

Right: In 2002, with National Science Foundation support, University of North Texas in Denton education professor Tandra Tyler-Wood launched a science-themed, after-school program that paired elementary and high school girls to explore the scientific method through a series of hands-on experiments in an outdoor laboratory. The goal was to improve the younger girls' critical thinking skills but also to hold their interest. Tyler-Wood dubbed the project BUGS, or Bringing Up Girls in Science.

At the end of the program's first year, the mentoring teams presented the results of their work to parents, teachers, and friends. The program concluded with a two-week capstone experience at a local environmental education center, giving the girls a chance to conduct experiments in the field and take part in environmental awareness programs. In the following two years, the high school students were introduced to mentors of their own—science and engineering majors from the American Association of University Women.

To see whether the partnerships encouraged an interest in science among the younger students, interviews were conducted with each participant before, during, and after her participation in the project. Using standardized science assessment tests, the researchers followed the students' math and science skill levels. The researchers also tested a group of fourth- and fifth-grade girls who were not involved in the BUGS program. Compared to this control group, BUGS students showed a marked increase in enthusiasm, confidence, and science skills at the end of the school year.

Tyler-Wood hopes to bring the concept to girls in middle school, noting that many girls enter high school without adequate math and science preparation. She also hopes to export what she has learned from the project to the broader education community.

Credit: Tandra Tyler-Wood, University of North Texas

For more information:

www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=103068&org=NSF

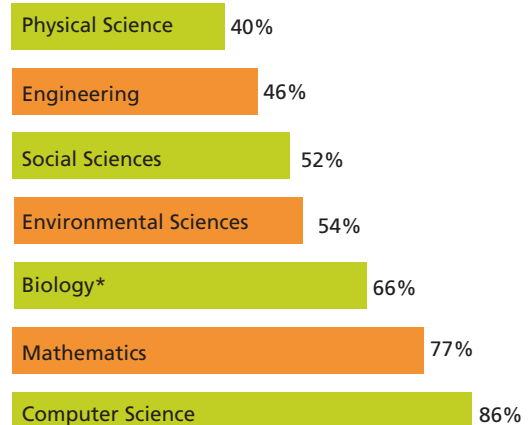


ADVANCING THE FRONTIER

The National Science Foundation (NSF) is steward of America's science and engineering enterprise. Our mission is to promote and advance the progress of research and education in science and engineering in the United States by supporting all fields of fundamental science and engineering except medical sciences. While the agency's \$5.5 billion budget accounts for only about 4 percent of the total federal budget for research and development, NSF provides nearly half of the federal support for nonmedical basic research at the nation's academic institutions. In many fields, including mathematics, computer science, environmental sciences, and the social sciences, NSF is the primary source of federal funding at America's colleges and universities.

NSF's unique task is to search out the frontiers of science and engineering and to foster high risk endeavors that produce new information and knowledge. The results of NSF investments—new discoveries and innovations—have enabled the United States to remain competitive in the global marketplace, sustain economic prosperity, protect the environment, and continually improve the quality of life for all. Since its establishment by Congress 56 years ago, NSF has supported generations of researchers and educators, including more than 160 U.S. and U.S.-based Nobel laureates.

NSF Support of Academic Basic Research in Selected Fields (as a percentage of total federal support)



*Excludes the National Institutes of Health

Moreover, not since World War II have advances in science and technology been more vital to national security. New technology such as advanced ad-hoc networking to enable more rapid first responder capability is critical for homeland security and combating global terrorism. NSF's pursuit of these new frontiers is key to maintaining a high standard of living and economic prosperity for generations to come.

Ideas. Tools. People. Organizational Excellence.

To achieve its mission of advancing the frontier of science and engineering, NSF invests in four strategic areas: Ideas, Tools, People, and Organizational Excellence.

Ideas: Investments in ideas are aimed at the frontiers of science and engineering, to ensure that America maintains its global leadership. They build the intellectual capital and fundamental knowledge that drive technological innovation, spur economic growth, and increase national security and welfare. They also seek answers to fundamental questions about the origin and the nature of the universe and humankind.

Tools: NSF investments provide state-of-the art tools and facilities that boost the overall productivity of the research and education enterprise. The strategy is to invest in wide-ranging instrumentation, multi-user facilities, distributed networks, digital libraries, and computational infrastructure that add unique value to research and are accessible and widely shared among researchers across the nation.

People: Leadership in today's knowledge economy requires world-class scientists and engineers and a national workforce that is scientifically, technically, and mathematically strong. Investments in people aim to improve the quality and reach of science, engineering, and mathematics education and enhance student achievement. In FY 2005, NSF investments supported 195,000 people, including researchers, postdoctoral associates, teachers, and students at every level across all the science and engineering disciplines. Embedded in all NSF programs are efforts to build a more inclusive, globally engaged workforce that reflects the strength of the nation's diverse population.

People Involved in NSF Activities (estimated numbers for FY 2005)	
Senior Researchers	32,000
Other Professionals	12,000
Postdoctoral Associates	6,000
Graduate Students	27,000
Undergraduate Students	33,000
K-12 Students	11,000
K-12 Teachers	74,000
TOTAL	195,000

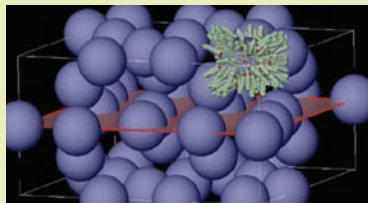
Organizational Excellence: Excellence in management underpins all of the Foundation's activities. NSF strives to maintain an agile, innovative organization that fulfills its mission through leadership in the core business processes—such as financial management and electronic government—with a results-oriented workforce that operates in a continuous learning environment.

A Catalyst for Innovation

NSF does not conduct research or operate laboratories or facilities except for the South Pole Station and other Antarctic program facilities. Instead, NSF is a catalyst for innovation, seeking and funding the best ideas and the most capable people and making it possible for them to pursue new knowledge, discoveries, and innovation.

Ninety percent of NSF funding is allocated through a merit-based competitive process that is critical to fostering the highest standards of excellence. NSF's merit review process is recognized throughout the federal government as the gold standard for responsible use of public funds. Reviewers focus on two primary criteria: the intellectual merit of the proposed activity and its broader impact—how

MOLECULAR SELF-ASSEMBLY



The National Science Foundation is enabling research into one of the most promising areas in science: the effort to understand—and to duplicate or even improve synthetically—the way that atoms and molecules in nature arrange themselves into various arrays with a host of specific functions. This kind of “bottom-up” programmed self-fabrication of materials is a key goal of nanoscience and may revolutionize manufacturing.

In one striking example of such research, scientists at the University of Pennsylvania created spherical branching molecules that assemble themselves into groups of precisely structured building blocks totaling about 250,000 atoms. The illustration above shows two layers of these self-assembled nanostructures that form a complex lattice with a repetitive arrangement of 30 ball-like molecules, each represented as a blue sphere. (Each spherical molecule actually more closely resembles the tree-like shape shown in green and red at top right.) The spherical molecules form a liquid crystal material that may help build nanostructures for molecular electronics or photonics materials. Each repetitive unit of 30 spheres occupies a rectangular volume nearly 20 nanometers (billionths of a meter) by 10 nanometers.

For more information:

www.nsf.gov/od/lpa/news/03/pr0322.htm

well it promotes teaching, training, and learning and what its potential benefit to society is. Reviewers also consider how well the proposed activity fosters the integration of research and education and attracts a diverse set of participants, particularly those from underrepresented groups. In FY 2005, 41,000 members of the science and engineering research and education community volunteered their time to serve as external reviewers, helping NSF conduct nearly 250,000 merit-based reviews.

In FY 2005, NSF awarded nearly 10,000 new grants from about 42,000 proposals to nearly 1,700 colleges, universities, and other public institutions throughout the country. With about one in four proposals funded, the level of competition is such that nearly \$2 billion of proposals are declined, even though they received ratings equal to funded proposals. These declined proposals represent a rich portfolio of lost opportunities at the frontiers of science and engineering with an untold impact on the Nation’s future economic growth.

Where Discoveries Begin

NSF supports cutting-edge research that yields new discoveries over time. These discoveries are essential for maintaining America’s competitive edge in science and engineering. They lead to new technologies that benefit society and improve the quality of life for all citizens.

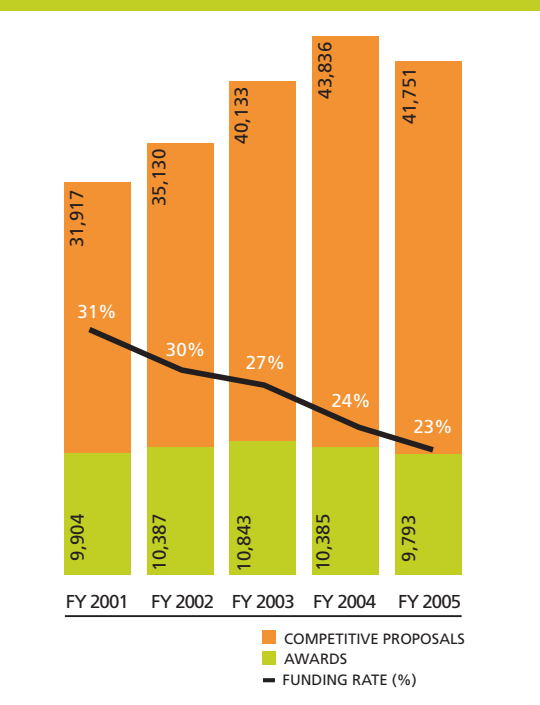
The examples that appear in sidebars throughout this report illustrate the impact and success of NSF’s investments in discovery, learning, and innovation. The results of many NSF-supported projects appear long after the initial investment; the discoveries highlighted here are the outcome of long-term support of research and education projects that emerged and were reported in FY 2005.

Commitment to Excellence

NSF is widely acknowledged as a well-managed, results-oriented agency with a reputation for responsible stewardship of the Nation’s investments in science and engineering. The Foundation has a long record of success in leveraging its agile, motivated workforce, management processes, and technological resources to enhance productivity and effectiveness. Historically, about 95 percent of NSF’s budget supports the conduct of research and education, with administrative overhead accounting for only about 5 to 6 percent.

NSF’s commitment to excellence is evident in a number of achievements in FY 2005. The President’s Management Agenda (PMA) is a governmentwide effort to improve the management, performance, and accountability of federal agencies. In FY 2005, NSF was one of only three agencies to achieve four or more “Green” successful ratings in the five primary PMA initiatives. NSF also achieved a “Green” rating for the agency’s Improper Payments initiative. In the Office of Management and Budget’s (OMB’s) annual review of federal programs using the Program Assessment Review Tool (PART), all NSF programs under the current strategic plan, including those evaluated for the FY 2005 budget year, have received the highest “Effective” rating. Finally, in a second survey of

Number of NSF Competitive Proposals and Awards, and Funding Rates





federal employees conducted by the Partnership for Public Service and the American University Institute for the Study of Public Policy Implementation, NSF once again was ranked as one of the top two federal government workplaces.

As accomplishments move us forward, new demands evolve. Workload and workload complexity remain a challenge, as the number of proposals received has increased more than 40 percent since FY 2000. This has been accompanied by an increase in multidisciplinary, collaborative projects and international activities, as well major research facility projects. In addition, meeting new external administrative, oversight, and accountability requirements is another burden on the Foundation's limited resources.

NSF is currently engaged in its fourth year of a business analysis to address the fundamental challenges facing the agency. During FY 2005, the study supported several PMA initiatives and emphasized opportunities in merit review and award management and oversight. As part of the business analysis, NSF is conducting an administration functions study to investigate the impact of rapidly changing work processes, shifts in workload, and advances in technology on the ability to efficiently perform its administrative duties. The results of this analysis will lead to development of a long-term business plan that will ensure that the Foundation continues to operate efficiently and effectively.

President's Management Agenda Scorecard	Baseline	Status	Progress
	9/30/01	12/30/05	
Strategic Management of Human Capital	●	●	●
Competitive Sourcing	●	●	●
Improving Financial Performance	●	●	●
Expanded Electronic Government	●	●	●
Budget and Performance Integration	●	●	●
Other Agency Initiative: Eliminating Improper Payments	N/A	●	●
<small>Note: Green represents success, yellow is for mixed results, and red is for unsatisfactory. Ratings are issued quarterly by the Office of Management and Budget. N/A indicates not applicable</small>			