Current Status of ENG And Vision for Future

- *Big Picture*: Challenges and Opportunities
- Directorate-wide Strategic Planning Process
- Influential External Reports
- ENG Budget Picture
- Rebuilding the “Core”
- *Assessing the Capacity of the U.S. Engineering Research Enterprise*
NSF Engineering Directorate

Assistant Director
John A. Brighton
Deputy Assistant Director
Michael Reischman

Bioengineering & Environmental Systems
BES
Bruce Hamilton

Civil & Mechanical Systems
CMS
Galip Ulsoy

Chemical & Transport Systems
CTS
Richard Buckius

Design, Manufacture & Industrial Innovation
DMII
Warren DeVries

Electrical & Communications Systems
ECS
Usha Varshney

Engineering Education & Centers
EEC
Gary Gabriele

Office of Industrial Innovation
SBIR/STTR*
Kesh Narayanan

*NSF-wide program
ENG Supports Administration’s R&D Priorities

- Support for nation’s technology workforce needs.
- Advancing fundamental discovery to improve future quality of life.
- Support technological innovation to enhance economic competitiveness.
Opportunities and Challenges

Directorate for Engineering faces new opportunities and emerging challenges.

**Opportunities:**

- Internal Strategic Plans
- External Reports
- Six-years of @10% Budget Increases
- Strong leadership at NSF

**Challenges:**

- Future Funding for NSF (and all S&E)
- Priorities in post-9/11 world
- Workforce (demand and diversity)
- Growing International Competition
NEW Programs in NSF/ENG

- **NEES Becomes Operational**
  - Operational as of October 1, 2004
  - NEES Research Grants Total $30 million in 2004
  - “Grand Opening” November 15, 2004

- **Cyberinfrastructure**
  - NSF Exploring different models for shared infrastructure
  - CISE developing initial partnerships
  - Possible ENG initiative to develop domain cyberinfrastructure communities and resources

- **CAREER Awards**
  - Recognizes and supports the early career-development activities of those teacher-scholars who are most likely to become the academic leaders of the 21st century.
Internal Task Forces

- Portfolio of Solicitations and Awards
- Awards Impact Assessment
- Making the Case
- Organizational Structure
- Engineering Workforce: Current Status, Issues and Recommendations
- Divisional Strategic Plans
External Reports


- *Assessing the Capacity of the U.S. Engineering Research Enterprise* – DRAFT An NAE Study
## ENG Funding

(Dollars in Millions)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BES</td>
<td>51.00</td>
<td>48.22</td>
<td>50.68</td>
<td>2.46</td>
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<tr>
<td>CTS</td>
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<td>65.79</td>
<td>68.99</td>
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<td>CMS</td>
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<td>DMI</td>
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<tr>
<td>ECS</td>
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<tr>
<td>EEC</td>
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<td>127.06</td>
<td>129.71</td>
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<td>OII</td>
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<td>102.76</td>
<td>105.33</td>
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<tr>
<td>Total, ENG</td>
<td>$565.57</td>
<td>$561.30</td>
<td>$580.68</td>
<td>$19.38</td>
<td>3.5%</td>
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</table>
ENG Funding History

Funding over the years:
- FY97: $300
- FY98: $350
- FY99: $400
- FY00: $450
- FY01: $500
- FY02: $550
- FY03: $600
- FY04: $650
- FY05: $700
- FY06: $750

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NSF
## ENG Investments in NSF Priority Areas

<table>
<thead>
<tr>
<th>Priority Area</th>
<th>FY 2004 Actual</th>
<th>FY 2005 Plan</th>
<th>FY 2006 Request</th>
<th>Change over FY 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biocomplexity in the Environment</td>
<td>6.00</td>
<td>6.00</td>
<td>6.00</td>
<td>0.00</td>
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<tr>
<td>Nanoscale Science and Engineering</td>
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<td>127.77</td>
<td>0.00</td>
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<tr>
<td>Mathematical Sciences</td>
<td>2.91</td>
<td>2.91</td>
<td>2.91</td>
<td>0.00</td>
</tr>
<tr>
<td>Human and Social Dynamics</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>
2004 NSF Directorate Success Rates (Research Grants)

Does not include SBIR/STTR

* FY 2006 Request
In spring 2004, ENG asked NAE to conduct a “fast-track” evaluation of:

- Past and future potential impact of U.S. engineering research enterprise on the nation's economy, quality of life, security, and global leadership
- Whether public and private investment is adequate to sustain U.S. preeminence in basic engineering research.
NAE Committee

- James J. Duderstadt
- Erich Bloch
- Ray M. Bowen
- Barry Horowitz
- Lee L. Huntsman
- Kristina M. Johnson
- Linda Katehi
- David C. Mowery
- Cherry A. Murray
- Malcolm R. O'Neill
- George Scalise
- Robert F. Sproull
- David Wormley
- Proctor P. Reid (NAE)
The Flow of Funding

- ENG/NSF gets its funding from:
  - OMB/Congress → NSF Director
  - Deputy Director → ENG Directorate
  - ENG Divisions
How Does this Work?

- Engineering Profession
- Engineering Academics
- Industry
- Advisory Committee

• NSF Administration

• Divisions
  - Ideas
  - Plans
  - Actions

Eng/ELT
- Ideas
- Plans
- Actions

• OMB
  and
• Congress
What ENG needs to do...

- ENG needs to be focused.
- ENG needs to address pressing issues.
- ENG needs to be connected to the engineering communities.
Concerns of Each Sector

- Congress, OMB, Policymakers, Public
  - Economy
  - Security
  - Safety
  - Environment
  - Health
  - Energy

- ENG – Priorities
  - Biology in Engineering
  - Critical Infrastructure Systems
  - Complexity in Engineered and Natural Systems
  - Manufacturing Frontiers
  - Nanotechnology
  - New Emerging Areas
ENG Values and Guiding Principles

- Merit Review
- Diversity and Broadening Participation
- Integration Education and Research
- Working at the Frontiers of Research and Innovation
- Address Societal Needs
ENG Values and Guiding Principles (cont.)

- Information Sharing and Openness
- Interdisciplinary and Collaborative Research
- Data Driven Assessment and Objectives
- Teamwork and Partnerships
- Balance of Solicited and unsolicited Proposals
What is *Engineering* and How does it fit in with *Science*?

- **Engineering is:**
  - **Basic Research** (research for discovery of new knowledge)
  - **Applied Research** (early stage of fundamental engineering innovation)
  - **Innovation** (ways to integrate and construct new devices and systems at early stages)
  - **Development** of new products and systems (Bringing them to market)
  - **Engineering Education** (Knowledge & Skills for Engineering Innovation)
Enabling the nation’s future through discovery, learning and innovation