2012 ASEE ERC

NSF Breakout: EEC

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Division Director
Engineering Education and Centers

The Madison Hotel
Washington, DC
March 6, 2012
NSF has more opportunities to leverage.
Engineering Education & Centers

Division Director
Theresa Maldonado

Engineering Centers
Lynn Preston

Engineering Research Centers
Lynn Preston
Deborah Jackson
Barbara Kenny

Nanoscale Science and Engineering
Daniel De Kee
Deborah Jackson
Barbara Kenny

Network for Computational Nanotechnology

“Engineer of the Future”

Diversity and Pre-College Education
Mary Poats

Research Experiences for Undergraduates
Esther Bolding

Research Experiences for Teachers
Mary Poats

Engineering Education Research
Sue Kemnitzer

Engineering Education Research
R. Alan Cheville
Sue Kemnitzer

Nanoscale Science and Engineering Research
Mary Poats

Veterans Initiative
R. Alan Cheville
Sue Kemnitzer
Engineering prioritizes research critical to the nation’s challenges.

- **National Priorities**
  - National Nanotechnology Initiative
  - National Robotics Initiative

- **OneNSF Initiatives**
  - Advanced Manufacturing
  - Communications and Cyberinfrastructure
  - Education and Workforce
  - Innovation Ecosystem
  - Interdisciplinary Research
  - Sustainability and Clean Energy
NSF Investments in Workforce

Primary focus: Enhancements to Flow (all levels)

- K12 Pre-college programs – EHR, EEC, RET
- Recruitment of undergraduate Engineers
  - GI Bill, PEEC
- Encouragement to pursue Graduate degrees
  - REU
- Support during graduate studies
  - GRF, IGERT
- Support for transition to Academia and Industry
  - Innovation Fellows, BRIGE, CAREER
The Directorate will invest in preparing the Future Engineering Workforce.

- **CAREER awards**
  ENG will support young investigators who exemplify the role of teacher–scholar through outstanding research, excellent education, and the integration of education and research.

- **Expeditions in Education (E²)**

- **Non–traditional Students**
  ENG will invest in activities that promote the entry and retention of veterans and other non–traditional students in engineering programs

$53\ M \ for \ CAREER$
OneNSF: Expeditions in Education (E-2) will integrate STEM education R&D to improve learning for the 21st century.

- Research-intensive activity
- Three focus areas:
  - Transforming UG STEM Learning through S&E
  - Learning and Understanding Sustainability and Cyberlearning
  - Data and Observations of STEM Education
- Timeline: 5-year initiative
- Outcome: Transform the NSF education portfolio into a coordinated and strategic set of investments.
- ENG investment: $1M FY13. Cyberlearning, Data, & Observations for STEM education (FY13 Request: $49M total)
Alternative Pathways: The Veteran’s Initiative pilot in ENG/EEC has quickly permeated many solicitations across NSF.
National Center for Engineering Pathways to Innovation

What is the Epicenter?
The Epicenter is dedicated to infusing entrepreneurship and innovation skills into undergraduate engineering in the United States.

Funded by the National Science Foundation and directed by the Stanford Technology Ventures Program, the Epicenter is an education, research and outreach hub for the creation and sharing of technologies that innovate.

Get Epicenter Updates

Email Address
* First Name
Last Name

Who are you? Check all that apply.

http://epicenter.stanford.edu/
Engineering Centers

- Engineering Research Centers (ERC)
  - Three generations (50 total) since 1985
  - Current competition
    - Nano-Systems ERCs
    - Awards ~ Fall 2012
  - Next competition (hopefully)
    - Solicitation FY13
    - Awards FY14

- Nanoscale Science and Engineering Centers (NSEC)
  - 19 NSECs since 2001
  - 3 graduated NSECs from FY01 class

- Science and Technology Centers (STC)

- Science of Learning Centers (SLC)

POC: Lynn Preston
ERC (Research) Strategic Framework:

- Testbed(s)
- Systems Research
- Technology Integration
- Technology Base
- Enabling Technology Research
- Testbeds

INNOVATION ECOSYSTEM & VALLEY OF DEATH
Innovation Bridge Structures Turn “Valley of Death” into “Challenge Basin”

Credit: Dr. Deborah Jackson, 2011
Innovation Bridge Structures Turn “Valley of Death” into “Challenge Basin”

- ERC Research at Universities
- Resources
- Level of Development
- Risk mitigation shift
- Championship shift
- Existing Commercialization Resources
- Existing Research Resources
- Inventing
- Commercializing

Credit: Dr. Deborah Jackson, 2011
Innovation Bridge Structures Turn ‘Valley of Death” into “Challenge Basin”

- ERC Research at Universities
- Inventing
- Challenge Basin
- Commercializing
- Level of Development
- New Products Sold by Companies
- Existing Research Resources
- Prototype capital expense
- Risk mitigation shift
- Championship shift
- Existing Commercialization Resources
- Resources
The ERC family expands in FY11.

NSF/DOE Co-Fund

NSF/DOE Co-Fund
Network for Computational Nanotechnology
Network for Computational Nanotechnology (NCN)

Cyber Platform: $2.9M/yr for five years; renewal possible after five years
Nodes: $700K/yr for five years
The Career–Life Balance initiative addresses personal challenges faced by faculty.
Wireless Innovation between Finland and US (WI–FI–US) – Virtual Institute is one of three inaugural SAVI institutes.

High Capacity Next Generation Wireless Solutions

- Optimal transmission mechanisms
- New radio spectrum allocation
- Increased base station density

Activities

- Joint publications
- Joint demonstrations
- Graduate degrees
- Researcher exchanges
Assessment & Evaluation: BRIGE Logic Model

Inputs
- Funding
- Logistics/Broadening Participation Plans
- Research Plan
- Inputs from other coordinating agencies

Project Activities
- URM undergrad, grad & post-doc participate in Research & training via supplements (REU, RET, GRDS).
- MSIs and community colleges engage with the project.
- High school students and K-12 teachers participate in research and training activities.

Outputs & Immediate Outcomes
Documented from BRIGE PI's survey
- K-12 teachers & URM students trained in labs.
- URM student participation in ENG increased.
- New grad students & research funded.
- Workshops/meetings held.
- Community outreach events conducted.
- Curricula developed.
- Research results published by faculty and students.
- Faculty role models and mentors increased.

Intermediate Outcome
- Academic career of BRIGE awardees thrives.
- Increased excitement about STEM among URM.
- Teachers trained start introducing research topics in their classes.
- ENG graduates start considering ENG careers in academia or industry.
- Faculty experience recognition.

Long-term Outcome
- Increased number of successful URM groups in ENG fields.
- Increased URM faculty actively engaged in STEM research.
- Increased number of successful URM students graduating with STEM degrees (undergraduate and graduate).

Life of the award
- Year 1-4 after the award
- Year 5-10 after the award
- Year 6-10 after the award

Short-term
Intermediate-term
Long-term
## ENG FY12 Proposed Budget ($M)

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**FY12 EEC Actual: $118M**
## ENG Budget ($M) FY13

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