

NSF and the Directorate for Engineering

ASEE ERC – February 27, 2006



**National Science Foundation
Directorate for Engineering**

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

Topics

- ➔ NSF and ENG Overview
 - ◆ External reports
 - ◆ American Competitiveness Initiative
 - ◆ Budgets
- ➔ ENG Observations
 - ◆ Investments
 - ◆ Research community
 - ◆ Awards and proposals
 - ◆ Collaborations
- ➔ ENG Directorate
 - ◆ ENG organization
 - ◆ ENG reorganization



External Reports

- *Engineering Research and America's Future* (NAE, 2005): Committee to Assess the Capacity of the U.S. Engineering Research Enterprise
- *The Engineer of 2020* (NAE, 2004) and *Educating the Engineer of 2020* (NAE, 2005)
- *Innovate American: National Innovation Initiative Final Report* (Council on Competitiveness, 2005)
- *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* (NRC/COSEPUP, 2005)



American Competitiveness Initiative

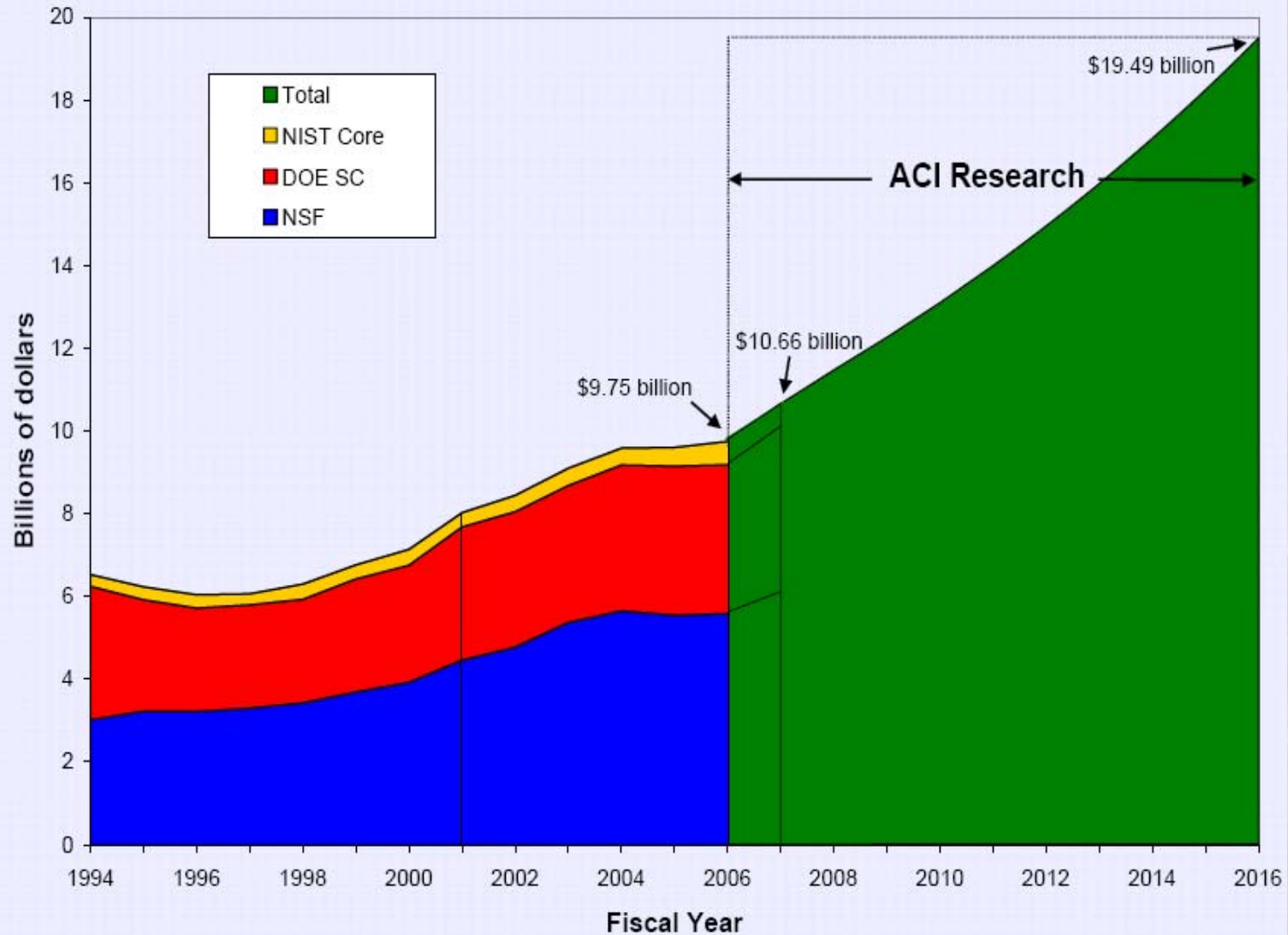
ACI and ENG

- The centerpiece of the 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 funding for innovation-enabling research that supports the 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.”



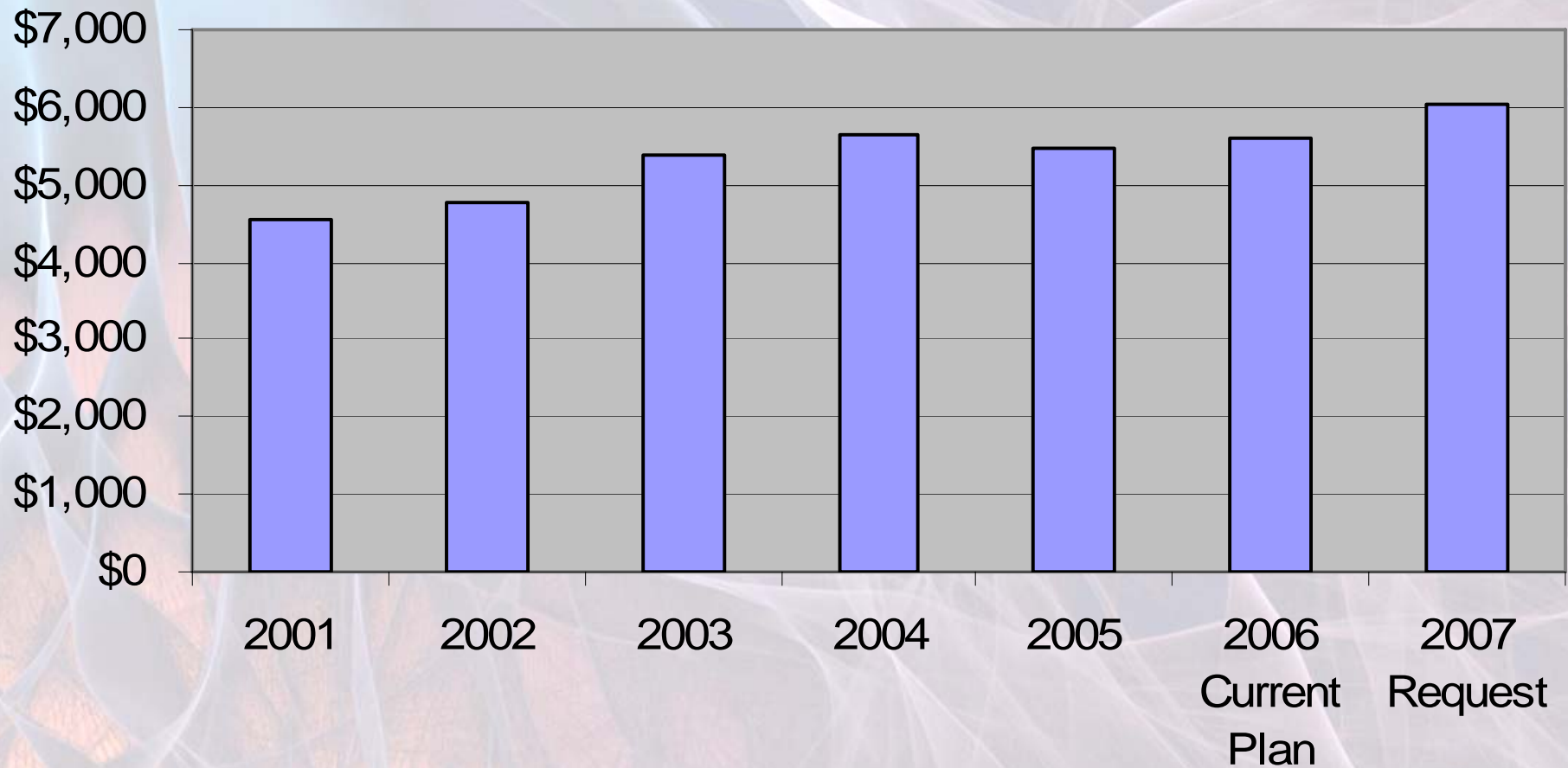
American Competitiveness Initiative

FY 2007 – FY 2016



NSF Budget 2001-2007

Dollars in Millions



NSF Research and Related Activities

FY 2007 Request by Directorate (Dollars in Millions)

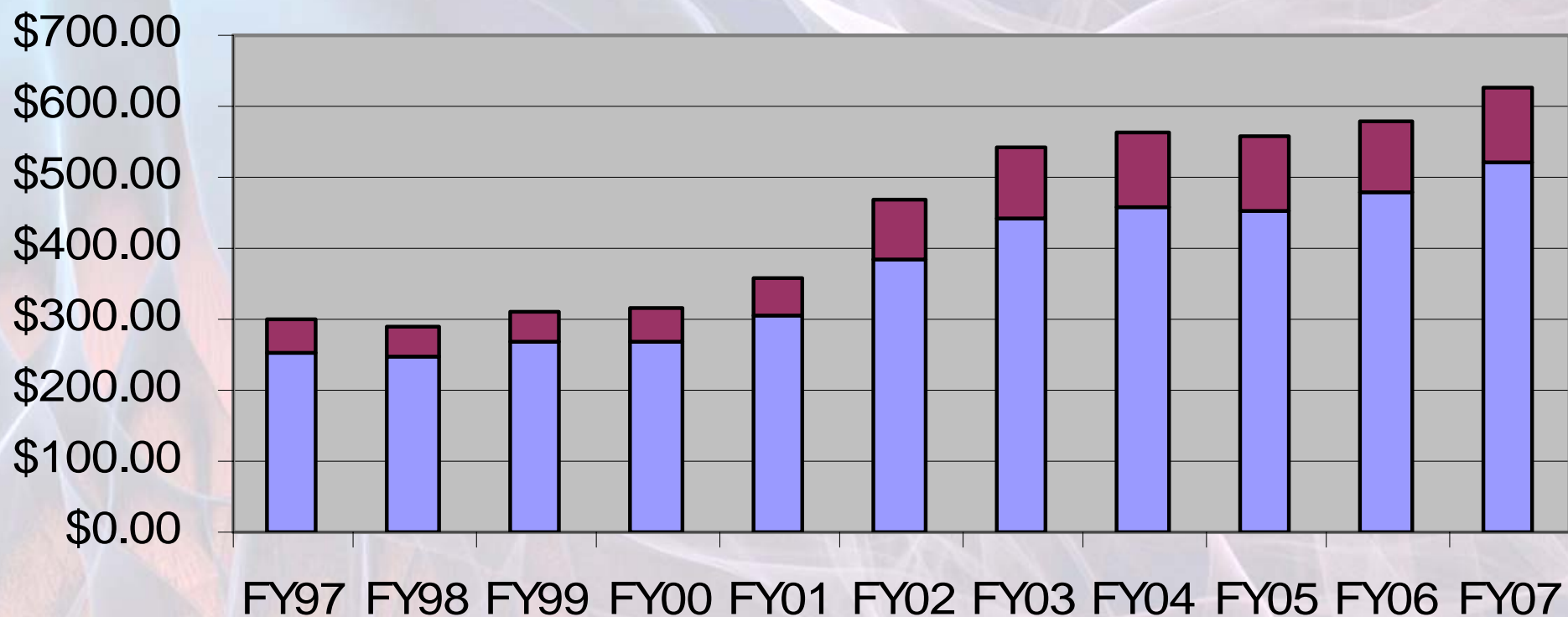
	FY 2006 Current Plan	FY 2007 Request	Amount Change	Percent Change
Biological Sciences	\$576.69	\$607.85	\$31.16	5.4%
Computer & Information Science & Engineering	496.41	526.69	30.28	6.1%
Engineering (includes SBIR/STTR)	580.92	628.55	47.63	8.2%
Geosciences	702.83	744.85	42.02	6.0%
Mathematical & Physical 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%
Total, R&RA	\$4,331.48	\$4,665.95	\$334.47	7.7%

Totals may not add due to rounding.



ENG Budget History

Dollars in Millions



■ ENG ■ SBIR/STTR



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ENG NSF-wide Investments

Dollars in Millions

	FY 2005 Actual	FY 2006		Change over FY 2006	
		Current Plan	FY 2007 Request	Amount	Percent
Biocomplexity in the Environment	6.00	5.94	4.00	-1.94	-32.66%
Human and Social Dynamics	2.00	2.00	2.00	0.00	0.00%
Mathematical Sciences	2.91	2.88	1.46	-1.42	-49.31%
Climate Change Science Program	1.00	1.00	1.00	0.00	0.00%
Cyberinfrastructure	52.00	52.00	54.00	2.00	3.85%
National Nanotechnology Initiative	123.77	127.77	137.02	9.25	7.24%
Networking & Information Technology R&D	11.20	11.20	11.20	0.00	0.00%

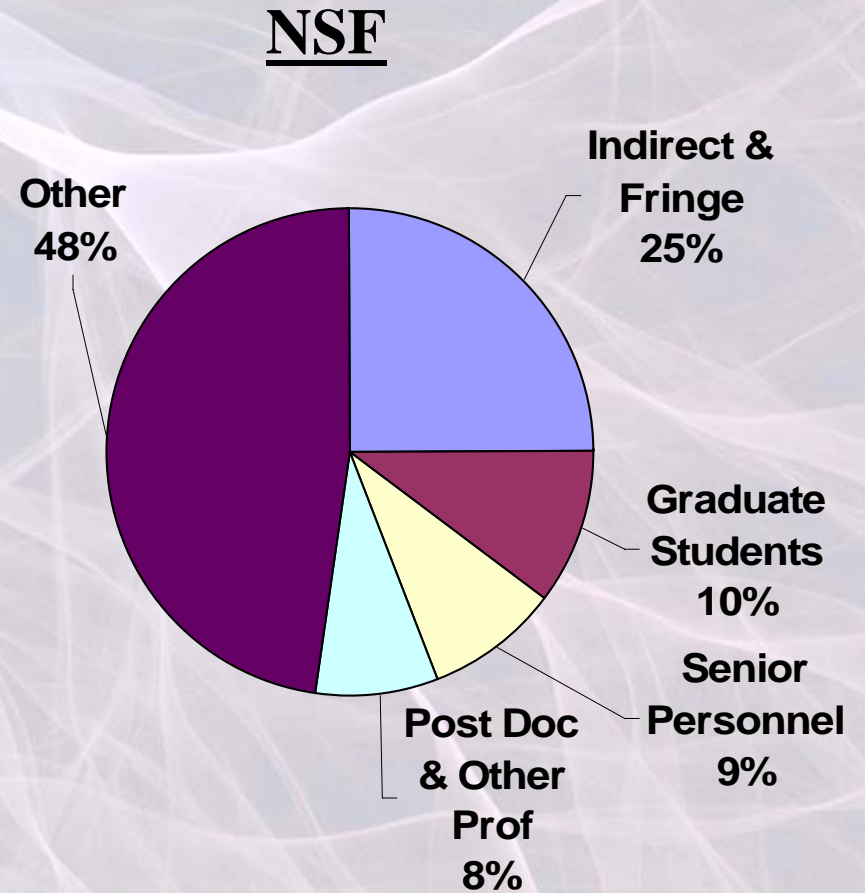
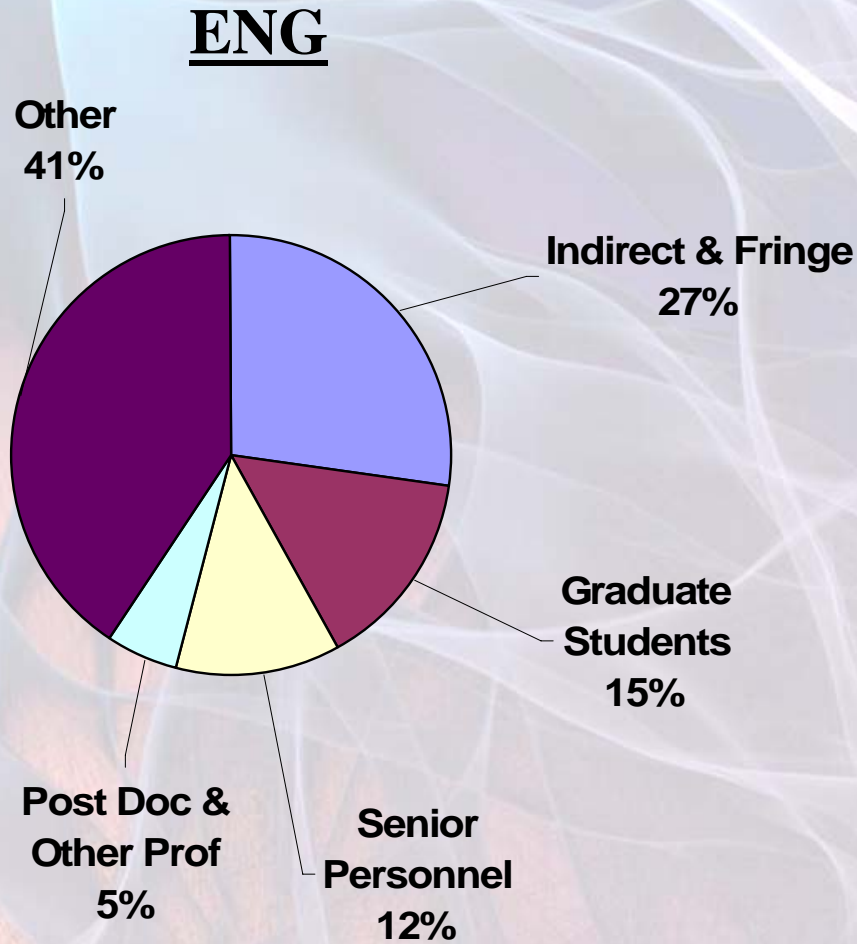


ENG Observations



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Investments

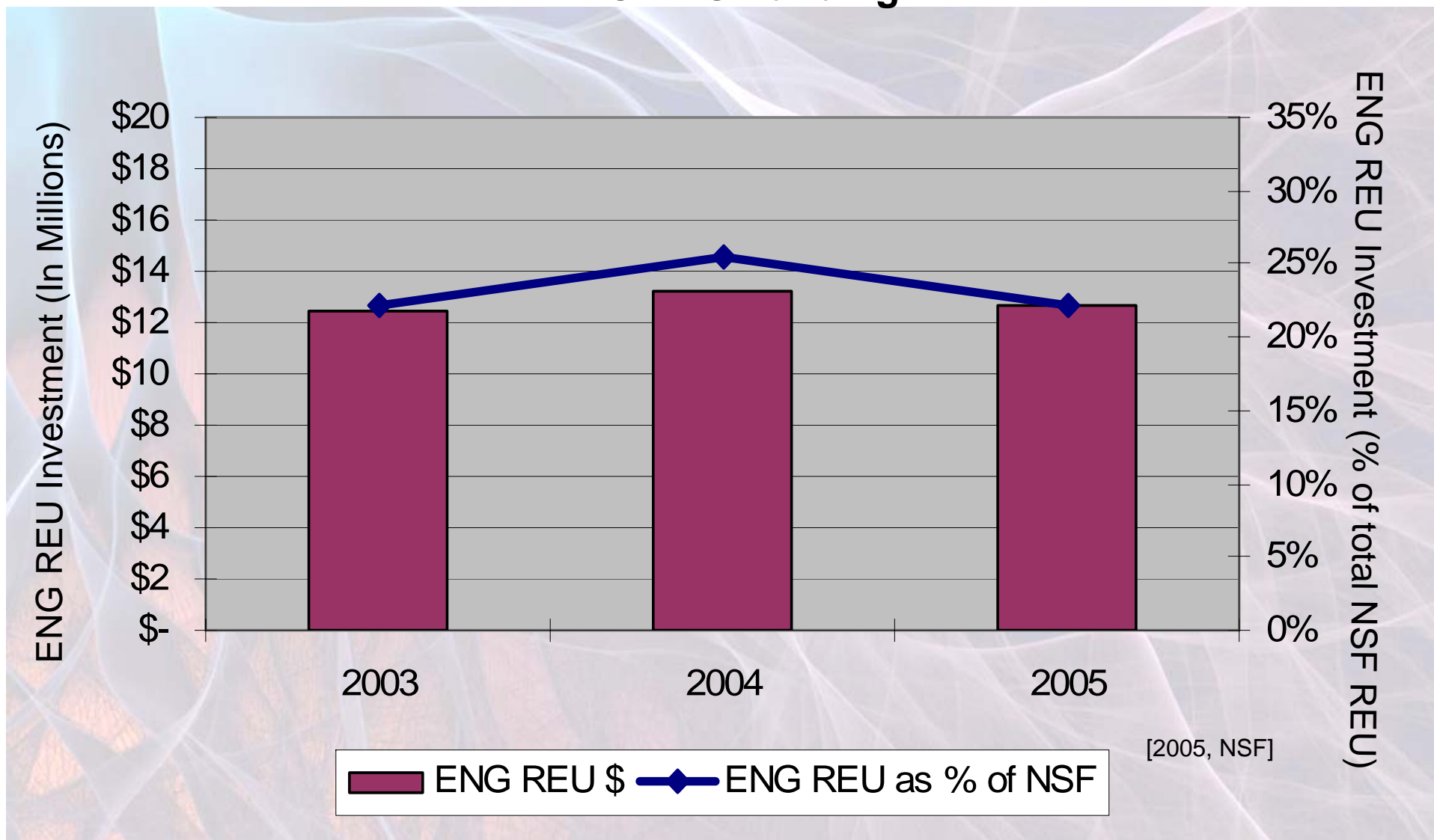


Other includes: direct costs (subcontracts, materials and supplies, consultant services), permanent equipment, travel, other personnel, etc.



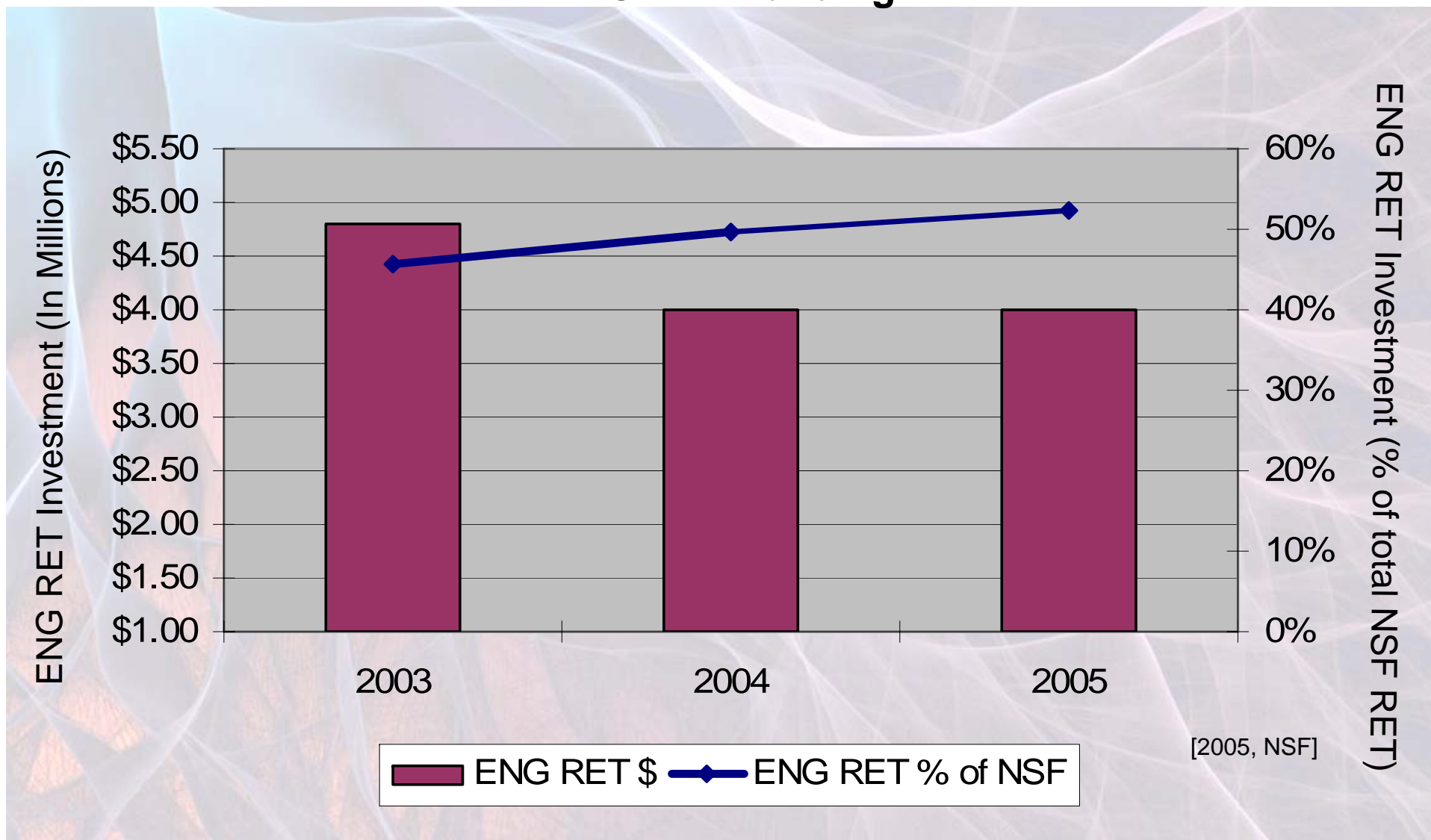
Research and Education

ENG REU Funding



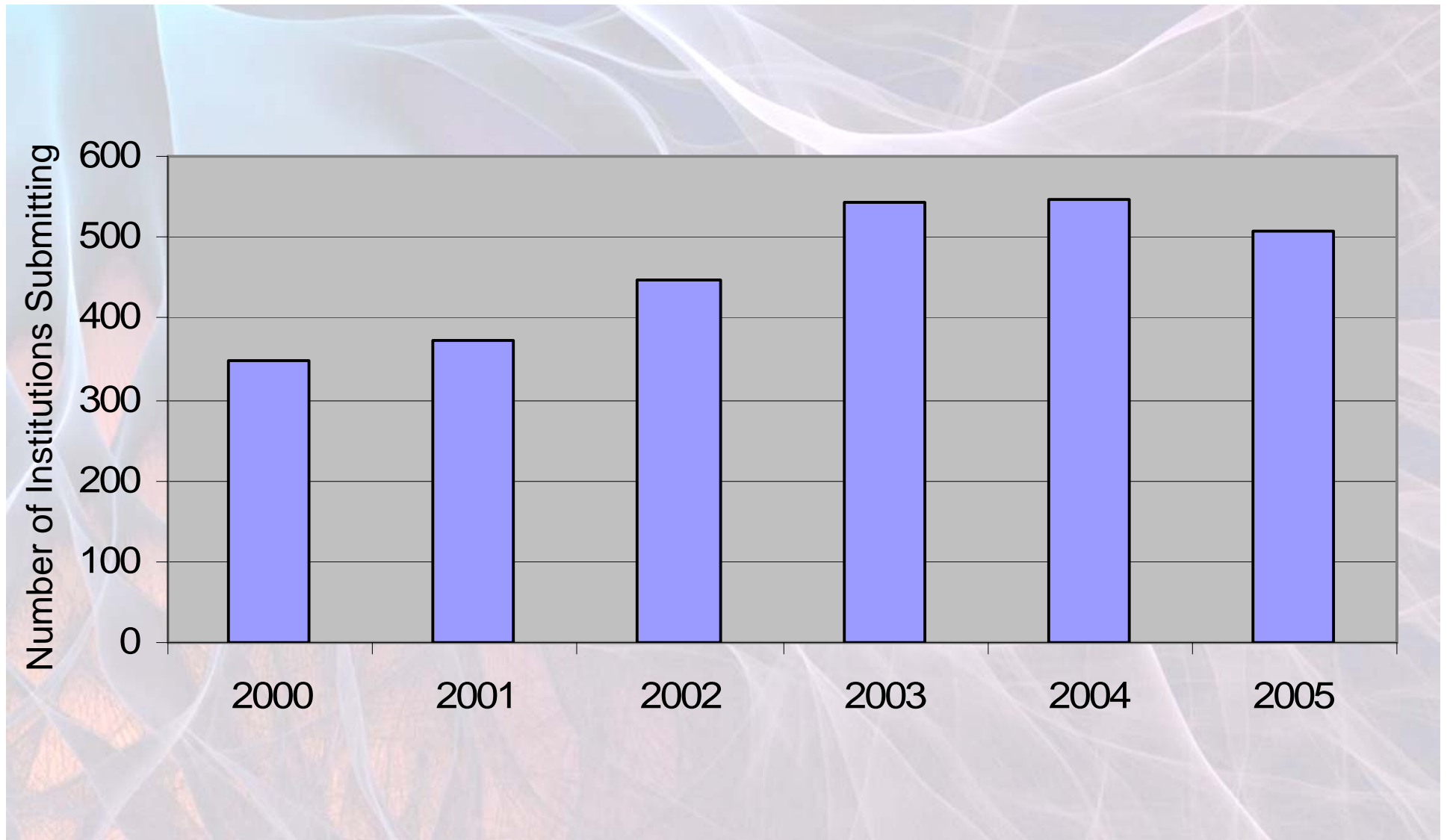
Research and Education

ENG RET Funding



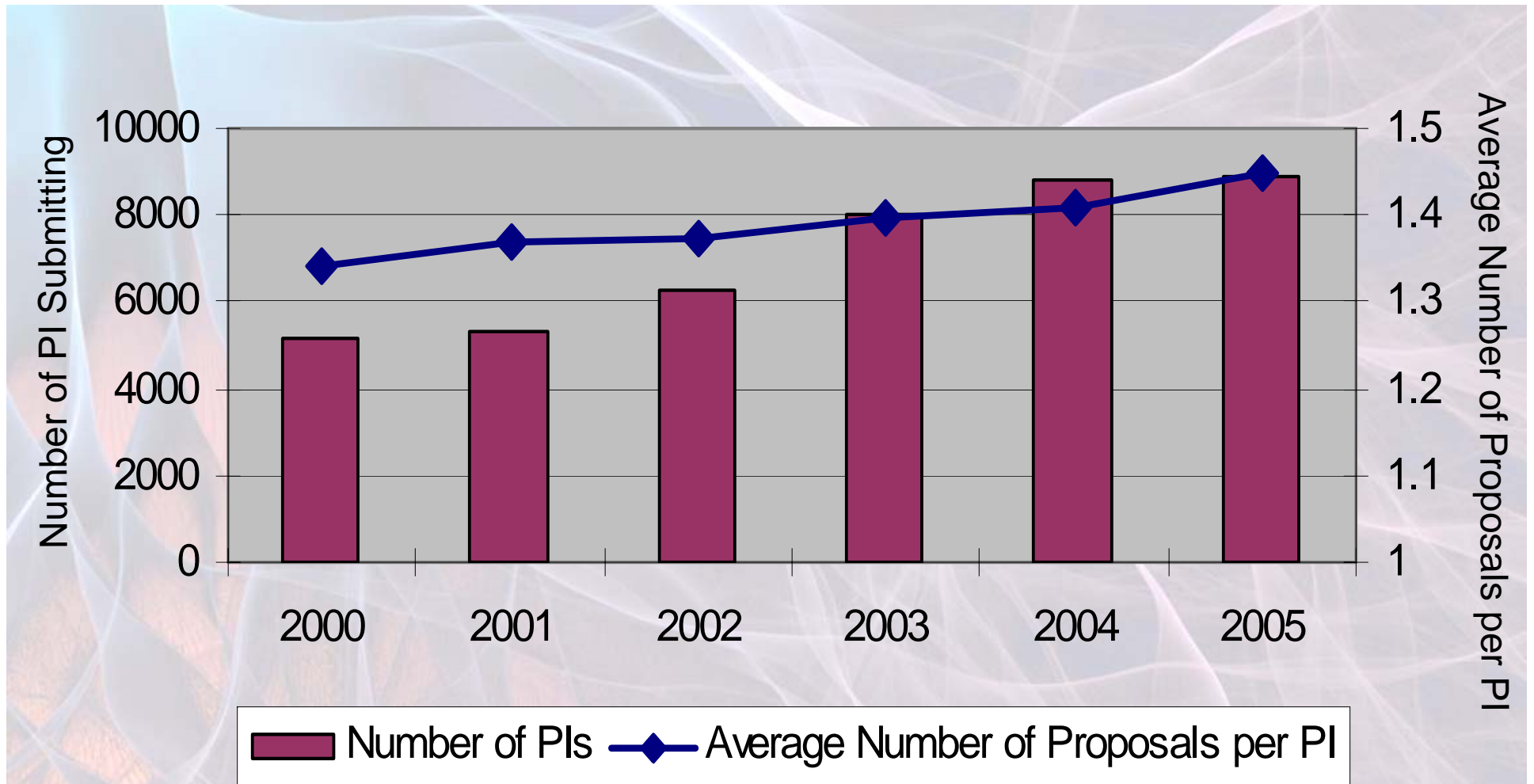
Institution Submissions

Non-SBIR



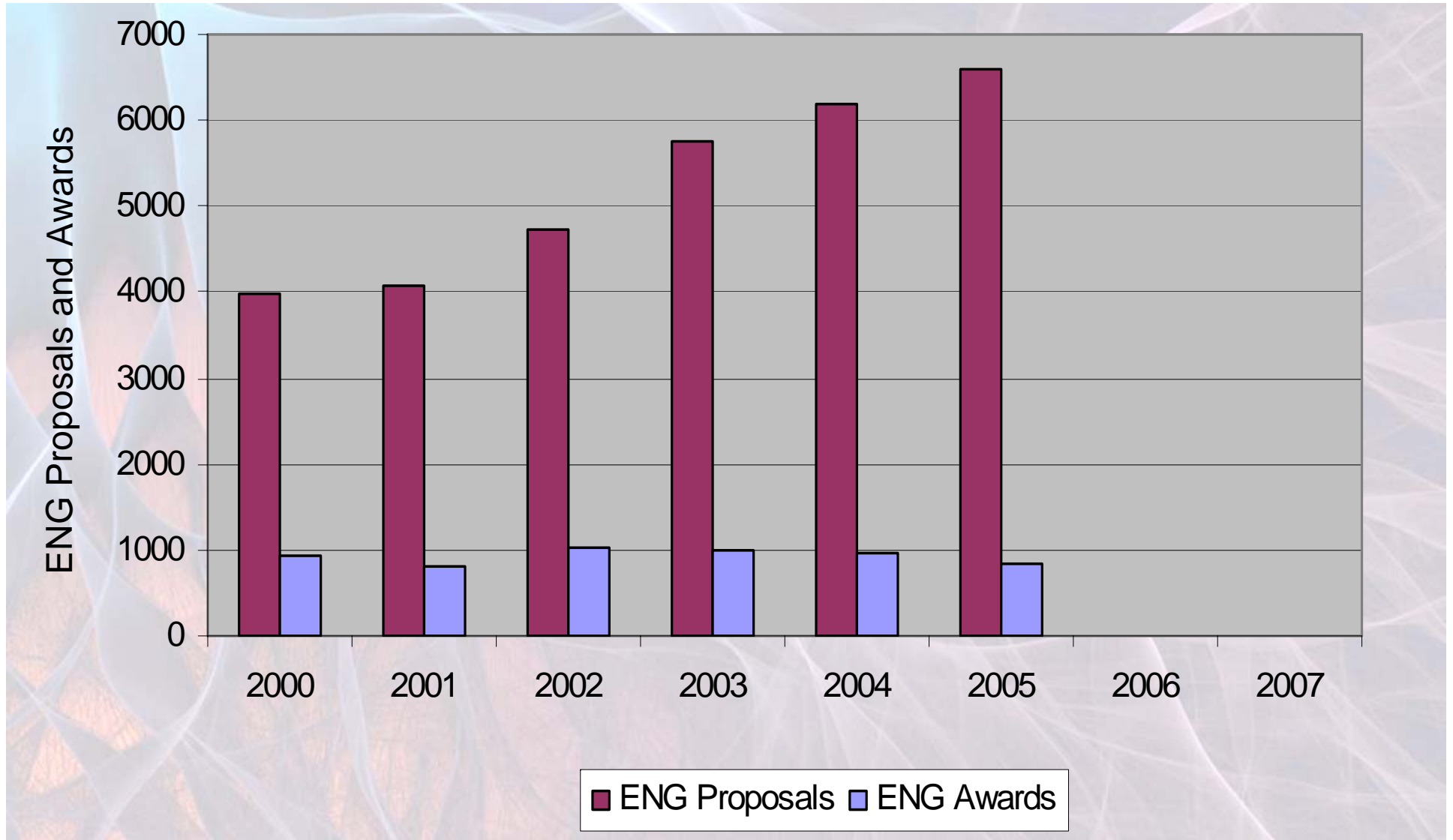
PI Submissions

ENG Research Grants



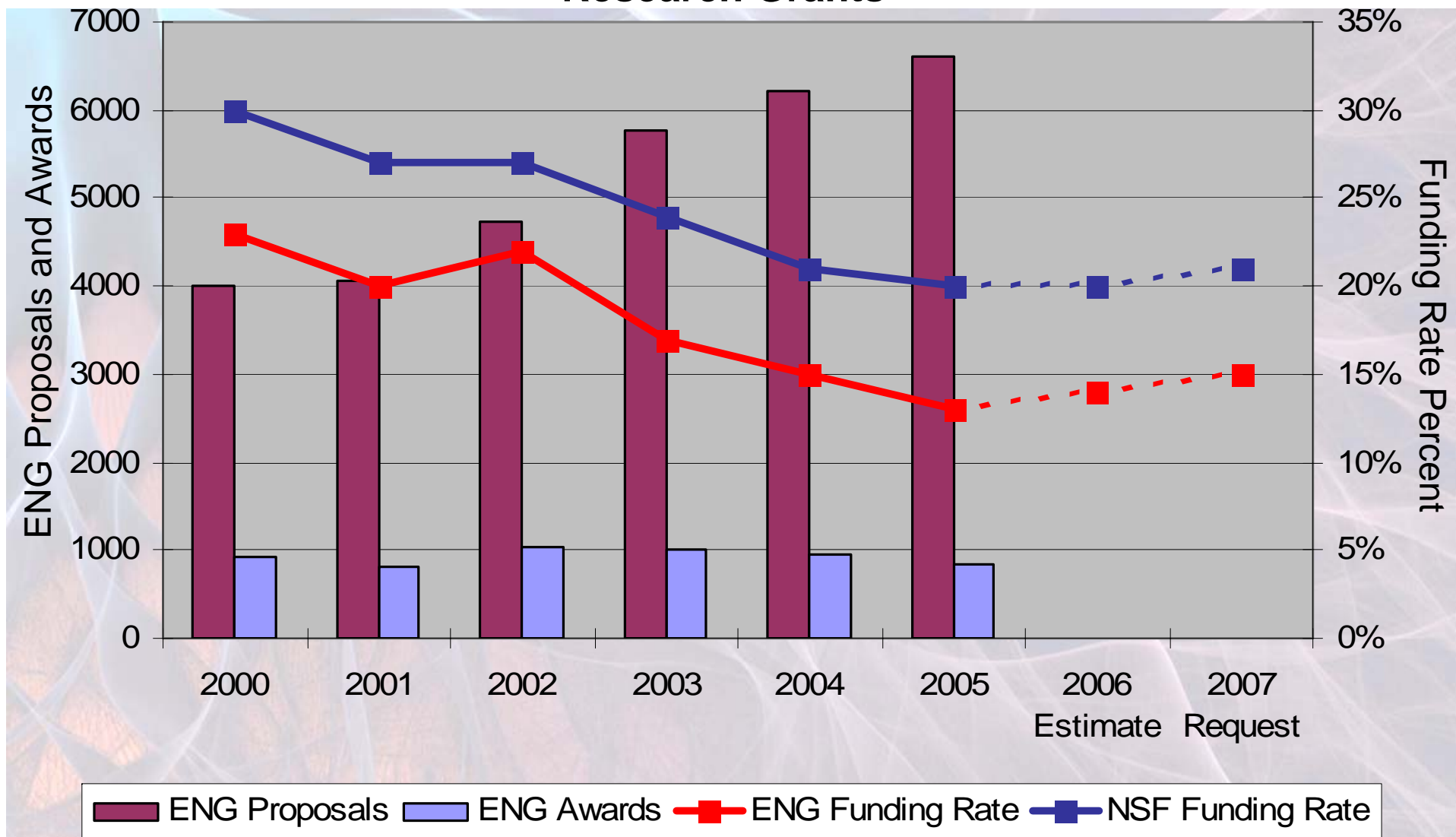
ENG Proposals and Awards

Research Grants



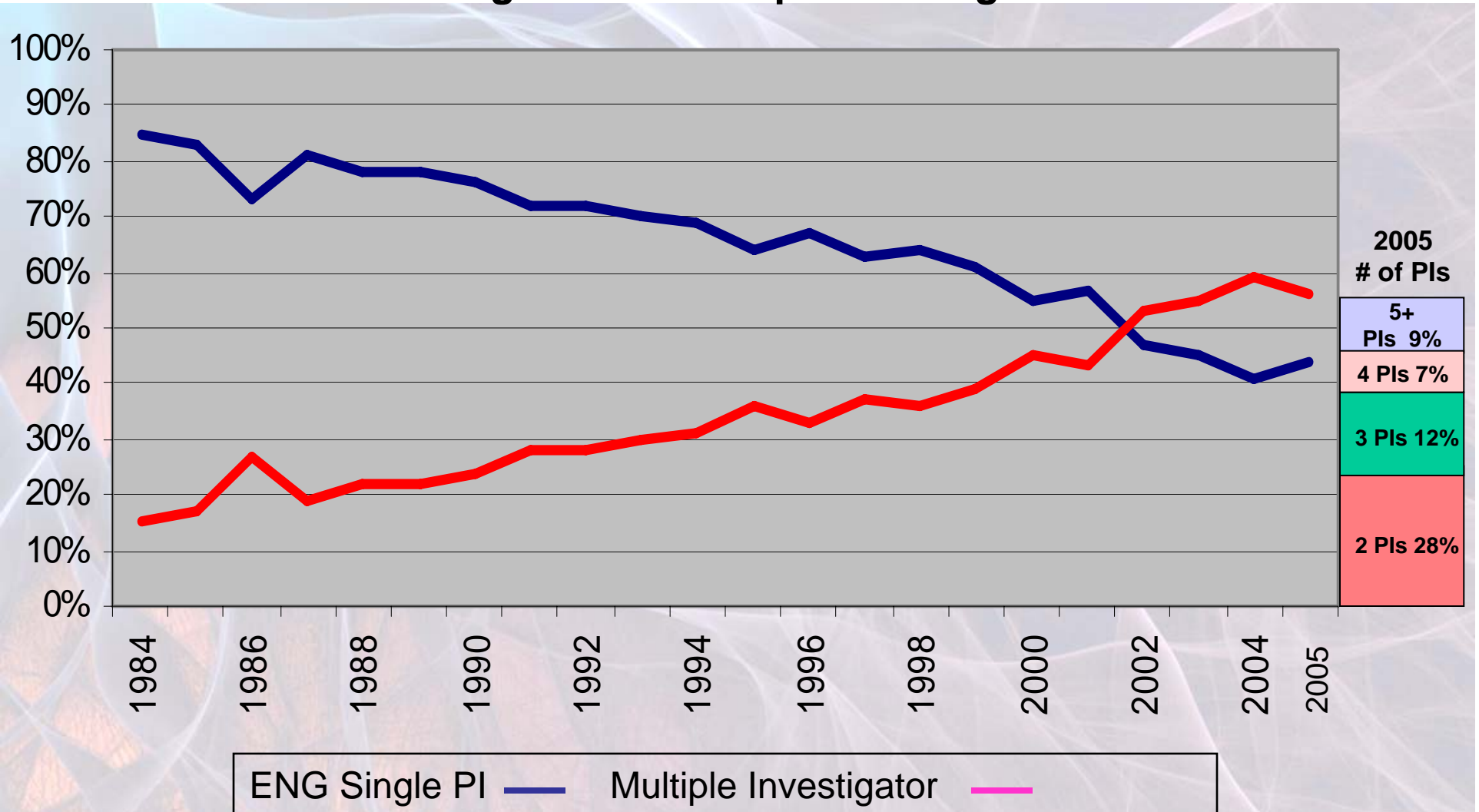
ENG and NSF Funding Rates

Research Grants



Research Collaborations

Percent of Single PI vs. Multiple Investigator Awards



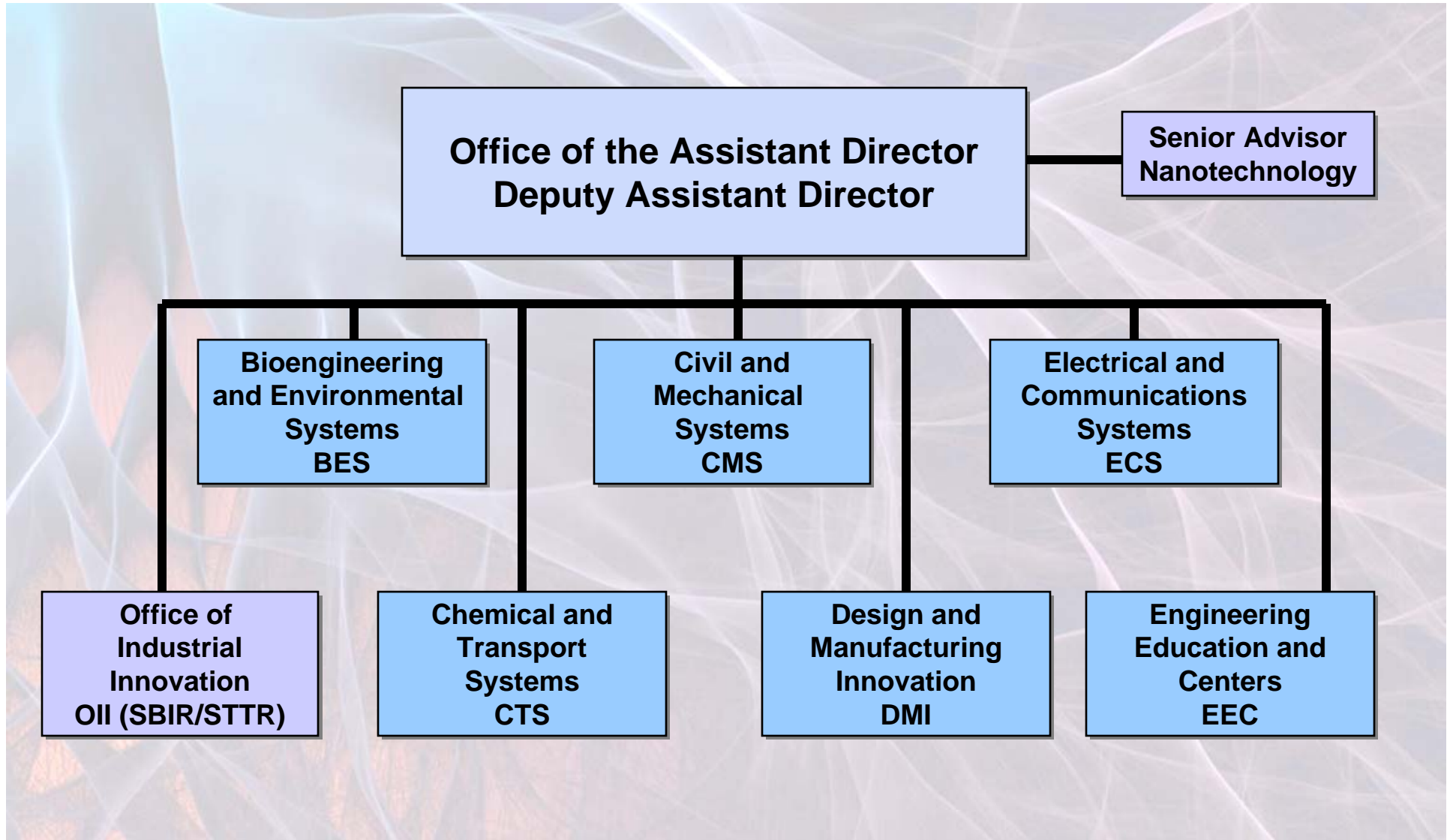
Directorate for Engineering



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Directorate for Engineering

Current Structure



Engineering at the NSF and in the U.S.

Internal Conditions

- In 2006, the NSF Engineering Directorate will invest approximately \$580 million – among the smallest budgets in NSF – to support the entire breadth of engineering, including its nanotechnology and cyberinfrastructure investments.
- These resources will be divided among 6 divisions and one office – the largest number of funding entities in all of NSF.
- Engineering currently receives the largest number of proposals of any NSF directorate.

External Conditions

- Engineering education and research are becoming increasingly interdisciplinary and collaborative. Universities and industries are adopting interdisciplinary clusters.
- Many foreign nations are increasing emphasis in engineering research and graduating more engineers than the United States.
- Leadership in technological innovation will be key to the nation's prosperity and security in a global, knowledge-driven economy.



Potential Reorganization Outcomes

Ability to Pursue New Directions

- Provides mechanisms to pursue high-risk, frontier research.
- Enables research at the intersection of diverse disciplines.
- Combined divisions promote agile and flexible responses to emerging challenges.

Collaboration Across Disciplines

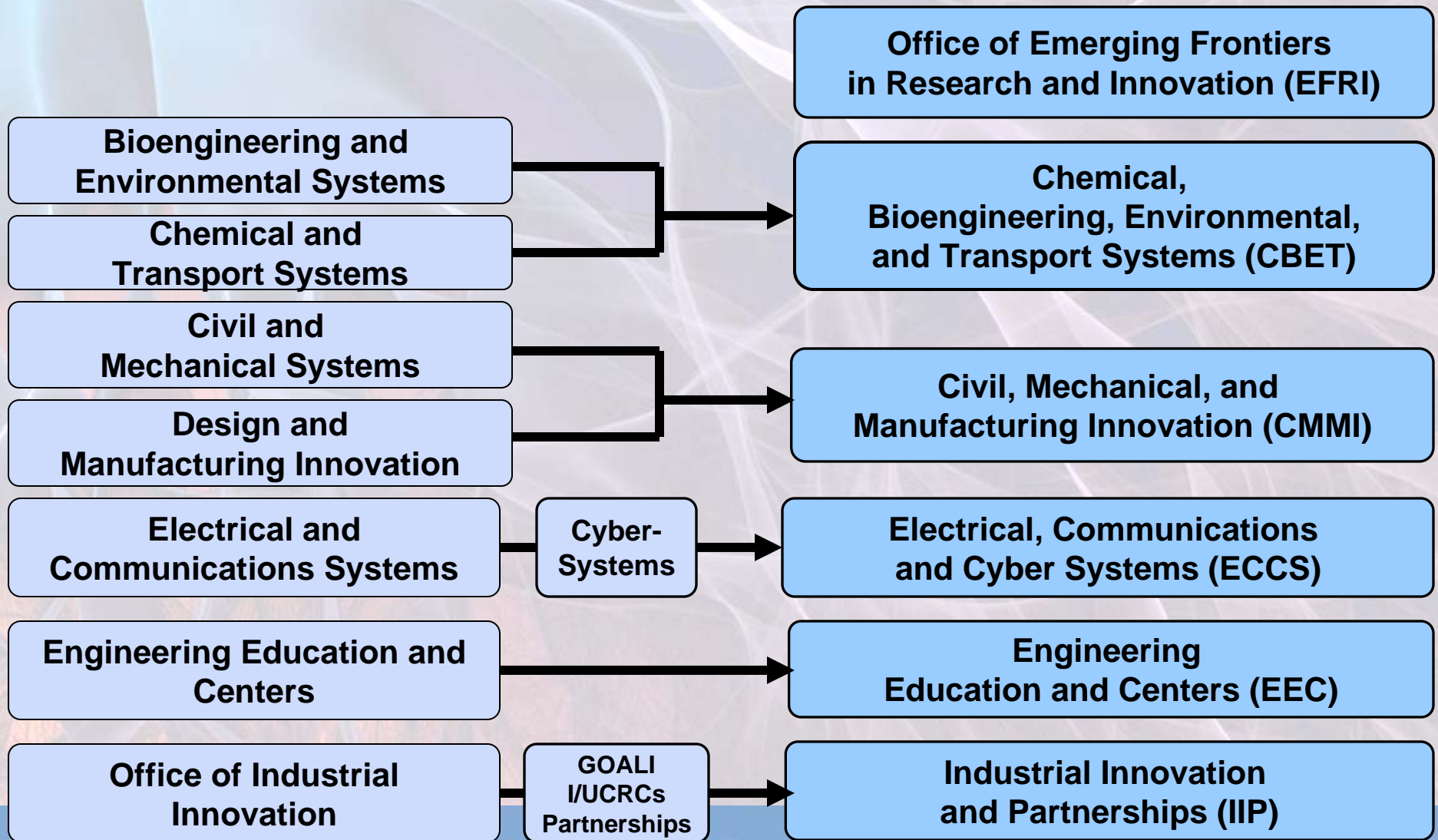
- Enhances integration of education and research.
- Enables a more integrated approach to research priorities.
- Builds synergy among basic research, discovery, and innovation.



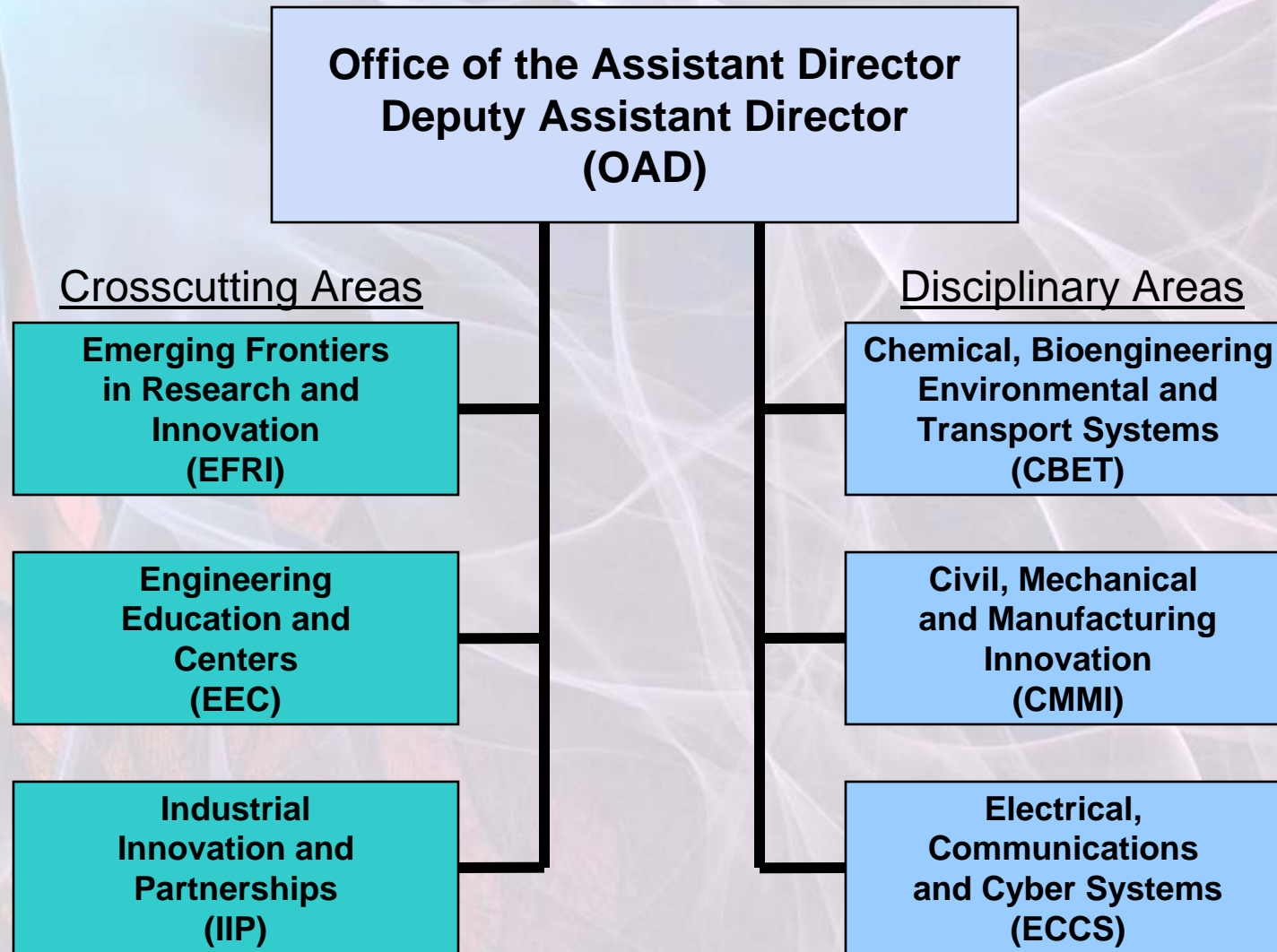
Merging Divisions and Priorities

Fiscal Year 2006

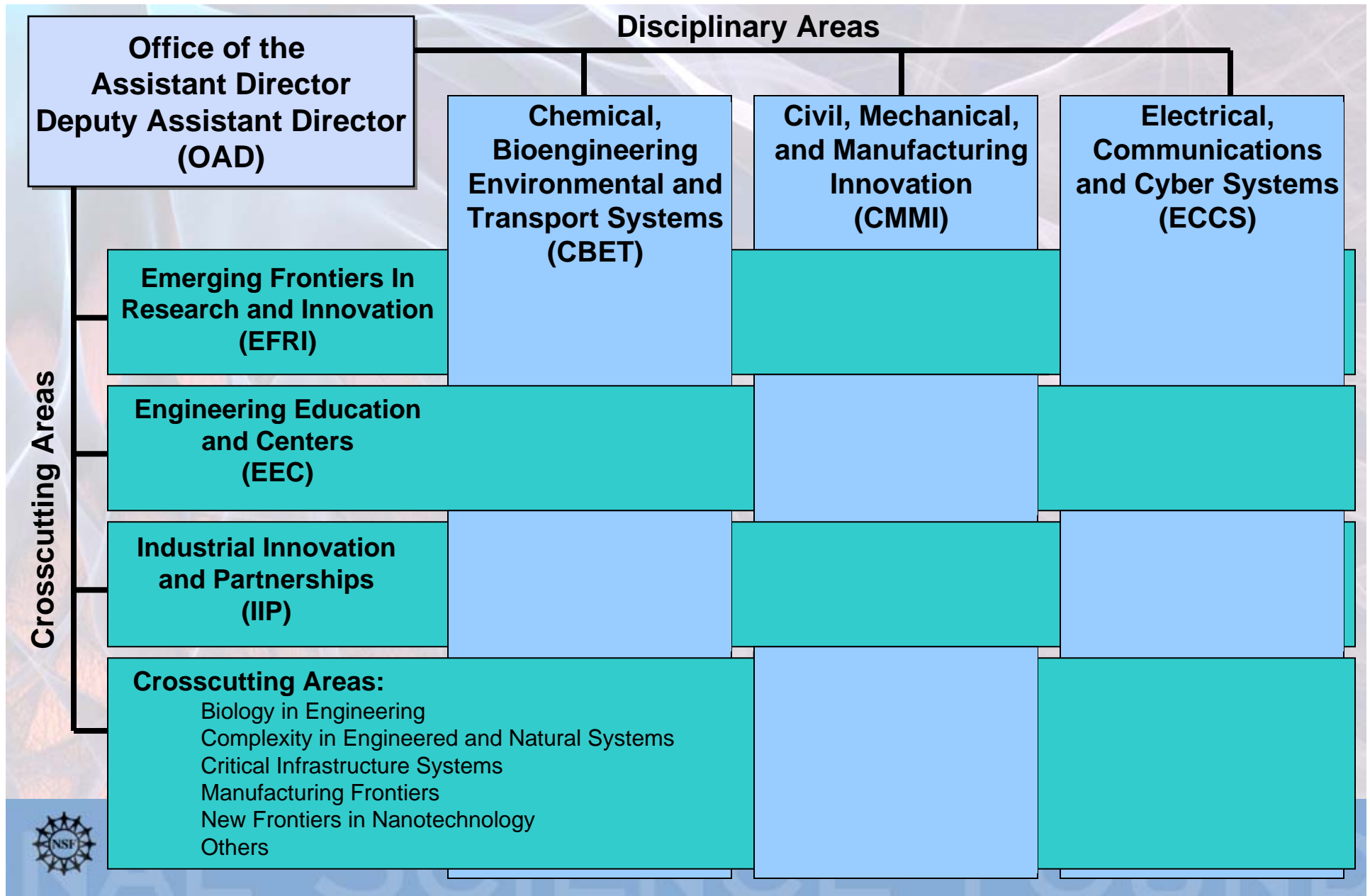
Fiscal Year 2007 (tentative division titles)



New Organizational Structure



New Organizational Structure



Feedback from the Community

- NSF and ENG have reached out to the engineering community to get broad feedback on the proposed reorganization. Highlights include:
- ◆ ENG should use care in merging divisions to ensure current successful programs are not lost.
 - ◆ Civil engineering focus on geotechnical research and environmental engineering should be retained.
 - ◆ Bioengineering should remain an explicit element in the new division title. This continual emphasis reflects the burgeoning nature of bioengineering in the United States and the world.
 - ◆ Crosscutting divisions can impact disciplines previously underrepresented at NSF, for example, fire research.



Reorganization Process

- Throughout 2004: ENG engaged in a comprehensive strategic planning process.
- 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.
- Spring 2006: Completed reorganization presented to Engineering Advisory Committee.
- FY 2007: Engineering Directorate reorganized.



Thank you



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