Spring 2009 Update
Directorate for Engineering

Thomas W. Peterson
Assistant Director for Engineering
April 22, 2009
Spring 2009 Meeting
Focus

• Partnerships
  – Key role(s) of partnerships
    • With industry
    • With other governmental agencies
  – How to improve/expand

• Evaluation of our investments
  – Status report on prior evaluations
  – How to regularize the process
ENG Update

• New ENG staff
• Budget and trends
• Presidential initiatives and priorities
• Vision for ENG
• AdCom business
ENG Update

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CMMI

- Christina Bloebaum, Program Director for Engineering Design and Innovation, State University of New York at Buffalo
- Michael Kim, Science Assistant
- Michelle Wood, Program Assistant
CBET

- Tiffany Boyd, Program Assistant
ECCS

- **Darryell Fortier**, Division Secretary
- **Aaron Jenkins**, STEP Student
- **Pinaki Mazumder**, Program Director for Power, Controls, and Adaptive Networks, University of Michigan
- **Emily Miller**, Science Assistant
- **Robert Trew**, Division Director, North Carolina State University, as of May 26
IIP

- **Elena Hillenburg**, SCEP Program Specialist Trainee
- **Amanda May**, Program Support Manager
OAD Staff

- **Thomas Peterson**, Assistant Director for Engineering, University of Arizona
- **Omnia El-Hakim**, Program Director for Diversity and Outreach, Colorado State University
- **Christine Lottes**, Science Assistant
ENG Update

- New ENG staff
- Budget and trends
- Presidential initiatives and priorities
- Vision for ENG
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Budget and Trends

• FY 2009 Budget
• American Recovery and Reinvestment Act (ARRA)
• FY 2010 NSF Budget
• Proposal pressures and trends
Simultaneously Coordinating Three Budgets

• FY 2009
  – Omnibus passed in March
  – NSF Directorate details pending

• American Recovery and Reinvestment Act (ARRA)
  – Bottom line passed in March
  – NSF Directorate details pending

• FY 2010 budget request from President anticipated in May
<table>
<thead>
<tr>
<th>Category</th>
<th>FY 2008 Actual</th>
<th>FY 2009 Request</th>
<th>Amount Change</th>
<th>Percent Change</th>
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<tbody>
<tr>
<td>Biological Sciences</td>
<td>$611.49</td>
<td>$675.06</td>
<td>$63.57</td>
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<tr>
<td>Computer and Information Science and Engineering</td>
<td>534.07</td>
<td>638.76</td>
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<tr>
<td>Engineering (includes SBIR/STTR)</td>
<td>636.32</td>
<td>759.33</td>
<td>123.01</td>
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<td>Geosciences</td>
<td>752.01</td>
<td>848.67</td>
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<tr>
<td>Mathematical and Physical Sciences</td>
<td>1,166.30</td>
<td>1,402.67</td>
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<td>20.3%</td>
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<td>Social, Behavioral, and Economic Sciences</td>
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<td>233.48</td>
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<tr>
<td>Office of Cyberinfrastructure</td>
<td>185.17</td>
<td>220.08</td>
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<td>Office of International Science and Engineering</td>
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<td>U.S. Polar Research Programs</td>
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<td>490.97</td>
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<td>Integrative Activities</td>
<td>236.17</td>
<td>276.00</td>
<td>39.83</td>
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<tr>
<td>Arctic Research Commission</td>
<td>1.47</td>
<td>1.53</td>
<td>0.06</td>
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<tr>
<td><strong>Total, R&amp;RA</strong></td>
<td><strong>$4,821.46</strong></td>
<td><strong>$5,593.99</strong></td>
<td><strong>$772.53</strong></td>
<td><strong>16.0%</strong></td>
</tr>
</tbody>
</table>

*Dollars in millions. Totals may not add due to rounding.*
## NSF Budget

<table>
<thead>
<tr>
<th>NSF</th>
<th>FY 2008 Actual</th>
<th>FY 2009 Request</th>
<th>FY 2009 Omnibus</th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>$6.065</td>
<td>$6.854</td>
<td>$6.490</td>
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<tr>
<td>Change over FY 2008</td>
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<td>13.0%</td>
<td>7.0%</td>
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*Dollars in billions*
**FY 2009: A Good Year for R&RA**

<table>
<thead>
<tr>
<th>NSF</th>
<th>FY 2008 Actual</th>
<th>FY 2009 Omnibus</th>
<th>ARRA</th>
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<tr>
<td>Total</td>
<td>$6.065</td>
<td>$6.490</td>
<td>$3.000</td>
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<tr>
<td>R&amp;RA</td>
<td>$4.821</td>
<td>$5.183</td>
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*Dollars in billions*
# NSF Budget Summary

<table>
<thead>
<tr>
<th></th>
<th>FY 2008 Actual</th>
<th>FY 2009 Omnibus</th>
<th>FY 2009 plus ARRA</th>
<th>FY 2010 Request</th>
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<tbody>
<tr>
<td><strong>Amount</strong></td>
<td>$6.065</td>
<td>$6.490</td>
<td>$9.492</td>
<td>$7.045</td>
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<tr>
<td><strong>Change over FY 2008</strong></td>
<td>--</td>
<td>7.0%</td>
<td>56.5%</td>
<td>16.2%</td>
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* Dollars in billions

Directorate for Engineering
NSF Budget ($B)


$0 | $1 | $2 | $3 | $4 | $5 | $6 | $7
Funding Rates for Competitive NSF Awards
Median Award Size, 2004-2008

Directorate for Engineering
ENG Update

• New ENG staff
• Budget and trends
• **Presidential initiatives and priorities**
• Vision for ENG
• AdCom business
Presidential Priorities for NSF

- Energy and climate
- Accelerating innovation
- Cyber-infrastructure
- Convergence of biology and the physical sciences/engineering
- Crosscutting priorities
  - Increasing support for high-risk/high-return research
  - Tripling the number of GRFs
  - Increasing support for early investigators
ARRA Priorities for NSF

- Increase success rate for highly meritorious research proposals
- Emphasize support for early investigators
- No new solicitations
- Additional funding for two prior solicitations:
  - Major Research Instrumentation (2nd round)
  - Academic Research Infrastructure
President’s FY 2010 Request

- Provides $7 billion for the National Science Foundation, a 16-percent increase over FY 2008
- Increases support for graduate research fellowships and for early-career researchers
- Increases support for the education of technicians in the high-technology fields that drive the Nation’s economy
- Encourages more novel high-risk, high-reward research proposals
- Increases support for critical research priorities in global climate change
- Details: www.whitehouse.gov
ENG Update

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Vision for ENG

• Current directions
  – ENG Strategic Planning Overview, June 2005
  – Plan implementation analysis, 2006
  – Directorate reorganization, October 2006

• Future Directions
  – Input from Executive and Legislative Branches
  – Input from professional community
  – Input from staff including AD and Leadership Team
Developing ENG Themes

ENG Research & Education Themes

Ideas and Capabilities of Engineering Research Community (AdCom, Workshops, PDs, PIs, other agencies)

National R&D Needs (OSTP, America COMPETES Act, White House Initiatives)

Financial Guidance (Office of Management and Budget)
NAE Grand Challenges

- Make solar energy economical
- Provide energy from fusion
- Develop carbon sequestration methods
- Manage the nitrogen cycle
- Provide access to clean water
- Restore and improve urban infrastructure

- Advance health informatics
- Engineer better medicines
- Reverse-engineer the brain
- Prevent nuclear terror
- Secure cyberspace
- Enhance virtual reality
- Advance personalized learning
- Engineer the tools of scientific discovery

Directorate for Engineering
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Directorate for Engineering
NAE Grand Challenges Redux

• Energy and environment
• Health
• Security
• Quality of life
ELT Retreat Outcomes

• ENG themes
• FY 2010 topics for Emerging Frontiers in Research and Innovation
• Review of division and directorate strategies
ENG Research and Education Themes

- Cognitive engineering: Intersection of engineering and cognitive sciences
- Competitive manufacturing and service enterprises
- Complexity in natural and engineered systems
- Energy, water, and the environment
- Systems nanotechnology
EFRI Topics

- **FY 2007**
  - Auto-Reconfigurable Engineered Systems (ARES)
  - Cellular and Biomolecular Engineering (CBE)

- **FY 2008**
  - Cognitive Optimization (COPN)
  - Resilient and Sustainable Infrastructures (RESIN)

- **FY 2009**
  - Biosensing & Bioactuation (BSBA)
  - Hydrocarbon from Biomass (HyBi)

- **FY 2010**
  - ?
  - ?

Directorate for Engineering
Translational Research

• What does it mean?
• Why is it important?
• What role does/should ENG play in the NSF translational research portfolio?
NSF Programs for Translational Research

- Engineering Research Centers (ERC)
- Materials Research Science and Engineering Centers (MRSEC)
- Grant Opportunities for Academic Liaison with Industry (GOALI)
- Industry/University Cooperative Research Centers (I/UCRC)
- Small Business Technology Transfer (STTR)
- Small Business Innovation Research (SBIR)
- Nanoscale Interdisciplinary Research Teams (NIRT)
- Emerging Frontiers of Research and Innovation (EFRI)
- Other ENG programs
Filling Gaps

Level of Development

Discovery Development Commercialization

Resources Invested

University Small Business Valley of Death Translational Research

Foundations Investors Industry

GOALI ERC STTR I/UCRC SBIR

STC ENG overall NSF overall NSF overall

Directorate for Engineering
Partnerships

• Partnerships with industry
• Partnerships with government agencies
• International collaboration
• Why are these important to NSF/ENG?
Educational Leadership

• Transforming engineering education
• Leadership role of the NSF
  – Role of ENG
  – Role of EHR
The Image of Engineering

- Image with community and public
- Image of the ENG Directorate within the NSF
Diversity

- Keeping in mind the multi-dimensional aspects: race, gender, culture, academic background, geography...
- Staying FOCUSED in ENG
- Doing WELL those things we choose to do
- Minimizing duplication
Evaluation

• Why do it?
• How do we do it now?
• If we are going to implement new assessment protocols, how to ensure valuable outcomes from the investment of resources?
AD Priorities for ENG

- Translational research
- Partnerships
- Education
- Public understanding/image of engineering
- Diversity

Assessment and Metrics
ENG Update

- New ENG staff
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Changes in AdCom

• Leadership: Steven Castillo begins as chair at fall meeting

• Membership:
  – One new member at spring meeting: Patrick Farrell, Provost of the University of Wisconsin-Madison
  – Nine new members at fall meeting
Future AdCom Meeting Dates

• October 21-22, 2009
• 2010 dates TBD