

EFRI will enable research at the intersection of diverse disciplines – particularly with the directorate’s larger divisions and crosscutting areas. EFRI also will build a foundation upon which the divisions can promote flexible responses to emerging challenges.

**Collaboration:** The new organization will allow the NSF to enhance the integration of education and research, which is critical to developing a world-class workforce. This collaboration will also enable a more integrated approach to national research priorities and the research priorities that evolve within the Directorate for Engineering. It also will help strengthen the continuum of basic research from discovery to innovation.

## Budget Crosswalk Table FY 2006

Dollars in Millions

| Budget Item                              | New Structure |          |         |          |          |         | Dollars  |
|--|---------------|----------|---------|----------|----------|---------|----------|
|  | CBET          | CMMI     | ECCS    | IIP      | EEC      | EFRI    |          |
| <b>Current Structure</b>                 |               |          |         |          |          |         |          |
| Bioengineering and Environmental Systems | 52.00         |          |         |          |          |         | 52.00    |
| Chemical and Transport Systems           | 70.87         |          |         |          |          |         | 70.87    |
| Civil and Mechanical Systems             |               | 85.35    |         |          |          |         | 85.35    |
| Design and Manufacturing Innovation      |               | 61.44    |         | 3.40     |          |         | 64.84    |
| Electrical and Communications Systems    |               |          | 77.27   |          |          |         | 77.27    |
| Engineering Education and Centers        |               |          |         |          | 6.80     | 123.43  | 130.23   |
| Office of Industrial Innovation          |               |          |         | 100.36   |          |         | 100.36   |
| Conceptual FY 2006 New Structure Total   | \$122.87      | \$146.79 | \$77.27 | \$110.56 | \$123.43 | \$0.00  | \$580.92 |
| FY 2007 Budget Request Total             | \$124.44      | \$152.16 | \$80.90 | \$120.08 | \$125.97 | \$25.00 | \$628.55 |

**Transitioning the Budget:** The above chart demonstrates the impact to the Fiscal Year 2006 Budget, if the reorganization were to take place today. The horizontal values represent the FY 2006 budget under ENG’s current organizational structure. The vertical columns show the budgetary impact of the proposed reorganization. Values from the NSF’s FY 2007 Budget Request to Congress are added to the bottom of the chart to better demonstrate the potential impact of the reorganization on future ENG budgets.

**Outreach and Feedback:** To ensure that all possible opinions and recommendations are brought to bear during the reorganization, the directorate has been extremely proactive in seeking external advice and input.

## 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, including fire research.

In addition to seeking comments from the engineering community, the directorate also engaged the Advisory Committee for Engineering, to ensure that all possible advantages and disadvantages were considered while bringing this plan to fruition.

## Reorganization Process

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

**Process and Next Steps:** Throughout the reorganization, the directorate will continue to receive guidance from the engineering community and others. With this careful attention to outside input and internal reviews, it is believed that this effort will yield a successful structure, which will continue to serve the needs of the national engineering enterprise, while supporting frontier research.

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# NATIONAL SCIENCE FOUNDATION DIRECTORATE FOR ENGINEERING

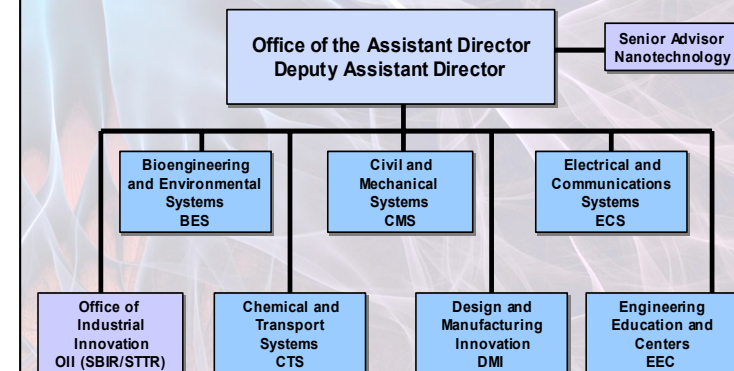


## Organization and Reorganization

The National Science Foundation’s Directorate for Engineering (ENG) supports leading edge engineering education and fundamental engineering research. The fruits of this activity yield critical new technologies and innovative systems. They enable our nation to be more secure and more prosperous, and its citizens to be healthier and more productive. The directorate’s current organizational plan — which has been in place for more than a decade and a half — enabled the NSF to meet these needs by investing in a broad range of research and education initiatives.

## Directorate for Engineering

Current Structure



NATIONAL SCIENCE FOUNDATION

Over that period, however, global competition in innovation has increased, new industries have emerged, and the engineering research and education process has evolved. These new conditions have compelled the Directorate for Engineering to undertake a comprehensive self-assessment.

## 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.

This careful review resulted in a new vision for how the directorate should be organized to ensure that the United States will retain its position of global leadership in frontier research, discovery, and innovation.

## Potential Reorganization Outcomes

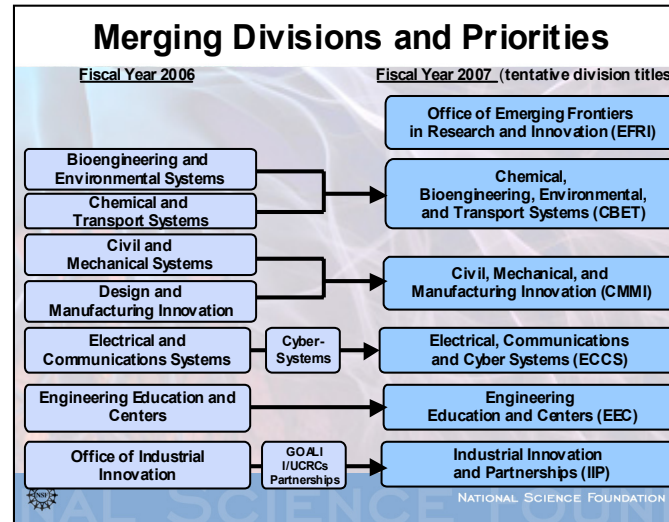
### Ability to Pursue New Directions

- 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.

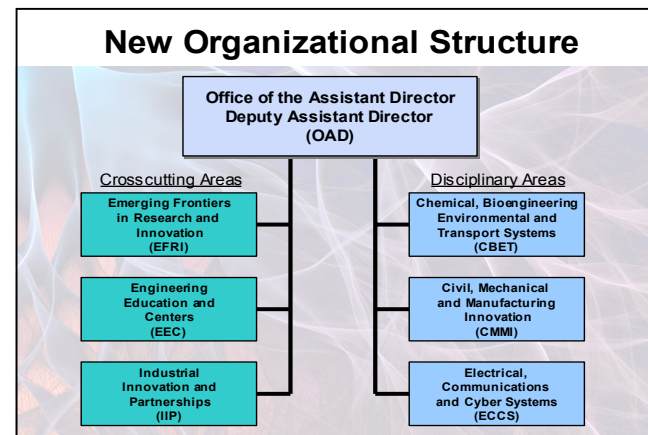
### Collaboration Across Disciplines

- 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:** The proposed new structure will enable the Directorate for Engineering to pursue emerging priorities, while fostering interdisciplinary research across the divisions. The reorganization will entail consolidating ENG's five current disciplinary divisions into three, and creating three crosscutting areas. The following chart outlines the specific changes.



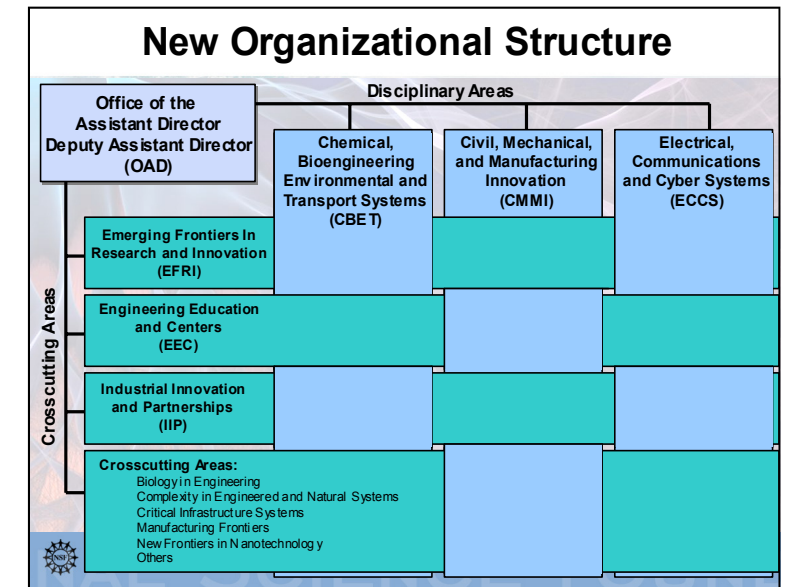
**Advancing the Frontier:** To enhance support for cutting-edge frontier research, a new Office of Emerging Frontiers in Research and Innovation (EFRI) will be created. Transformational changes in engineering research — from discovery to innovation — are frequently found in high-risk, interdisciplinary areas. The current divisions are not strategically aligned to support this type of research, which may fall outside the usual classifications and research areas. EFRI will give the directorate an important tool to support fundamental research. It also will provide leadership in meeting engineering grand challenges in a timely manner.



**Expanding Portfolios:** The reorganization also will expand two existing elements of the directorate. Specifically, cybersystems will become part of the Division of Electrical and Communications Sys-

tems. Additionally, the Office of Industrial Innovation will expand its portfolio of partnerships to include Grant Opportunities for Academic Liaison with Industry (GOALI), Industry/University Cooperative Research Centers (I/UCRCs), and other partnerships critical to advancing discovery and innovation.

**New Structure:** When complete, the new organizational structure will allow the Directorate for Engineering to be more agile in addressing the emerging problems facing the engineering profession and the nation. The new structure also will represent the two fundamental approaches through which the directorate will pursue transformational research and innovation — disciplinary areas and crosscutting interdisciplinary areas — as demonstrated in the following matrix.



**Benefits and Outcomes:** By undertaking this proposed reorganization, the Directorate for Engineering will be better positioned to respond to the emerging national and international demands on the U.S. engineering enterprise.

**New Directions:** One fundamental need is the agility to move quickly as new opportunities appear on the horizon. This enhanced ability to respond in new directions will provide the directorate with mechanisms to pursue high-risk, frontier research — especially with the creation of the Office of Emerging Frontiers in Research and Innovation.