

# Directorate for Engineering Advisory Committee Meeting

May 3 - 4, 2006



**National Science Foundation  
Directorate for Engineering**

**Acting Assistant Director for Engineering  
Richard O. Buckius**

# Topics

- **New Staff Introductions**
- **Reorganization Update**
- **ENG and Engineering Education**
- **ENG Updates and Trends**
- **Summary**





# New Staff Introductions



# New Staff Introductions – CMS

## → Civil and Mechanical Systems

- ◆ **Perumalsamy Balaguru**
  - Program Director, Infrastructure Materials and Structural Mechanics, Rutgers University Center for Advanced Infrastructure and Transportation
- ◆ **Thomas Birkland**
  - Program Director, Infrastructure Management and Hazard Response, University at Albany's Rockefeller College of Public Affairs and Policy
- ◆ **Clark Cooper**
  - Program Director, Surface Engineering and Material Design, United Technologies Research Center
- ◆ **Trena L. Robinson**
  - Program Assistant, CMS



# New Staff Introductions – CTS and ECS

## → Chemical and Transport Systems

- ◆ **Judy Raper**
  - Program Director, Particulate and Multiphase Processes, University of Missouri-Rolla
- ◆ **Latisha Wadlington**
  - Office Automation Assistant, Student Temporary Employment Program

## → Electrical and Communications Systems

- ◆ **Ronqing Hui**
  - Program Director, Electronics, Photonics and Device Technologies, University of Kansas





# New Staff Introductions – EEC and OII

## → Engineering Education and Centers

- ◆ Dawn Applegate
  - Part Time, Chief Executive of RegeneMed
- ◆ Deborah Jackson
  - ERC Program Director for Microelectronics, Jet Propulsion Laboratory

## → Office of Industrial Innovation

- ◆ F.C. Thomas Allnutt
  - Program Manager, SBIR/STTR

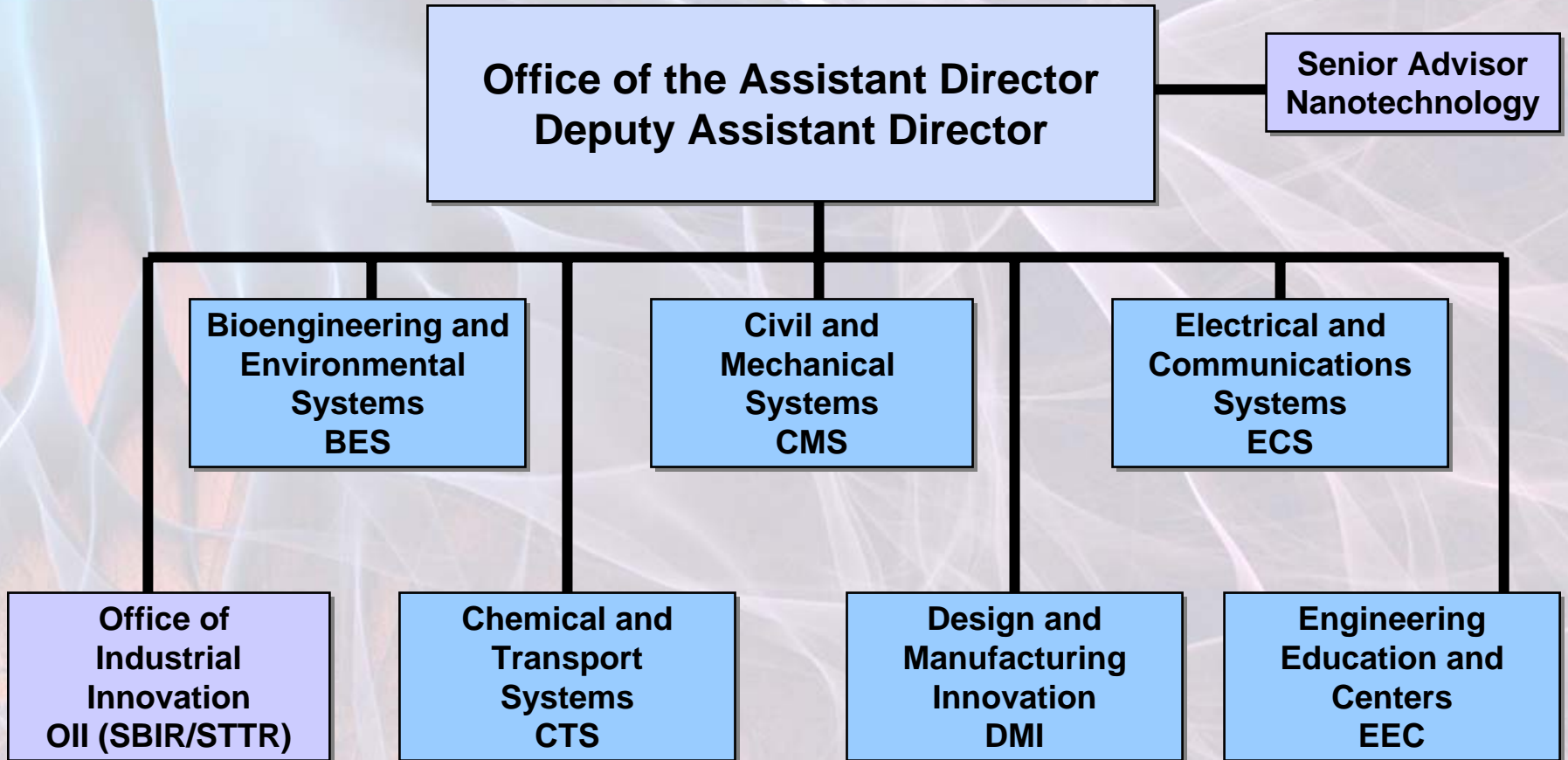


# ENG Reorganization Update



# Directorate for Engineering

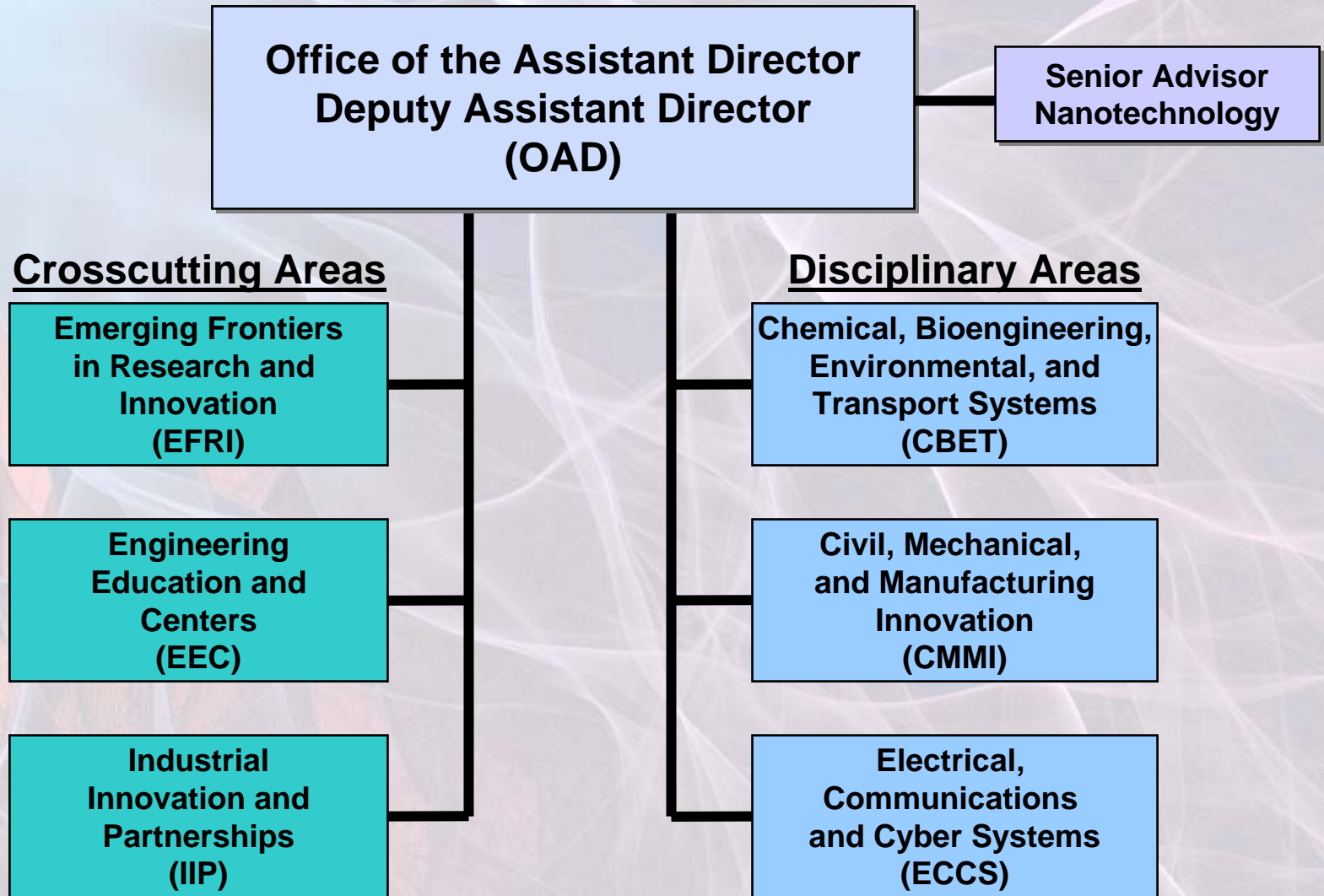
Current



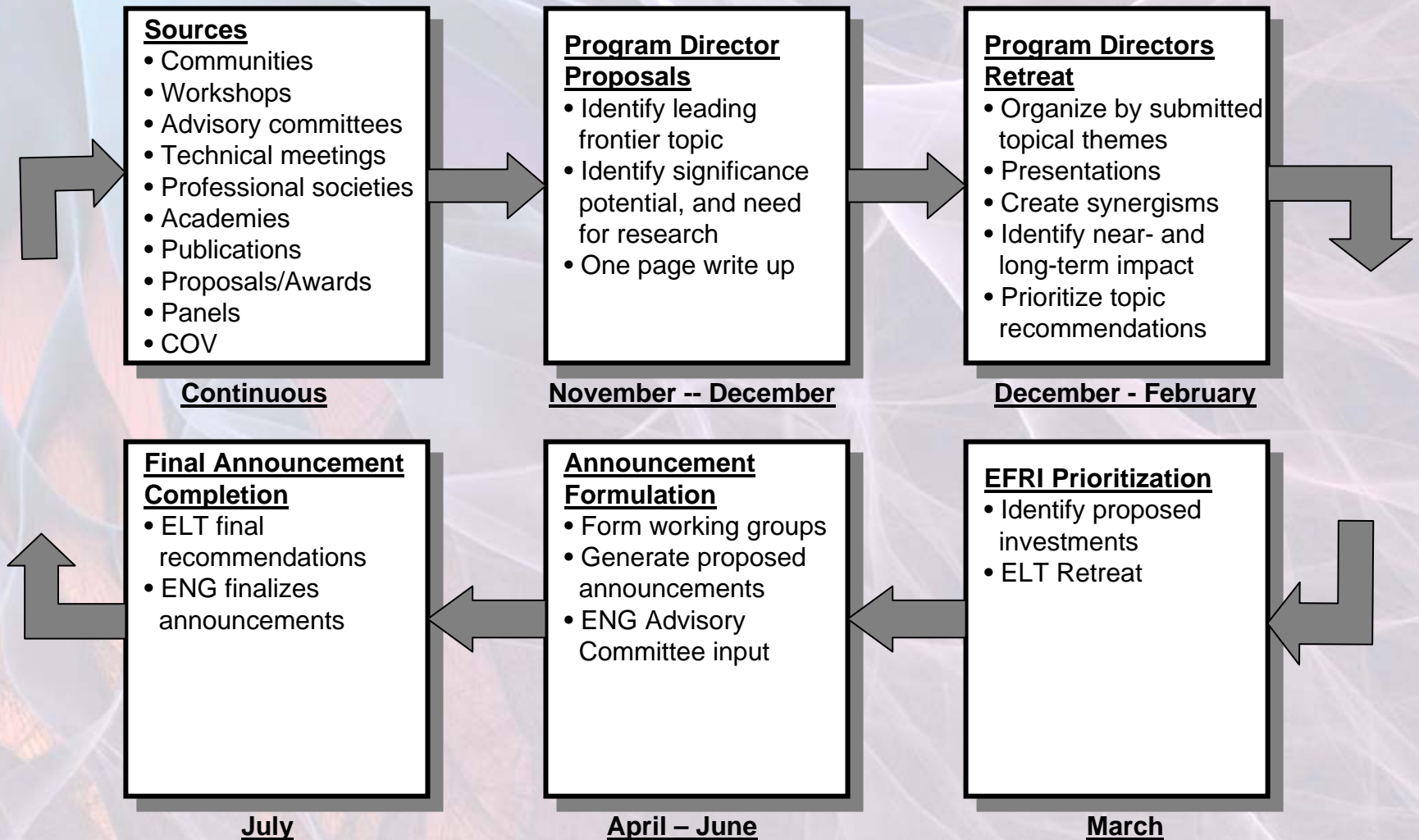


# Directorate for Engineering

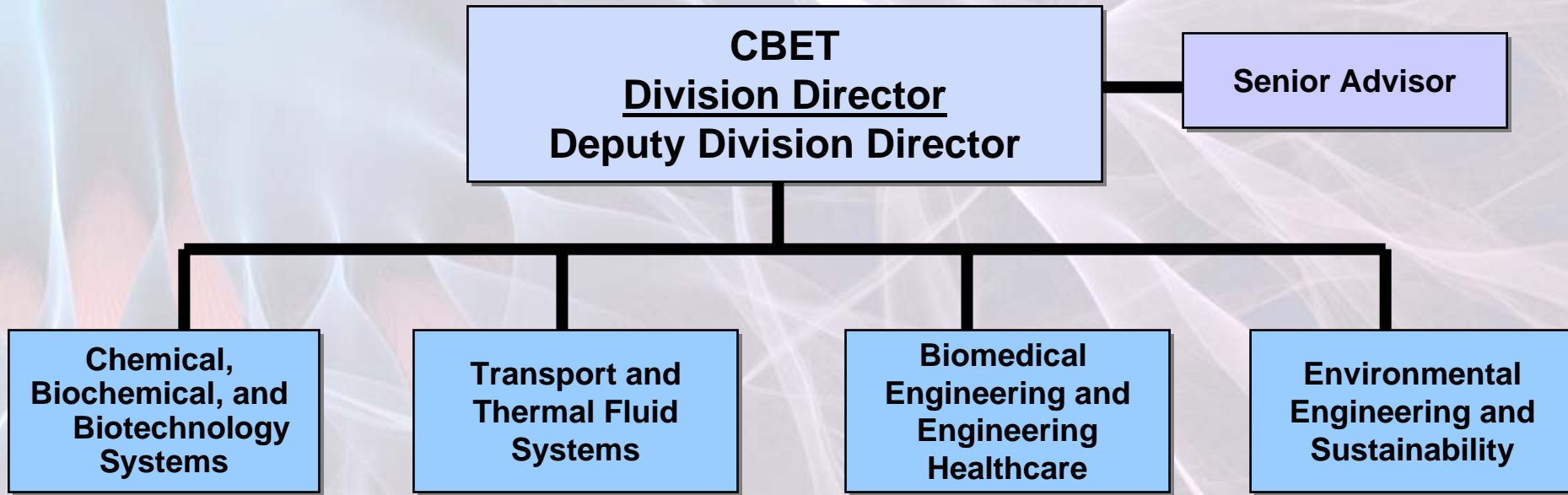
FY 2008



# EFRI Annual Process

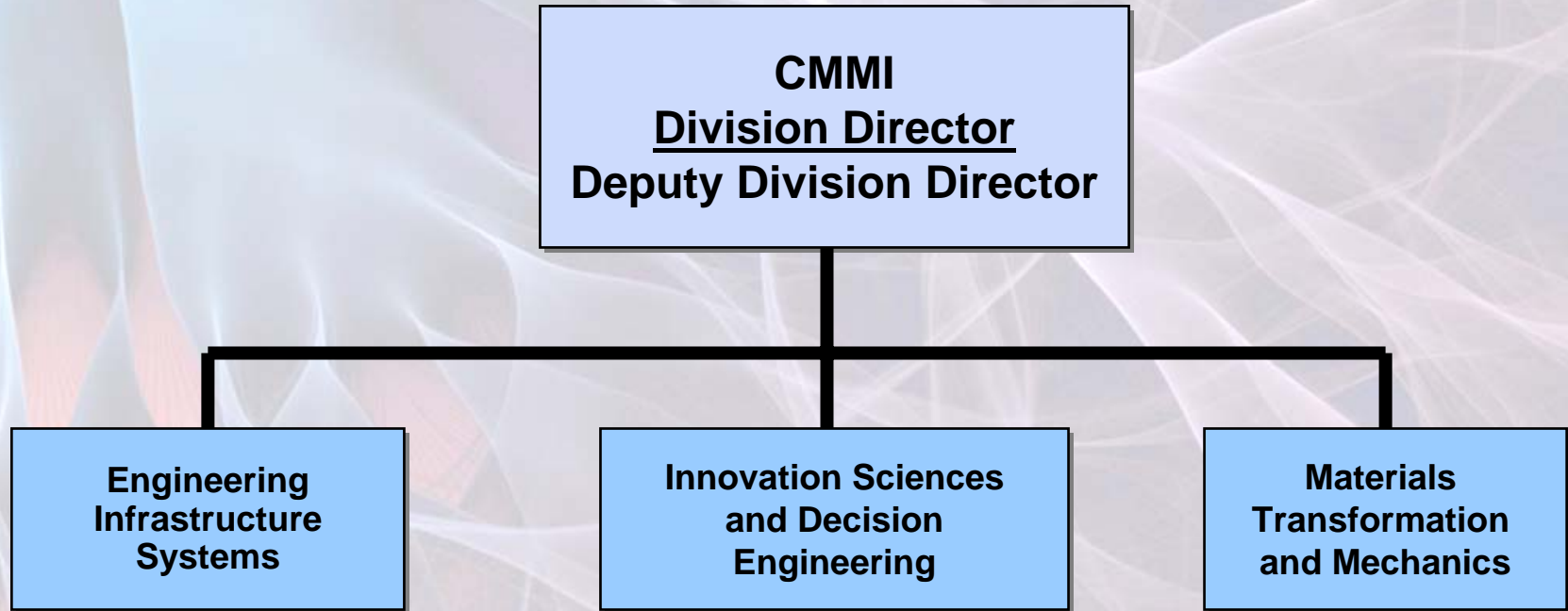


# Chemical, Bioengineering, Environmental, and Transport Systems

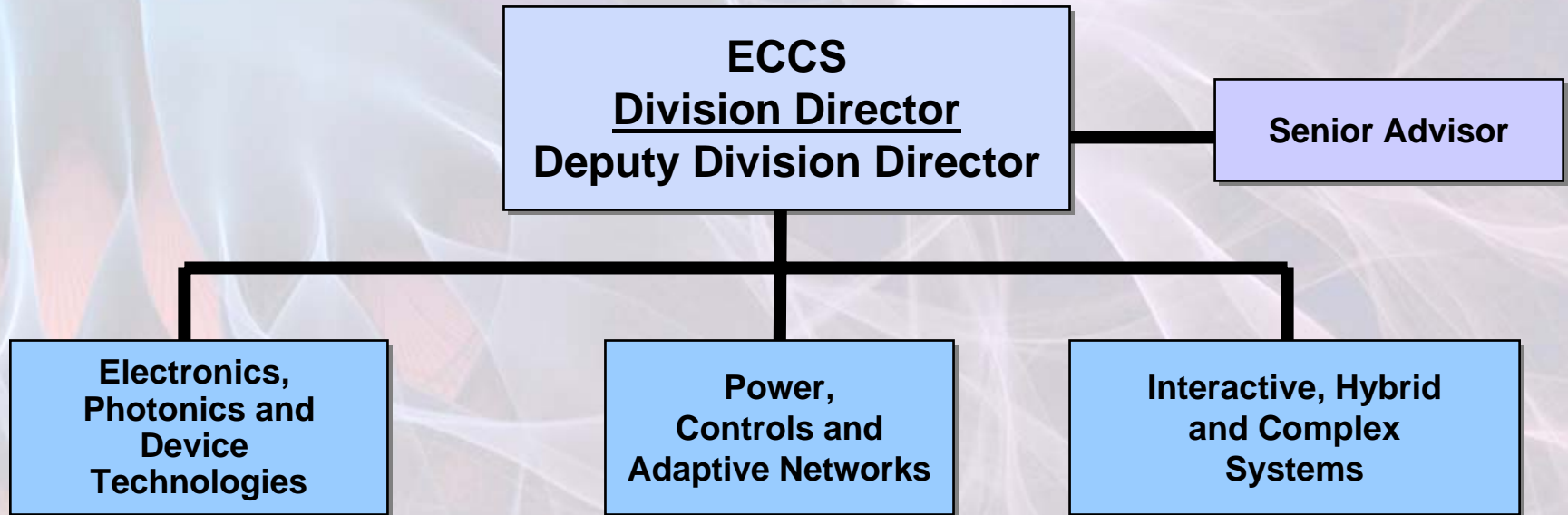




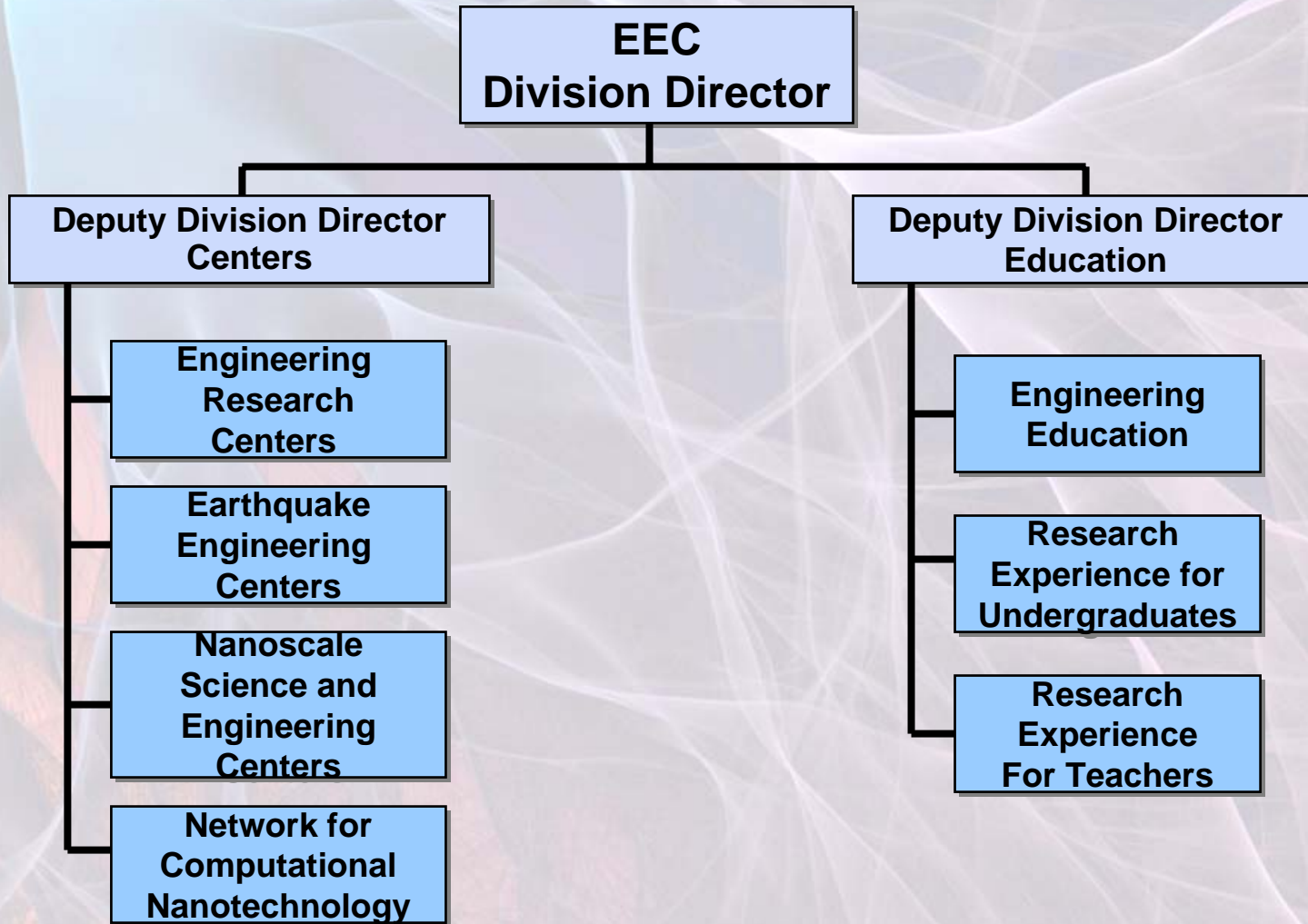
# Civil, Mechanical, and Manufacturing Innovation



# Electrical, Communications and Cyber Systems

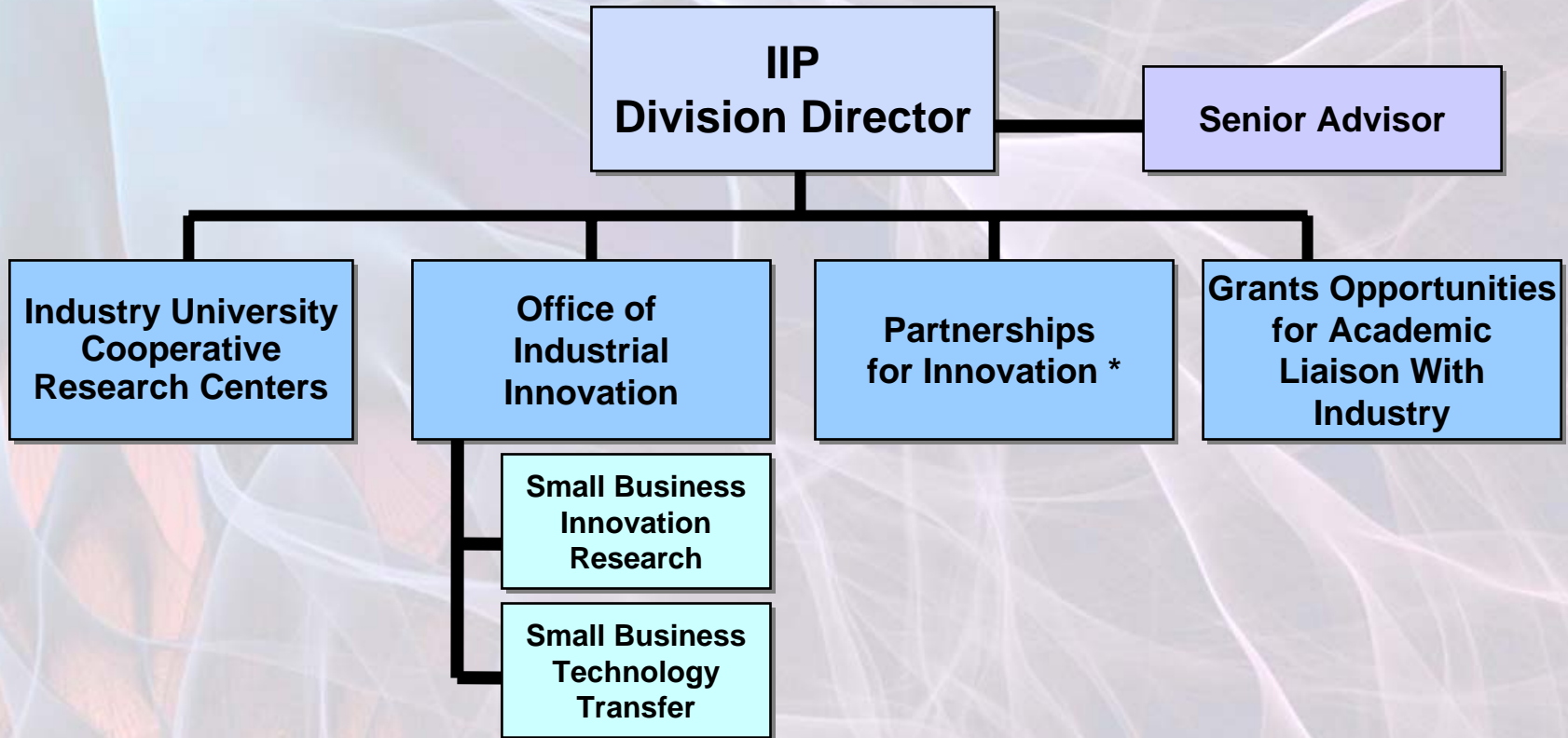


# Engineering Education and Centers





# Industrial Innovation and Partnerships



\* Program funds reside in OIA.



# Reorganization Process and Status

- Throughout 2004: ENG conducted a strategic planning process. Among the goals identified by this process was “Organizational Excellence.”
- Spring 2005: Engineering Advisory Committee reviewed and commented on conceptual framework for reorganization.
- Summer/Fall 2005: Public comments were solicited via the NSF website.
- Fall 2005: Engineering Advisory Committee reviewed conceptual framework in light of public comments.
- End of 2005: Conceptual structure complete.
- Spring 2006: NSF and ENG Budget rollout, position announcements, and personnel alignment request completed.
- FY 2007: Engineering Directorate reorganized.



# Task Force Progress and Status

- Throughout FY 2004 and FY 2005, ENG produced a series of task force reports to provide direction. The reorganization is a direct outgrowth of this process.
- The recommendations from each task force continue to be discussed and acted upon.
  - ◆ Strategic Thinking Group
  - ◆ Awards and Solicitations
  - ◆ Awards Impact and Assessment
  - ◆ Making the Case for Engineering
  - ◆ Engineering Organization and Structure
  - ◆ Engineering Workforce





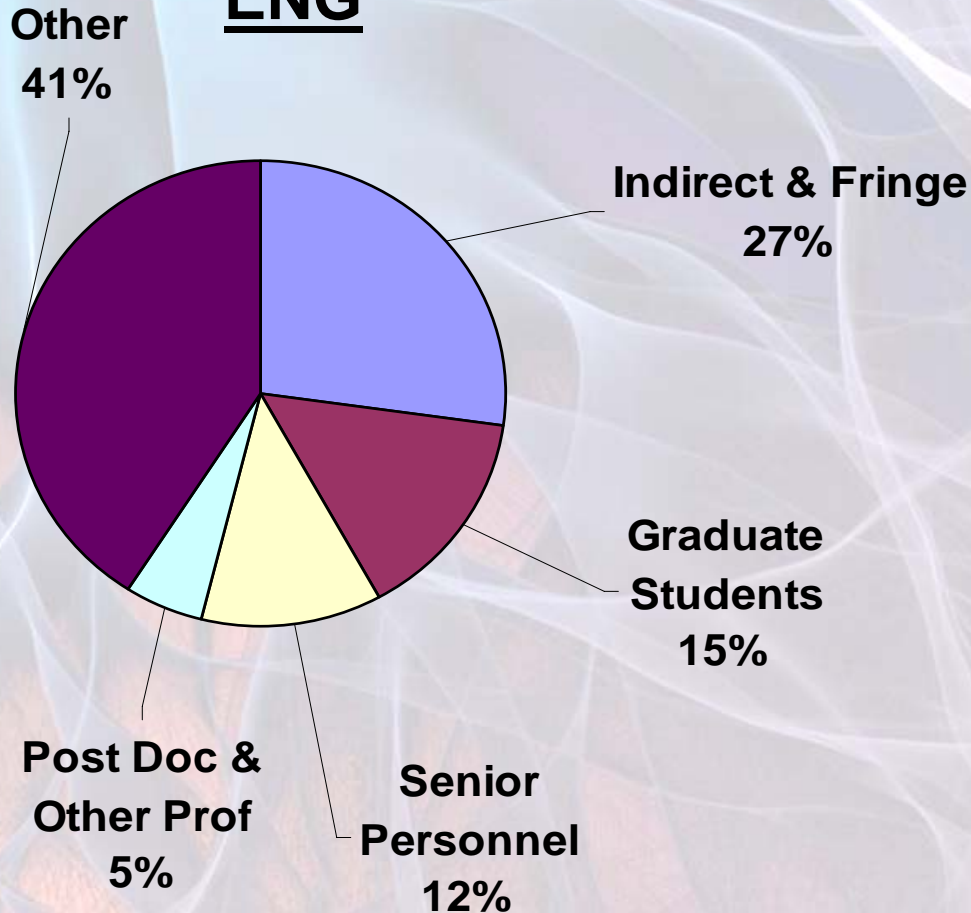
# ENG and Engineering Education



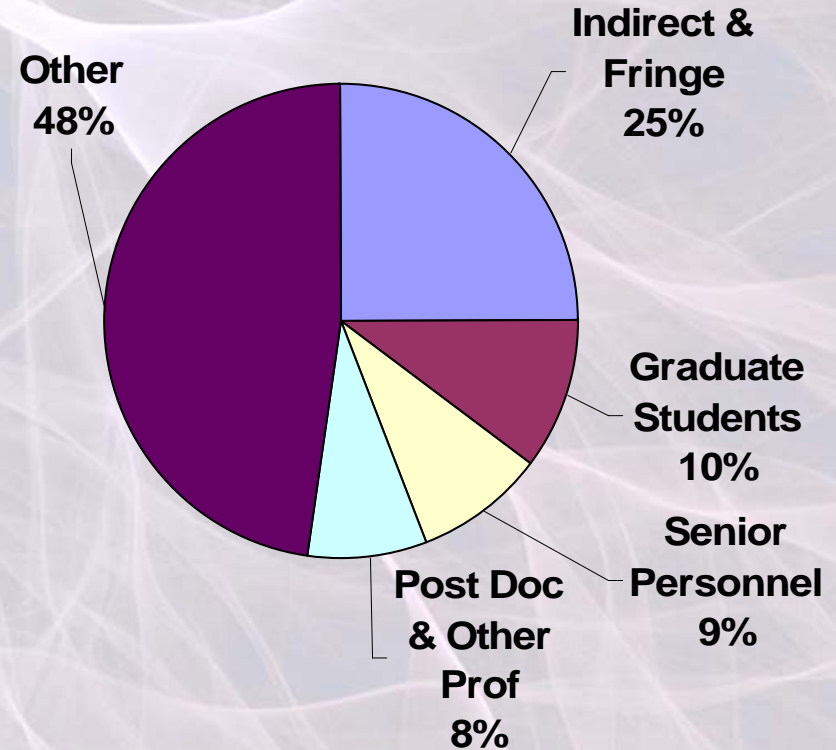
# ENG and NSF Investments

FY 2005

## ENG



## NSF



**Other** includes: direct costs (subcontracts, materials and supplies, consultant services), permanent equipment, travel, other personnel, etc.



# Research and Education

## ENG Integration

### → CAREER Proposals

- ◆ Program started in 1994
- ◆ Must have a well thought-out plan for integration of research and education, in addition to significant research project
- ◆ ENG provides approximately 1/4 of all NSF CAREER awards

### → Engineering Research Center (ERC) Awards

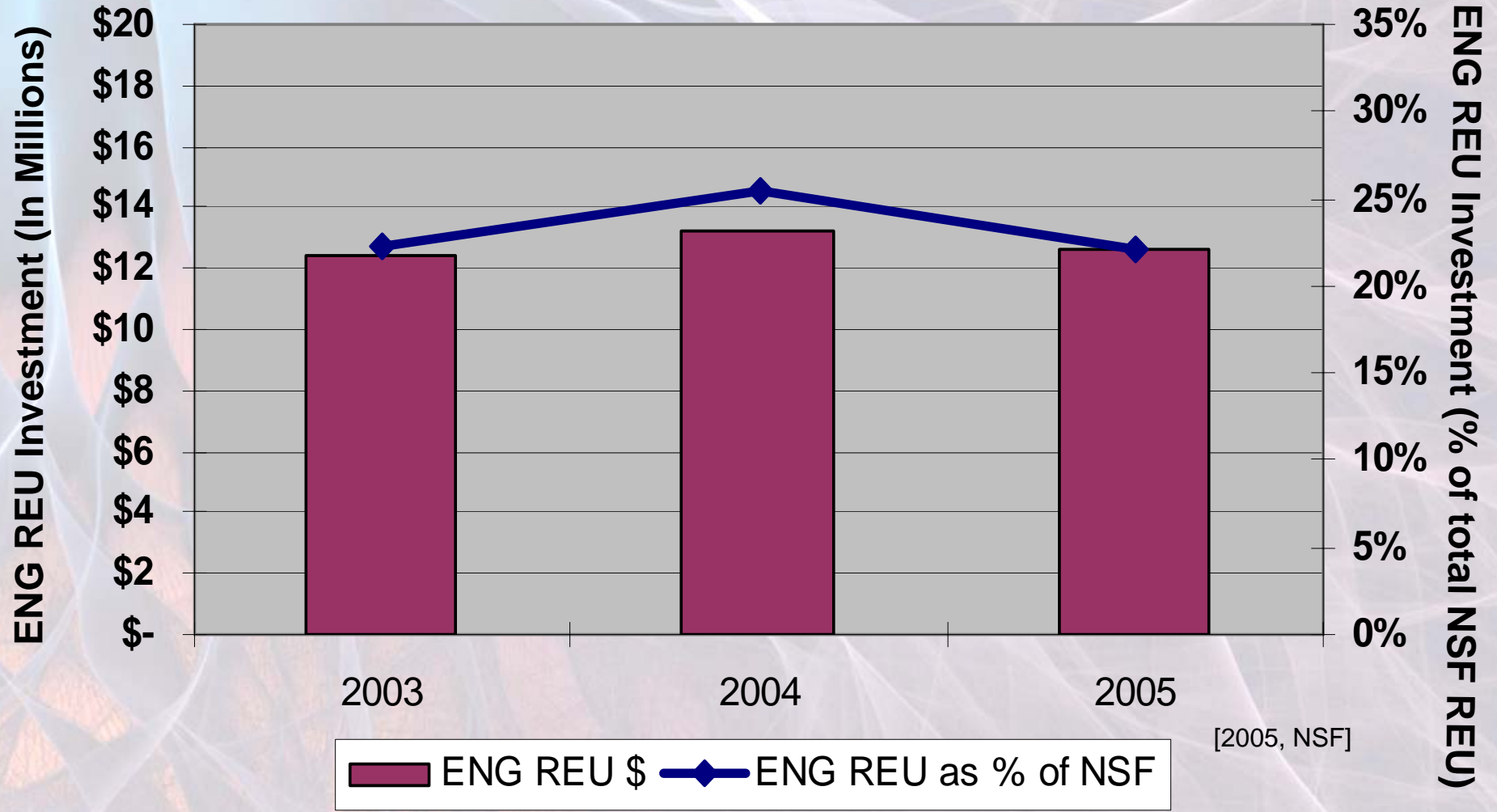
- ◆ Program initiated in 1985
- ◆ ERC innovations in research and education are expected to impact curricula at all levels -- from pre-college to life-long learning -- and to be disseminated to and beyond academic and industry partners





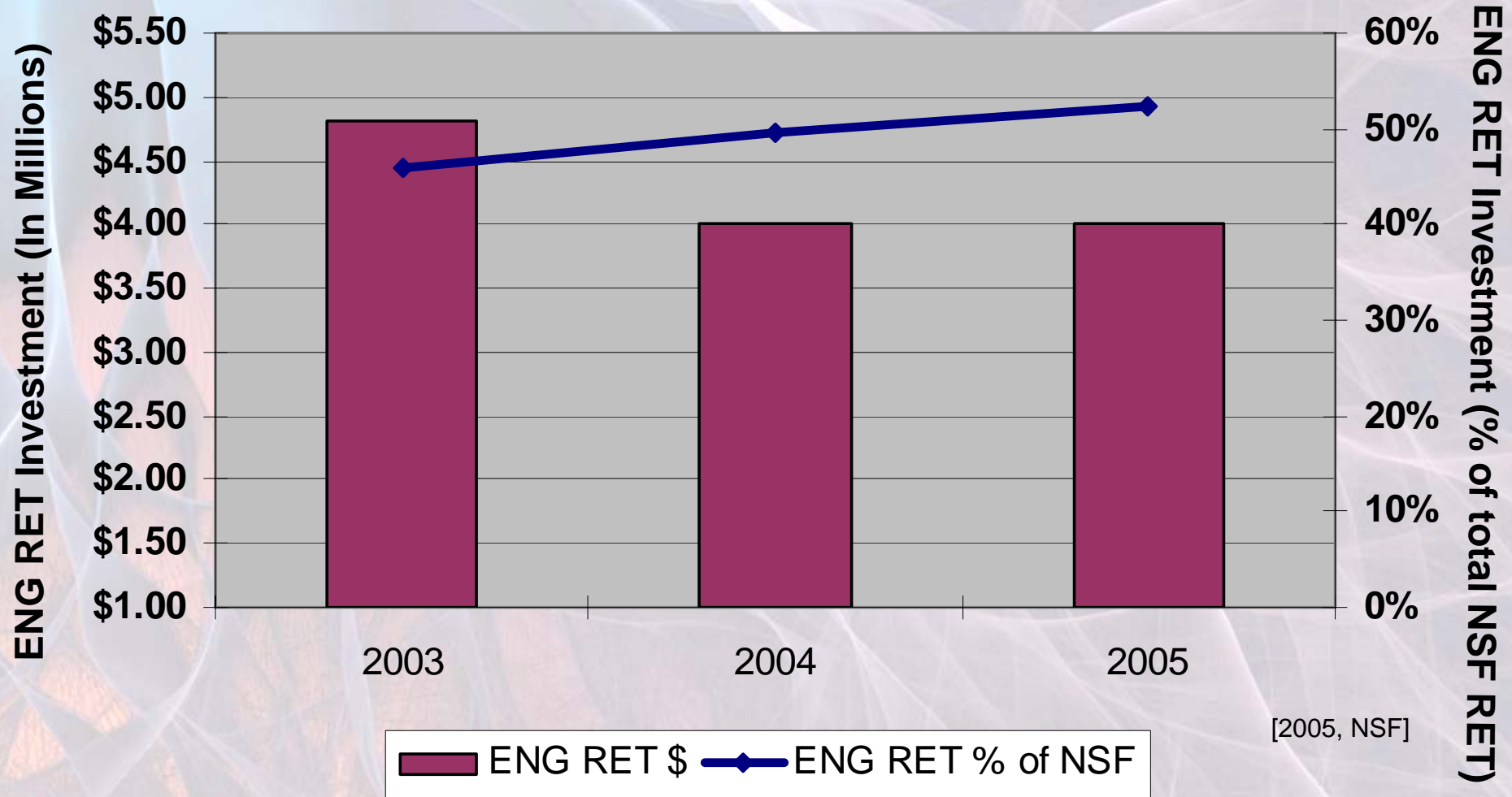
# Research and Education

## ENG REU Funding



# Research and Education

## ENG RET Funding



# Research and Education

## NSF Programs

- In addition, other NSF-wide activities include
  - ◆ **ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers**
  - ◆ **Centers for Learning and Teaching**
  - ◆ **Graduate Research Fellowships**
  - ◆ **Graduate Teaching Fellows in K-12 Education**
  - ◆ **Integrative Graduate Education and Research Traineeship Program**
  - ◆ **Nanoscale Science and Engineering Education**
  - ◆ **National Nanoscale Infrastructure Network**
- In addition to ENG Engineering Education and Centers programs, other ENG/EHR activities include
  - ◆ **NSF-Navy Civilian Service Fellowship-Scholarship Program**
  - ◆ **SBIR Supplemental Funding for Diversity Collaborations**





# Updates and Trends



# American Competitiveness Initiative

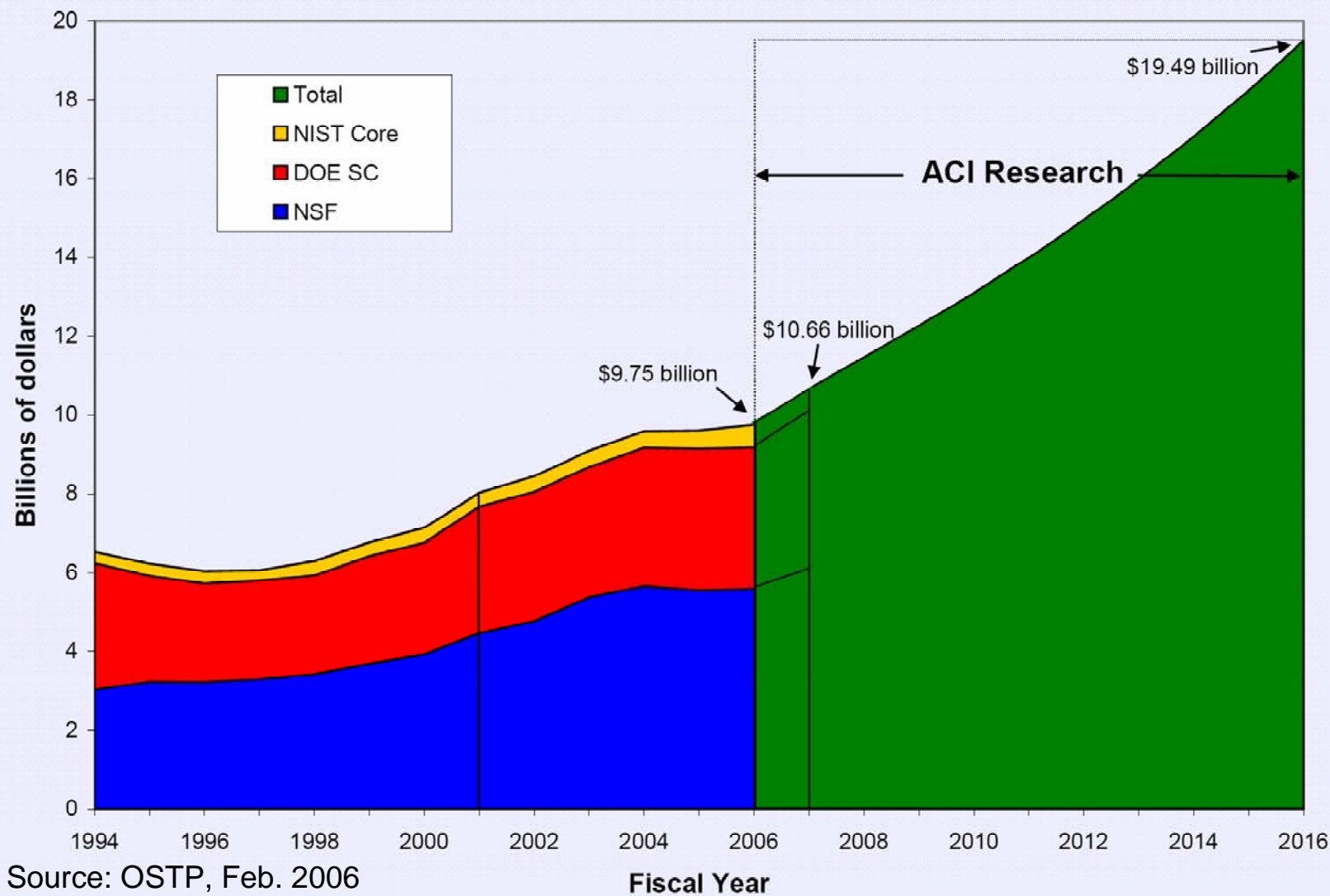
## NSF Implications

- NSF funding derived from the ACI initiative is expected to support:
- ◆ More than 500 additional research grants in 2007
  - ◆ Provide opportunities for upward of 6,400 additional scientists, engineers, students, post-doctoral fellow, and technicians to contribute to the innovation enterprise.



# American Competitiveness Initiative

FY 2007 – FY 2016

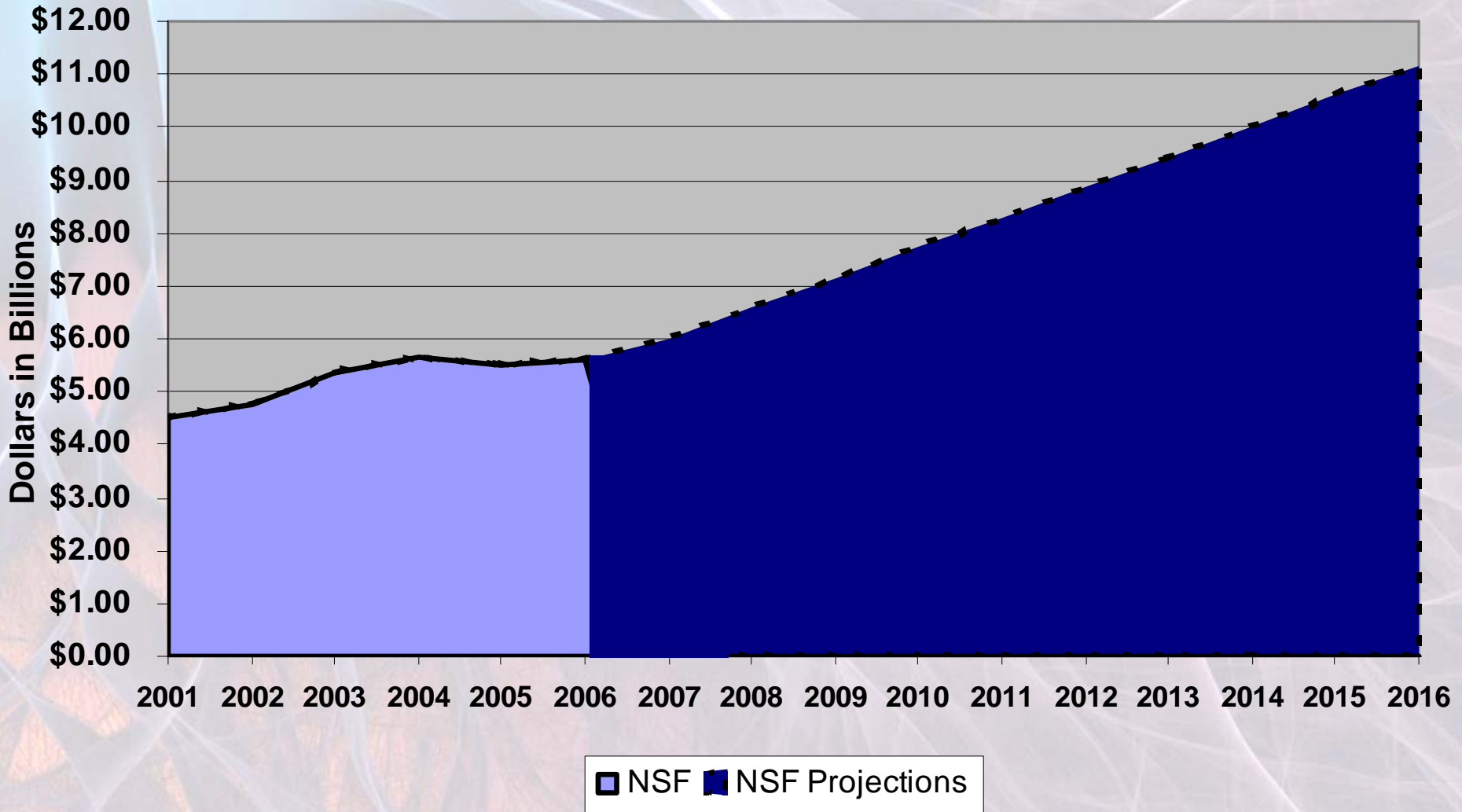


Source: OSTP, Feb. 2006





# ACI-Driven NSF Budget Projections

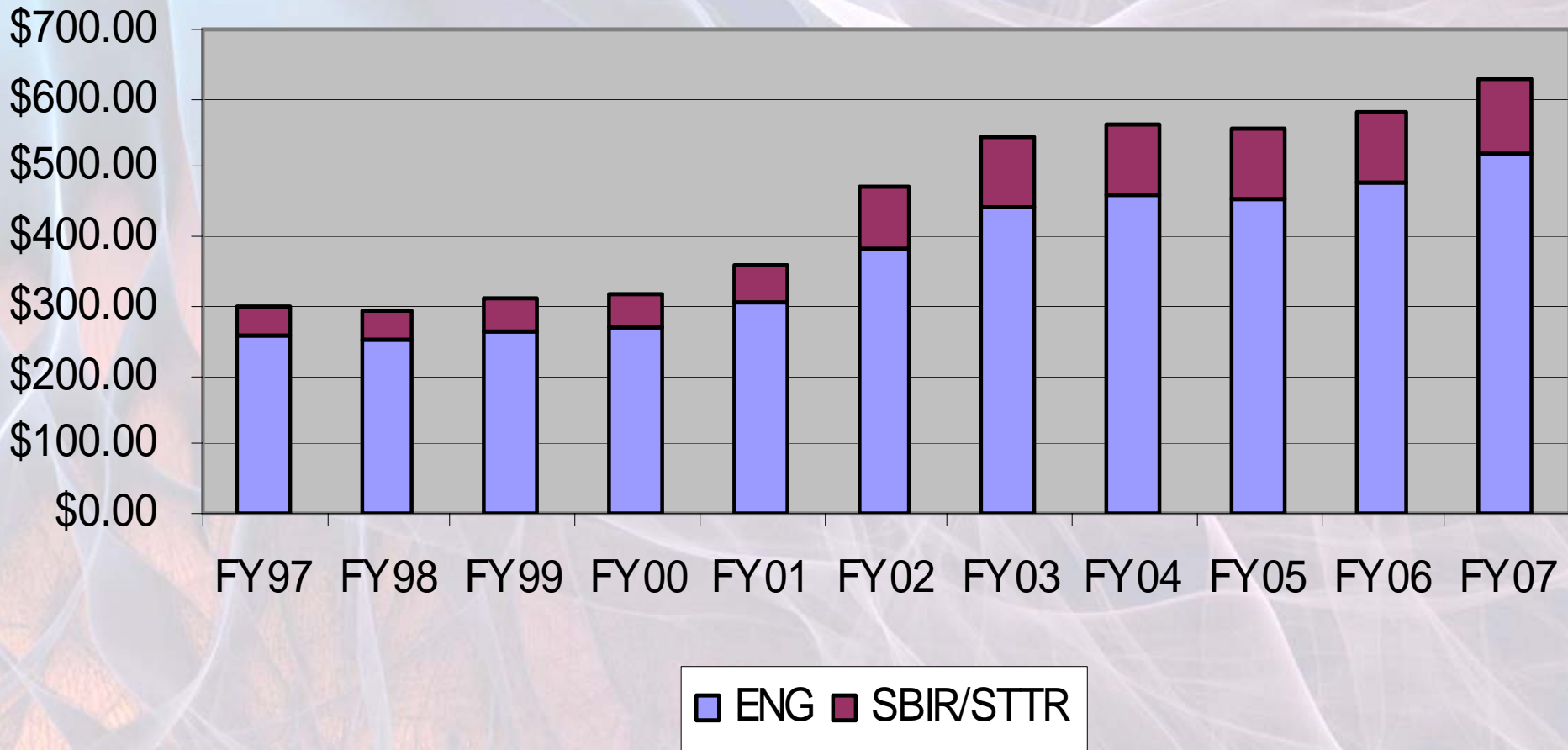


FY 2006 through FY 2016 budgets are estimates based on White House data.



# ENG Budget History

Dollars in Millions



# ACI and ENG

- The centerpiece of the *American Competitiveness Initiative* (ACI) is the commitment to double investment over 10 years in key Federal agencies that support basic research programs in the physical sciences and engineering.
- Specifically, the ACI doubles, over 10 years, funding for innovation-enabling research at key Federal agencies that support high-leverage fields of physical science and engineering at NSF, DOE Office of Science, and NIST.
- These agencies have “... a strong track record of leading to scientific publications, patents and eventually to new products and technologies.”
- The NSF funds “ ... potentially transformative basic research in areas such as nanotechnology, advanced networking and information technology, physics, chemistry, materials science, mathematics and engineering.”





# NSF Research and Related Activities

## FY 2007 Request by Directorate (Dollars in Millions)

	FY 2006 Current Plan	FY 2007 Request	Amount Change	Percent Change
Biological Sciences	\$576.69	\$607.85	\$31.16	5.4%
Computer & Information Science & Engineering	496.41	526.69	30.28	6.1%
Engineering (includes SBIR/STTR)	580.92	628.55	47.63	8.2%
Geosciences	702.83	744.85	42.02	6.0%
Mathematical & Physical Sciences	1,085.45	1,150.30	64.85	6.0%
Social, Behavioral & Economic Sciences	199.91	213.76	13.85	6.9%
Office of Cyberinfrastructure	127.12	182.42	55.3	43.5%
Office of International Science and Engineering	34.52	40.61	6.09	17.6%
U.S. Polar Research Programs	322.68	370.58	47.9	14.8%
U.S. Antarctic Logistical Support Activities	66.66	67.52	0.86	1.3%
Integrative Activities	137.12	131.37	-5.75	-4.2%
Arctic Research Commission	1.17	1.45	0.28	23.9%
<b>Total, R&amp;RA</b>	<b>\$4,331.48</b>	<b>\$4,665.95</b>	<b>\$334.47</b>	<b>7.7%</b>

Totals may not add due to rounding.



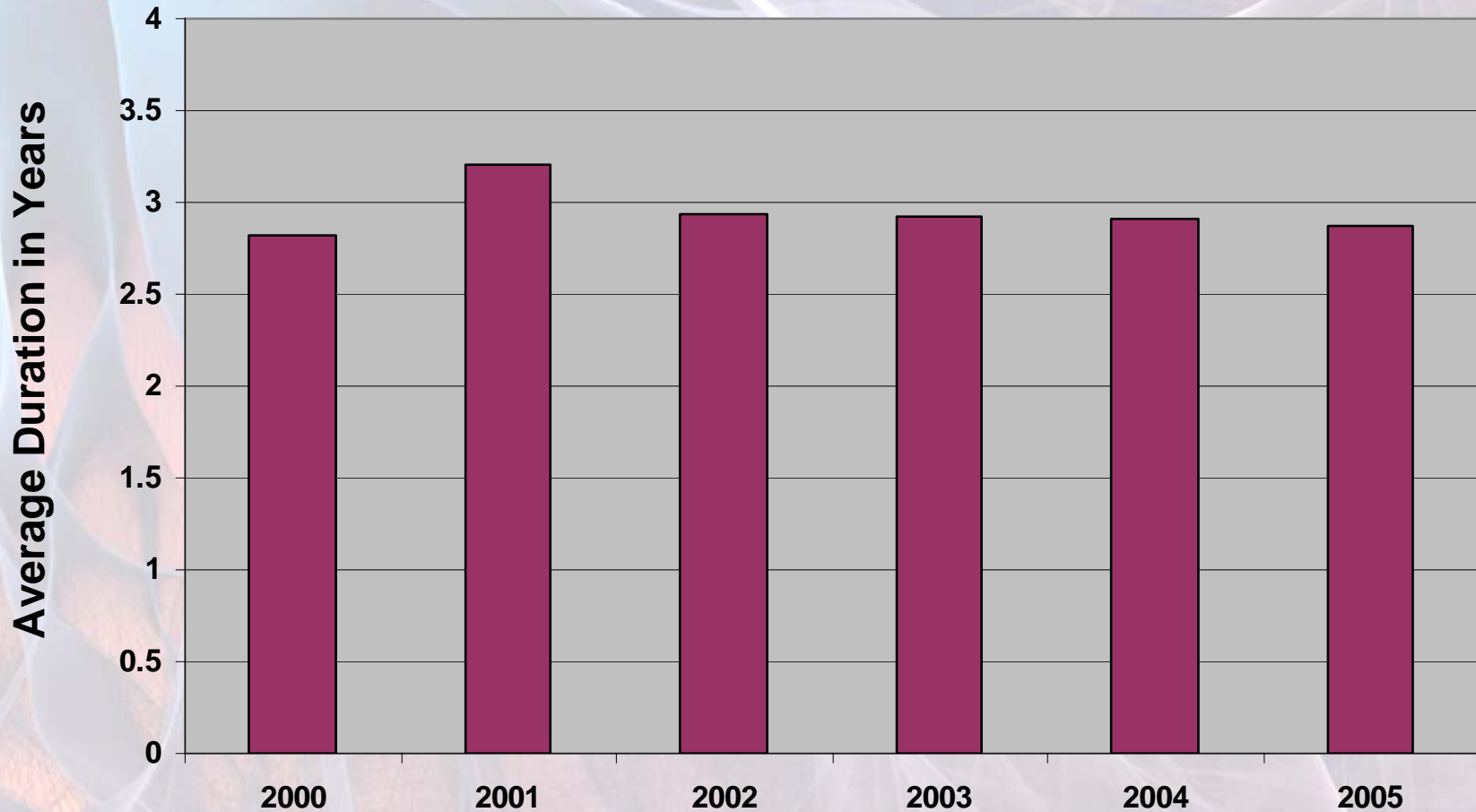
# ENG's NSF-wide Leadership in Sensors

- The Foundation is requesting \$20.0 million to support leading edge, frontier research on sensors and related topics.
- This will be NSF-wide, interagency effort, led by ENG.
- Research will advance fundamental knowledge in sensors and other technologies, focusing on prediction and detection of explosive materials and related threats.
- An NSF-wide working group will be formed to develop the solicitation and management of plan.



# Average Award Duration in Years

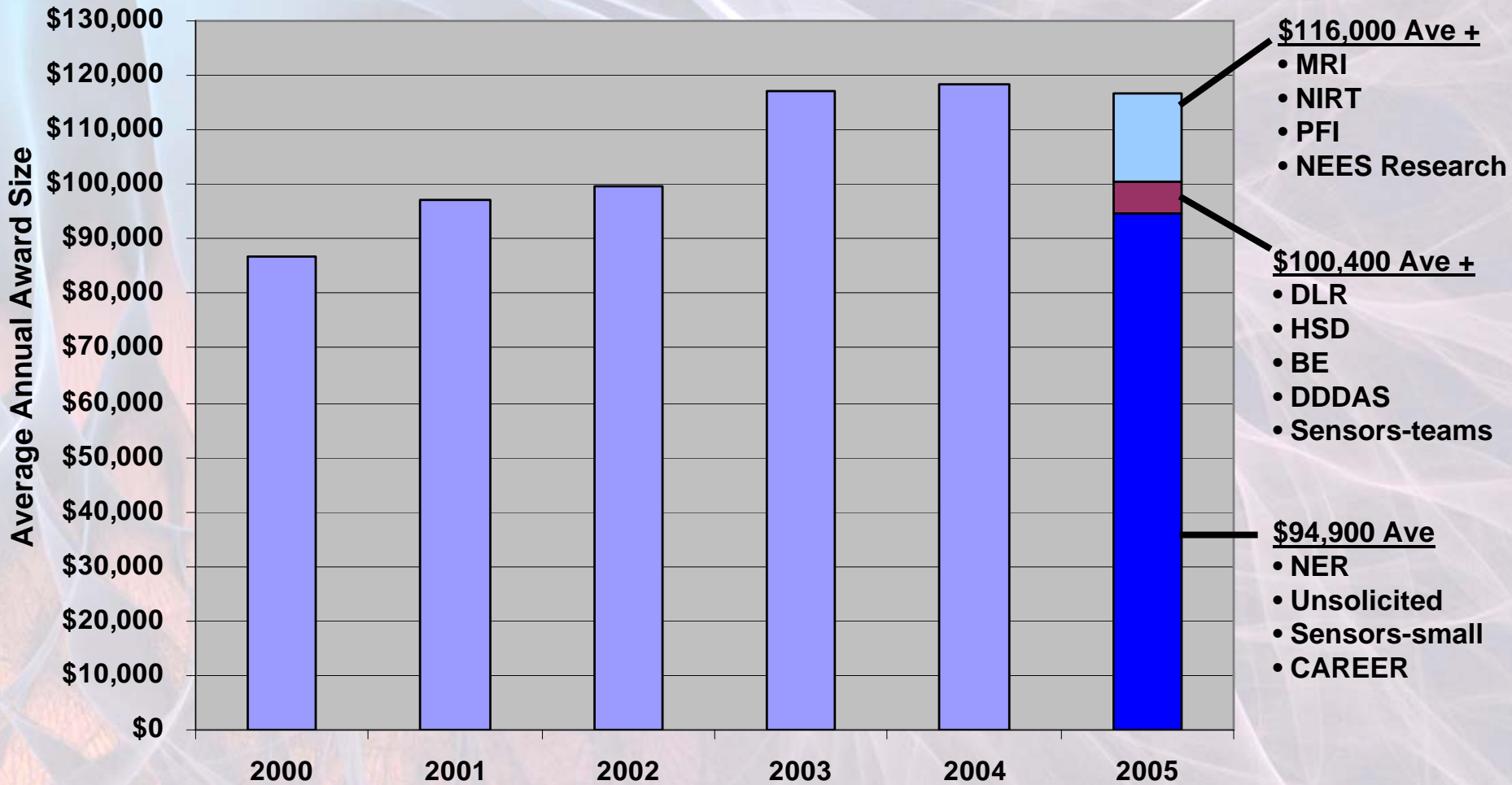
## ENG Research Grants





# Annual Award Size

## Averages for ENG Research Grants

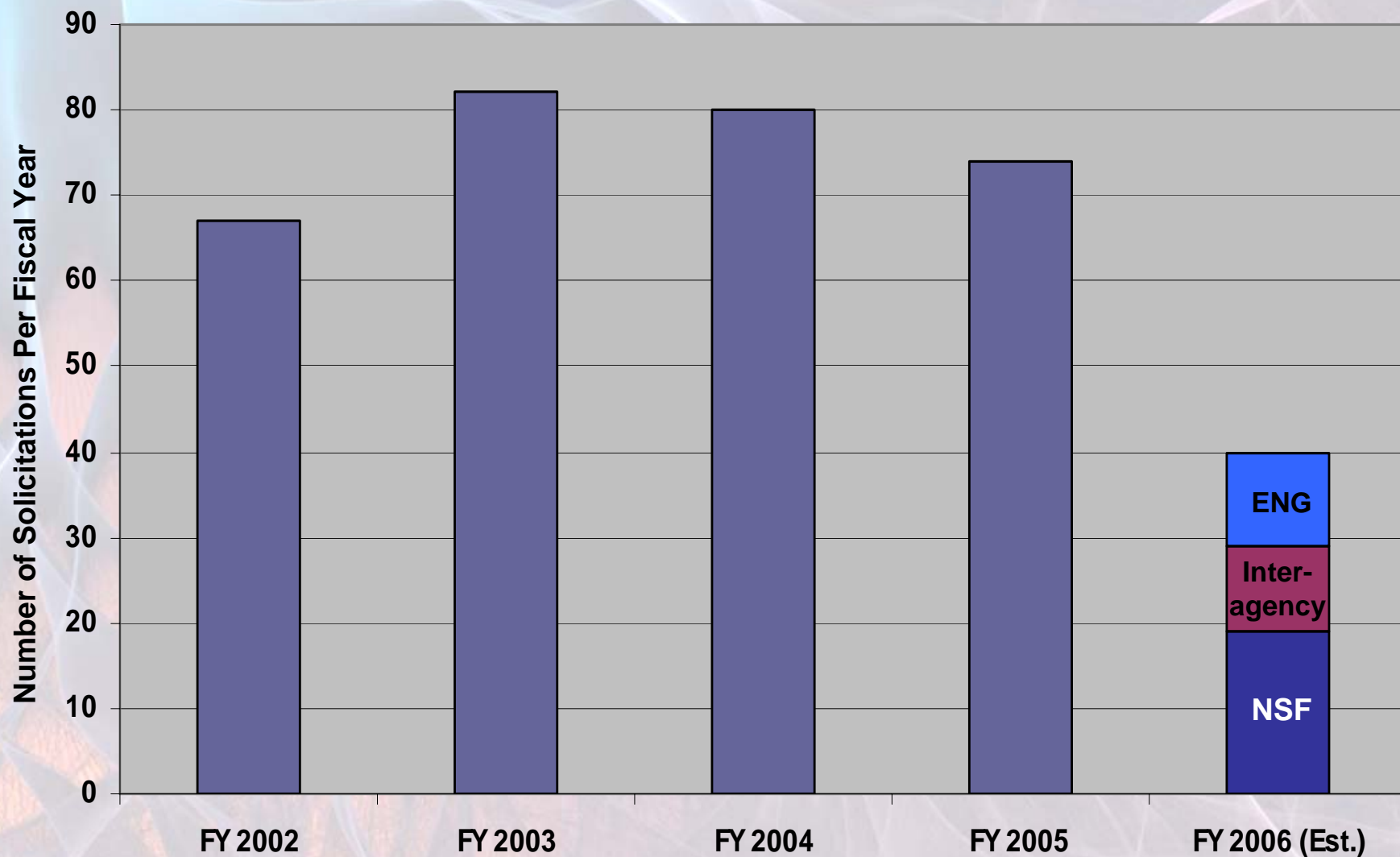


Award size data annualized.



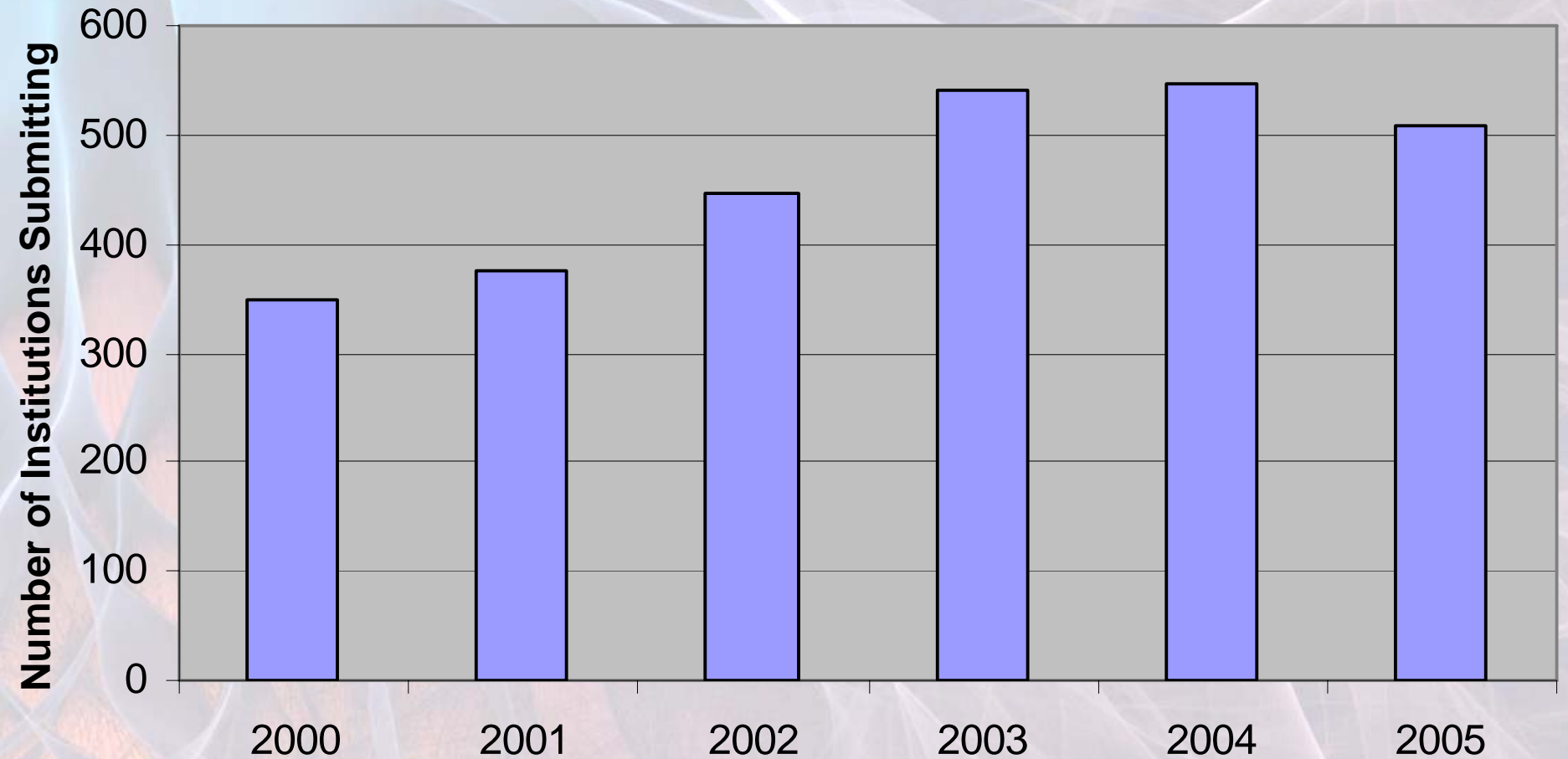
# Solicitation Actions with ENG Involvement

With ENG FY 2006 Proposal Generating Documents



# Institution Submissions

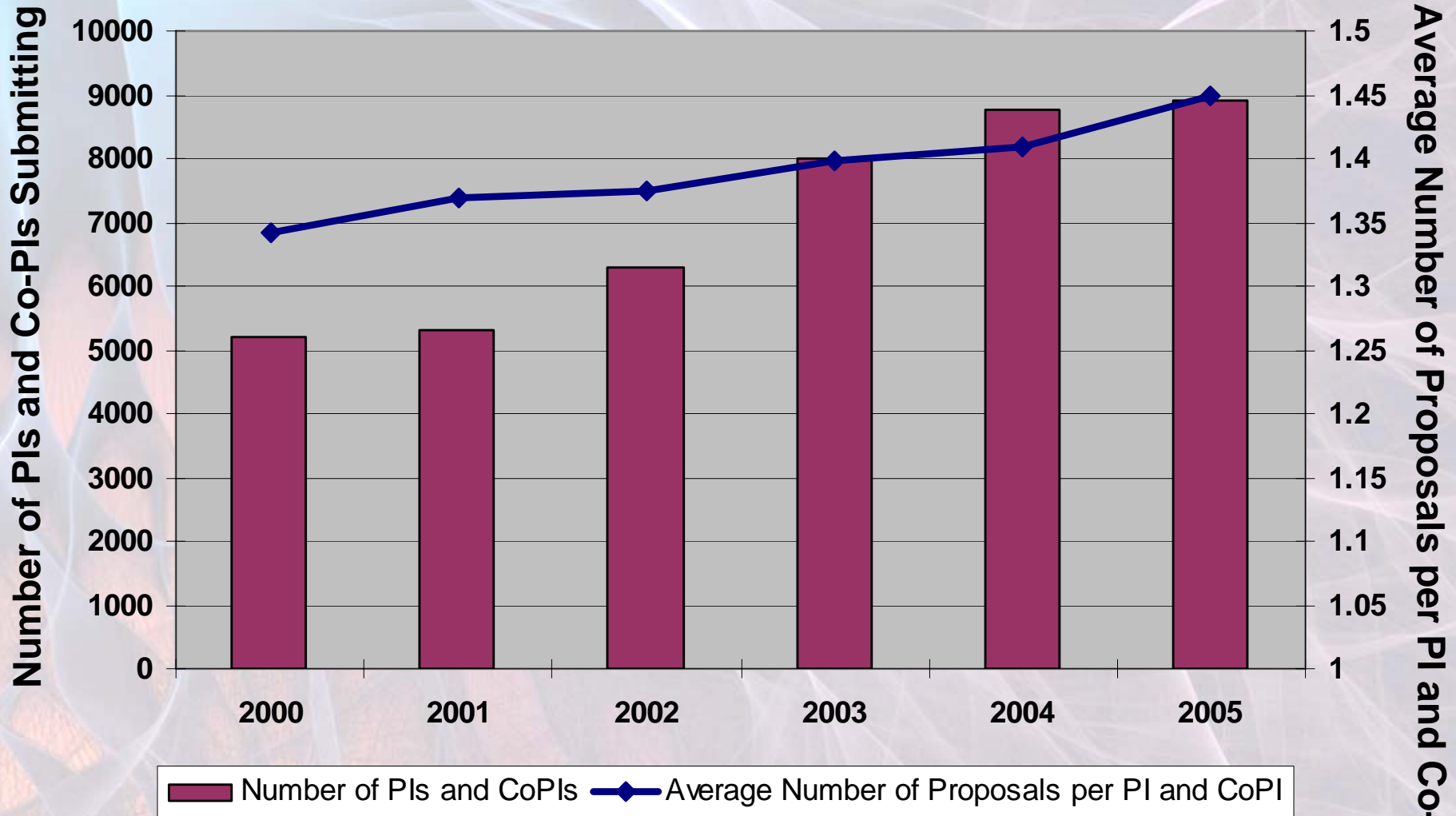
Non-SBIR





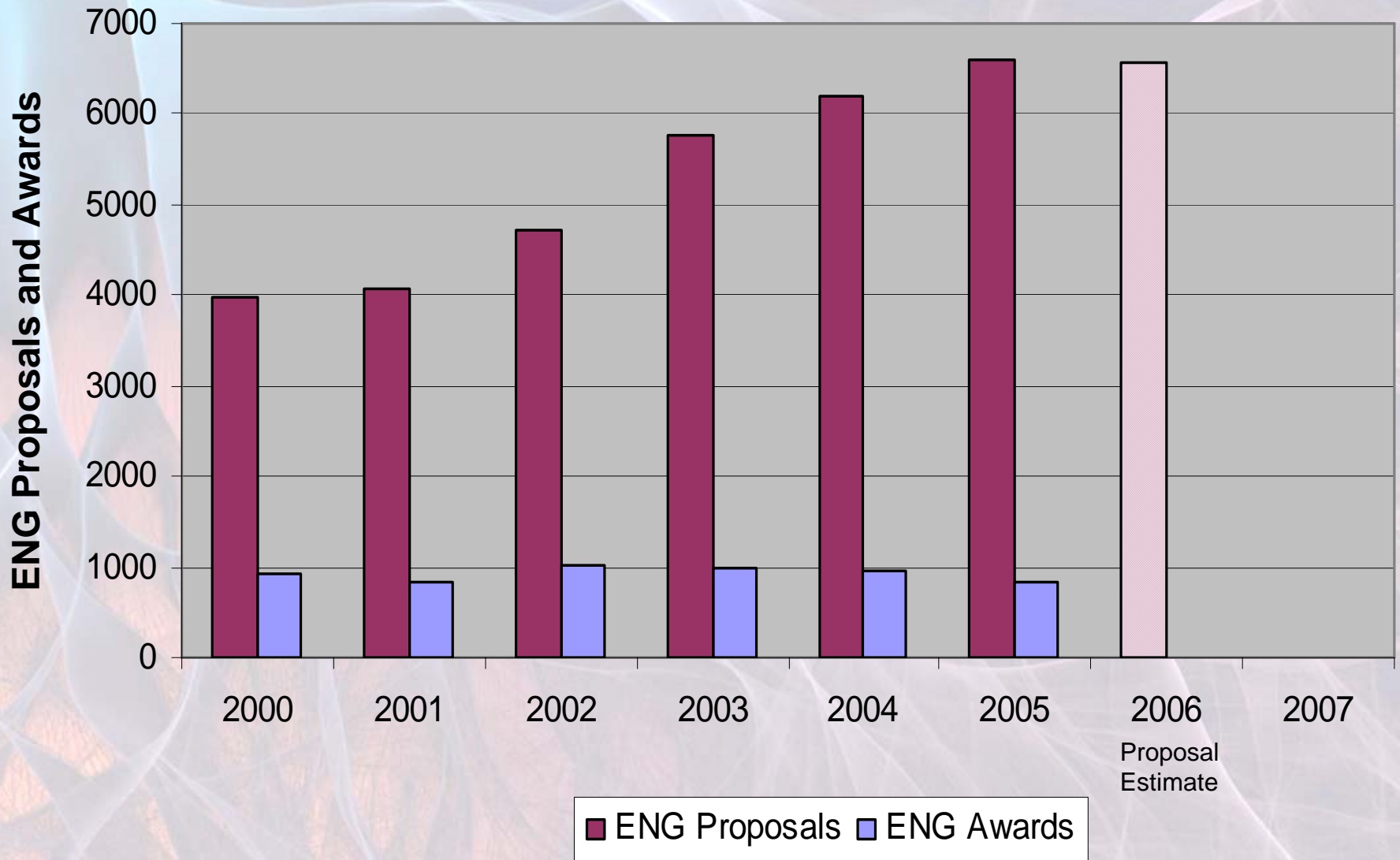
# PI and Co-PI Submissions

## ENG Research Grants



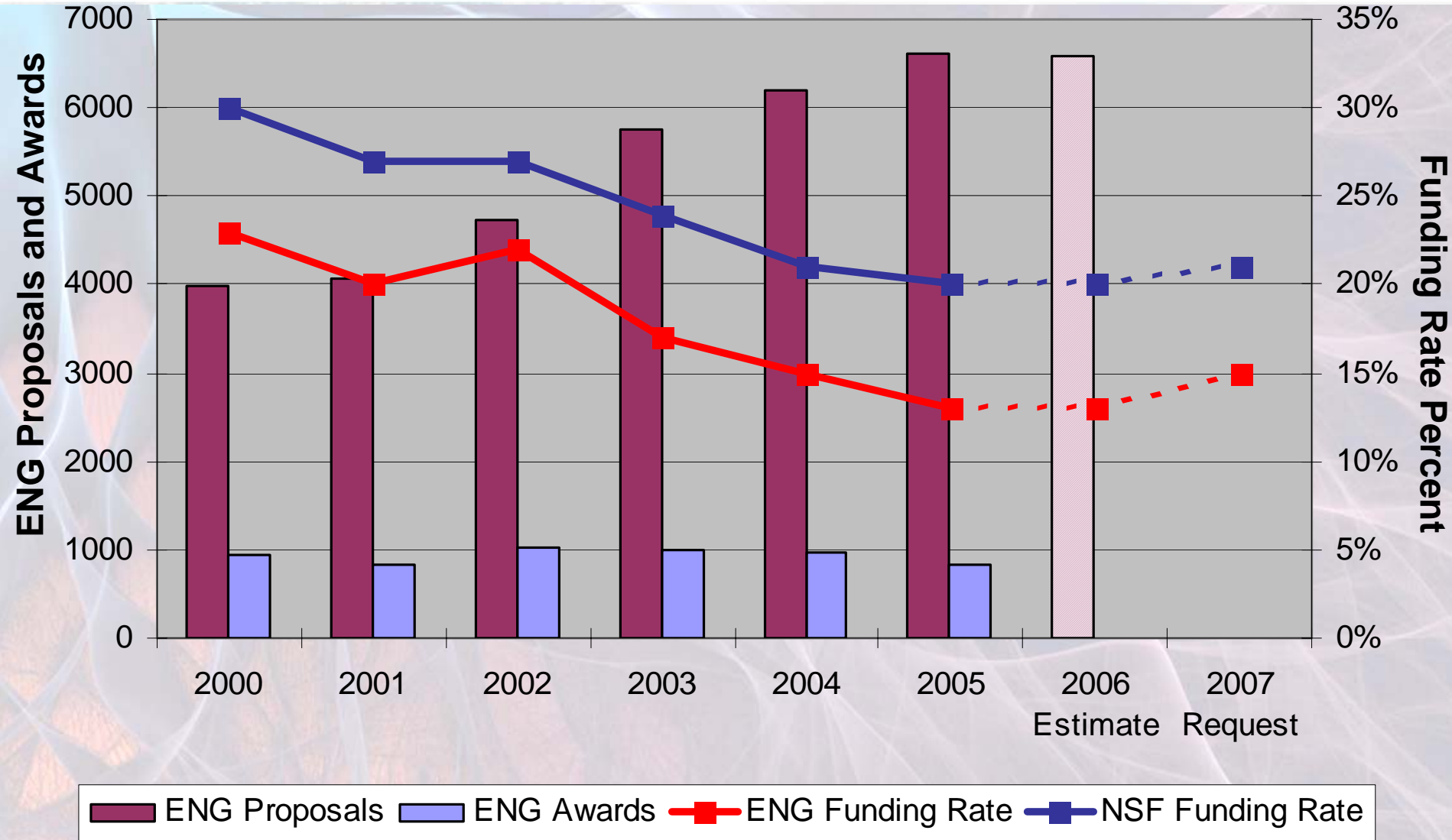
# ENG Proposals and Awards

## Research Grants



# ENG and NSF Funding Rates

## Research Grants





# Summary



# Summary

- The reorganization of the directorate has gone smoothly, and ENG has been able to work effectively with the various stakeholders within NSF to move this forward.
- The EFRI process was well-received by ENG division directors and program managers. Internally, the process to date has been very successful.
- ENG appears to be on track to increase funding rates.
- The ACI will significantly benefit NSF and ENG.



# Summary

- **Current trends indicate that ENG will experience increased impact and growth for the foreseeable future.**
- **With these increasing opportunities, there are also increasing responsibilities.**
- **Clearly defined priorities will be essential for the future of ENG.**
- **Areas where ENG can take a leadership role will be important.**





# Questions





# NSF and ENG Priorities

## → Topics

- ♦ represent a significant intellectual opportunity for NSF and ENG,
- ♦ have matured to a point where multiple disciplines can contribute, and
- ♦ focused enough so that NSF and ENG can have a unique and meaningful impact.

## → Priorities

- ♦ provide broad guidance on those areas where NSF and ENG can advance a body of knowledge in meaningful ways, and
- ♦ are tools that communicate the societal impact of our investments to the research community, to Congress, and to the public at large.



# NSF and ENG Priorities

## → Timeline

- ◆ FY08 topics initiated in Spring 2006
- ◆ ENG Advisory Committee meeting
- ◆ OSTP/OMB R&D priorities provided in early summer
- ◆ Budget calls in summer of 2006
- ◆ FY08 budget request to OMB in Fall 2006
- ◆ ENG Advisory Committee meeting
- ◆ Throughout the Fall, OMB/White House determine request level
- ◆ EFRI Program Directors meeting
- ◆ FY08 Budget released in February 2007



