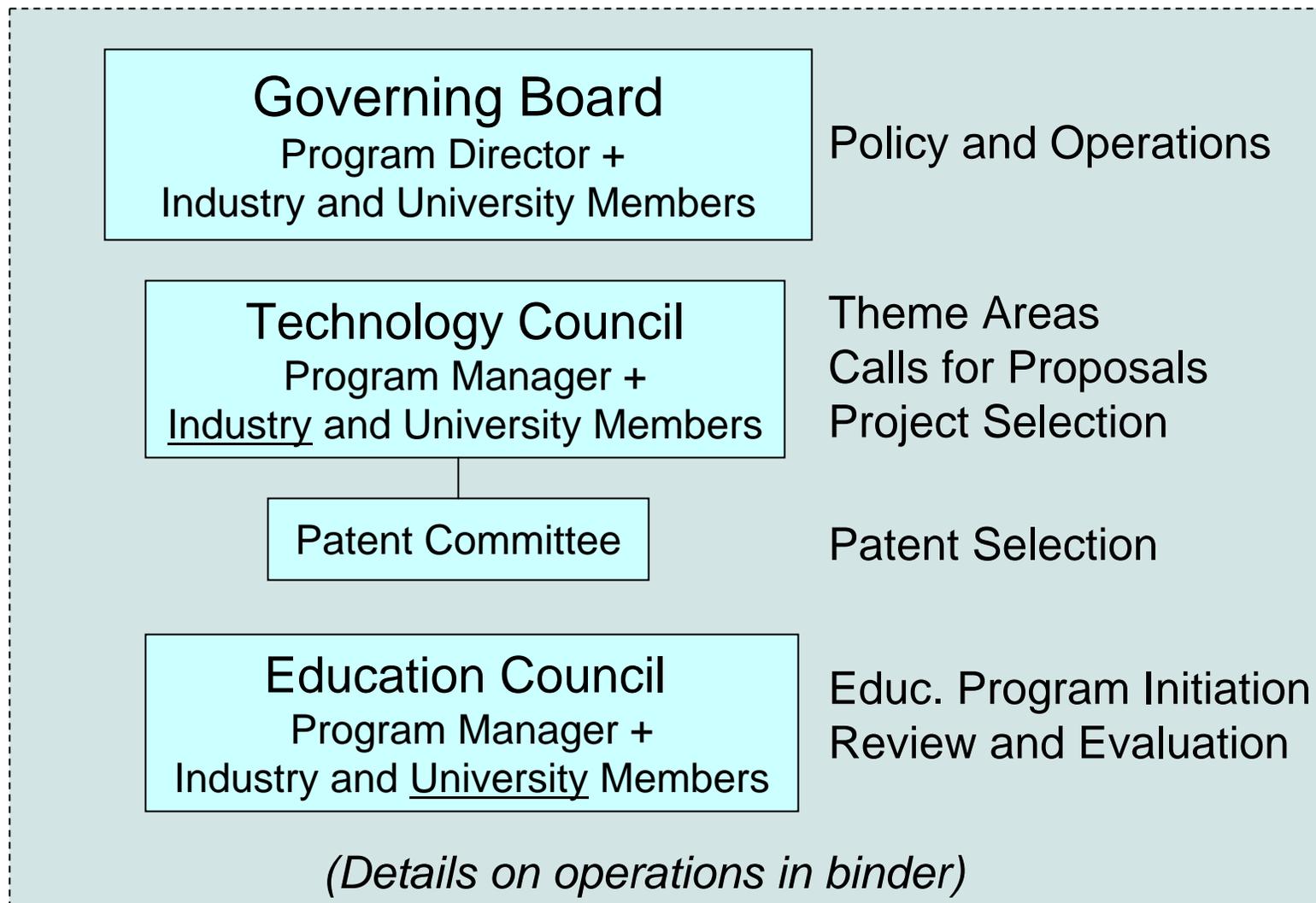
➤ **Nano-based Energy Technologies**

- ✓ Nanoengineering for Solid State Lighting
- ✓ Developing a Thermal Microscopy Platform for In-Situ Thermal/Thermoelectric Structure-Property Studies of Individual Nanotubes and Nanowires
- ✓ CO₂ Reduction Using Biomimetic Photocatalytic Nanodevices
- ✓ Improving Electronic Structure Calculations to predict Nanocatalyst Functions
- ✓ Optimized Nanoporous Materials
- ✓ Fundamentals of Synthetic Conversion of CO₂ to Simple Hydrocarbon Fuels

NINE focuses on “Big Problems” of National Importance



Strawman NINE Structure





Industry Workshop Goals

- Understand industry's nano-engineering interests and how to incorporate them into NINE priorities and projects
- Introduce NINE governance structure, operating policies, IP
- Develop a compelling value proposition for industry partners that justifies significant investment in NINE
- Determine next steps for NINE
 - Theme Area Workshops to focus NINE's technical work, and identify new technical opportunities
 - 2008 Summer Program including industry interns
 - Development of a NINE DSEII proposal

NINE Industry Workshop **- Afternoon Agenda -**



Lunch discussions with PIs on their technical projects, then ...

- Wrap-up discussion on industry nanotech interests and their fit with NINE's Technology Theme Areas
- NINE structure
- NINE value proposition and the role of industry in NINE
- Next Steps
 - Theme Area Workshops in Jan-Feb
 - Summer Program, Industry Intern Program, Teacher Program, time frame for responses
 - DOE DSEII proposal



Intellectual Property Status

Terms Sheet sent out in September. Comments received from several partners, no show stoppers.

Highlights:

- NINE-sponsored inventions will be owned by the inventing organization(s).
- NINE will pay the cost of patenting selected inventions and of maintaining and licensing the patents to NINE members.
- Patented inventions created during NINE-sponsored projects shall be made available to all NINE Members in good standing. Industry members receive a non-exclusive, paid up license to make, have made, use, sell products, and practice methods covered by the patents. University members have the right to conduct further research and development on NINE inventions.
- Educational materials including curricula, learning modules, etc. developed under NINE funding will be shared without royalty fees.

New Option – SRC involvement



- We are exploring alternatives to Sandia for distributing industry funds to universities (policies & overhead make this difficult)
- The Semiconductor Research Corporation is a non-profit organization that distributes industry funds to universities for the semiconductor industry
- Advantages of SRC participation
 - 25 years experience, industry credibility
 - good relationships with universities
 - infrastructure for calls, proposals, distribution of funds
 - low overhead and high level of interest
- Discussions with SRC scheduled in December

Strawman NINE Value Proposition For Industry Members



Industry Member Benefits:

- Access to a nationwide network of top nano science & engineering students, faculty, and researchers
- A strong voice in selecting pre-competitive nano-engineering research areas and specific projects to be funded
- Project access to world class equipment and facilities at Sandia
- Opportunity for your research staff to be part of the project team
- Early access to technical project results
- Opportunity to evaluate and select potential new hires from the pool of NINE-trained students working on your projects
- Financial leverage from DOE funding and co-funding from other NINE members

Question: What is the appropriate role for NINE industry partners?



Industry roles in:

- Governance
- Technology direction
- Participation in R&D
- Educational programs
- Supporting technical activities and students



Theme Area Workshops – Jan-Feb

- Presentations on all Theme Area projects from PIs, researchers and students
- Evaluation of progress and identification of new opportunities
- Presentations on related NINE-associated projects in theme areas
- Technology Council develops new proposal calls for the Theme Areas

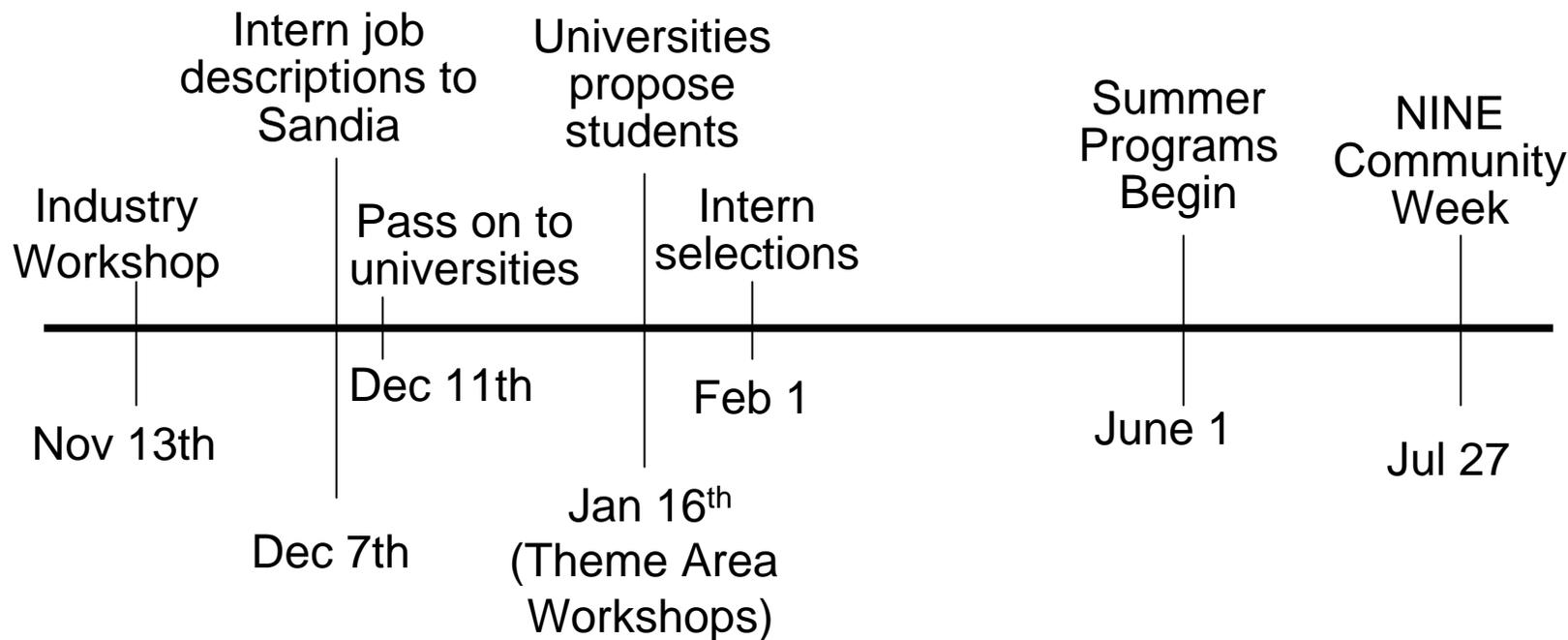
2008 Summer Program Plans



- Students working on NINE projects come to Sandia for 4-9 weeks to work with Sandia mentors and industry researchers. (Is there interest in sending industry researchers to participate?)
- NINE organizes Theme Area-focused presentations and lunch time courses in business, IP, communications for the NINE students.
- NINE sponsors Nano-Engineering Expo program with tours, courses, and hands-on nanotech activities for teachers and undergrads with follow-up nano-learning module development. (Industry members sponsor a teacher to come and participate?)
- NINE industry interns spend 6-10 weeks at industry member's sites, travel to Sandia for NINE Community Week. (Need job descriptions by Dec, University response by mid-Jan, selection by Feb 1)
- NINE Community Week July 27-Aug 1. Nano-Engineering Expo Programs for students. Presentations by students. Education Council meeting. Technology Council selects new projects.



2008 Industry Intern Program Schedule



Proposed NINE Goals for 2008



- Implement NINE structure, policies, operating plan, intellectual property agreements, partner relationships
- Engage industry in guidance & support of NINE activities
- Put in place technical and educational programs with high student participation and broad university engagement
- Develop a strong DSEII proposal for DOE by summer 2008