FY 2006
PERFORMANCE HIGHLIGHTS

Investing in America's Future:
Advancing Discovery, Innovation, and Education

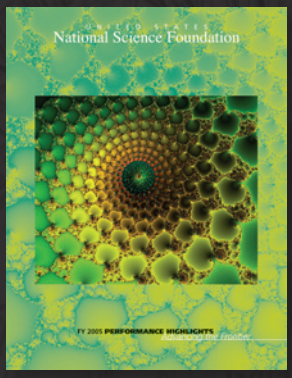
UNITED STATES
National Science Foundation

On the cover:
Networks of neurons within the visual cortex of the brain. This still image is from animations developed by researchers at the Pittsburgh Supercomputing Center (PSC) for the planetarium show, "Gray Matters: The Brain Movie," at the Carnegie Science Center in Pittsburgh. Informal science education projects like planetarium shows expose science and engineering to countless numbers of people of all ages. "Gray Matters" was a collaboration among the Studio for Creative Inquiry at Carnegie Mellon University, the Center for the Neural Basis of Cognition, and PSC. This work was supported in part by the National Science Foundation (NSF), a principal supporter of PSC. NSF supports a range of activities that expand our understanding of brain functions and foster connections between physical, computational, cognitive, and biological sciences and engineering.

Credit: **Greg Hood, John Burkhardt, and Greg Foss, Pittsburgh Supercomputing Center**

For more information:

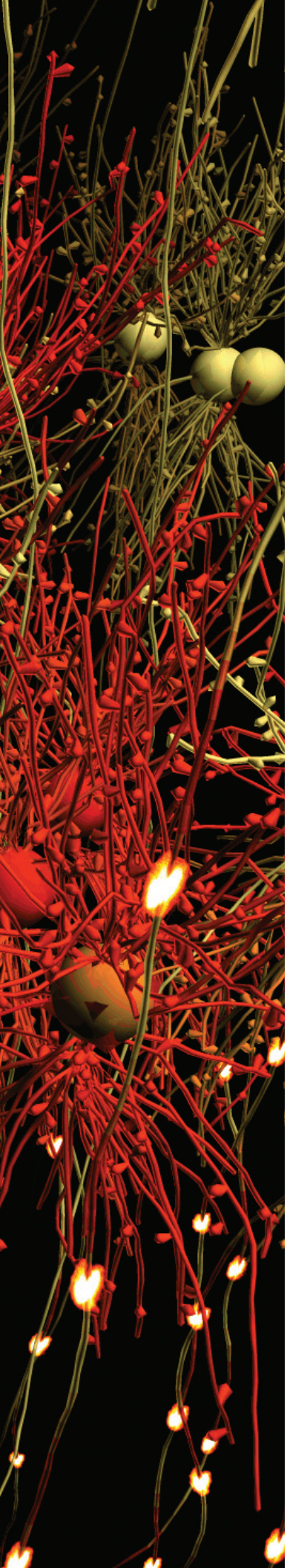
www.nsf.gov/news/mmg/mmg_disp.cfm?med_id=51839&from=search_list



Winner of 2001–2005 VISION Awards
Annual Report Competition
League of American Communications Professionals

Credit: The Webby Awards

2006 Webby Award
People's Voice Winner



Statutory Mission

To promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense.

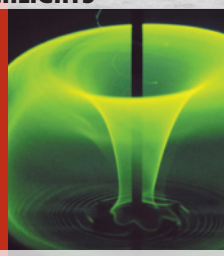
—From the *National Science Foundation Act of 1950*

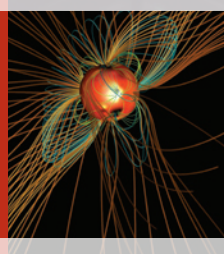
Vision

Advancing discovery, innovation, and education beyond the frontiers of current knowledge, and empowering future generations in science and engineering.

—From *Investing in America's Future: NSF FY 2006–2011 Strategic Plan*

NSF BY THE NUMBERS	
$5.65 billion	FY 2006 Budget (obligations)
4%	NSF's share of total annual federal spending for research and development
45%	NSF's share of federal funding for nonmedical basic research at academic institutions
42,000	Proposals evaluated in FY 2006 through a competitive merit review process
10,450	Competitive awards funded in FY 2006
42,000	Scientists and engineers who evaluate proposals for NSF in a given year
239,000	Proposal reviews done in FY 2006
42,000	Students supported by NSF Graduate Research Fellowships since 1952
170,000	People (researchers, postdoctoral fellows, trainees, teachers, and students) NSF supports directly





Right: In FY 2006, NSF awarded nearly $12 million to the California Institute of Technology (Caltech) for the development of software to analyze neutron-scattering experiments. Neutron scattering looks at the position and motion of the atoms that make up materials, molecules, and condensed matter at various temperatures and pressures to analyze their stability. This work could affect the design of new materials for a huge variety of applications in transportation, construction, electronics, and space exploration. According to project leader Brent Fultz, Professor of Material Science and Applied Physics at Caltech, the research will eventually show how new materials can be optimized for mechanical strength, electrical conductivity, energy storage, and resistance to corrosion. Using data from facilities such as DOE's new Spallation Neutron Source (SNS) in Oak Ridge, Tennessee, this project will integrate new materials theory with high-performance computing. The image at the right shows Rick Martineau of Los Alamos National Laboratory conducting a final inspection of an SNS component before it is shipped.

For more information:

www.nsf.gov/news/news_summ.jsp?cntn_id=107078

FROM THE DIRECTOR

"All of us would like the Foundation to be recognized as a home for transformational research—that is research with the potential to revolutionize existing disciplines or bring an entire new field of research into existence. We will need to take an aggressive approach—a willingness to place bets on new frontiers. To do that, we will have to hone our risk-taking skills—reaching out beyond familiar territory to the truly unknown. As Will Rogers once said, 'Sometimes you have to go out on a limb because that's where the fruit is.'"

Arden L. Bement, Jr.

For more information:

NSF's *FY 2006 Performance and Accountability Report* is available at www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf0701

Arden L. Bement, Jr.
Director

The National Science Foundation (NSF) is the only federal agency dedicated to the support of fundamental research across all fields of science and engineering and all levels of science and engineering education. For more than 50 years, NSF has had a profound and far-reaching impact on protecting the environment, improving people's health and standard of living, sustaining the nation's competitiveness in a global economy, and supporting homeland security. NSF has been at the forefront of discovery—nearly 200 Nobel Prize winners, and thousands of other distinguished scientists and engineers have conducted their groundbreaking research with the help of NSF funding. In addition, NSF investments are critical to producing the next generation of world-class scientists and engineers who will develop the ideas and research tools needed to address the challenges we face now and in the future.

In fiscal year (FY) 2006, NSF received over 42,000 proposals and made 10,450 new awards to 1,700 colleges, universities, and other research enterprises throughout the country. The discoveries resulting from these investments in all fields of science and engineering research and education are both exciting and transformative. Included here are results reported in FY 2006 by NSF grantees—from individual researchers to multinational collaborations involving researchers from several disciplines. NSF's establishment of a foreign office in Beijing, China, last spring will permit more effective participation in the international arena as well as education initiatives that will help build a greater capacity for productive multinational collaboration.

In FY 2006, NSF-supported researchers conducting on-site studies across the southeastern United States were able to determine how and why numerous levees failed during Hurricane Katrina, thus providing data that will enable engineers to adjust and improve on their plans for repairs.

NSF-supported researchers at New York University's Courant Institute of Mathematical Sciences developed a new algorithm that makes it much easier to detect certain cancer genes. These are only two examples of the many discoveries reported by NSF-supported researchers last year—discoveries that have important implications for the future. Additional discoveries are discussed in this report and can also be found on the NSF website at *www.nsf.gov/discoveries*.

Underlying NSF's programmatic achievements is a commitment to results-oriented management practices and sound financial oversight. Some notable achievements include the following:

- NSF received its ninth consecutive unqualified "clean" opinion from an independent audit of its financial statements, with no material weaknesses reported. NSF is in substantial compliance with the Federal Managers' Financial Integrity Act of 1982, although a qualified management assurance over internal control is being reported because of the limited scope of the internal review of financial reporting.

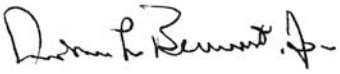
- NSF is one of only a handful of agencies that have maintained "Green" successful ratings in four or more of the President's Management Agenda initiatives.

- All NSF programs evaluated to date by the Office of Management and Budget's Program Assessment Rating Tool are among the 15 percent government-wide that have received the highest "Effective" rating.

- NSF successfully achieved all four strategic outcome goals and nearly 70 percent of our annual GPRA performance goals.

- NSF made headlines by winning a Webby Award in a competition that *Time* magazine calls the "online Oscars." NSF was named the Best Government Website of 2006 in the annual People's Voice voting. At the 2005 Vision Awards, the *FY 2005 Performance Highlights* report received a League of American Communications Professionals Honors Award. NSF was also the only federal agency to be recognized for five years of distinction in its annual reports. These awards speak to NSF's continuing commitment to be informative and accountable to its stakeholders, its customers, and the public in its pursuit of scientific excellence and sound stewardship of the public's resources.

I hope you will enjoy reviewing this report. To learn more about the achievements of the past year and about the exciting discoveries that are emerging every day, I invite you to read the *FY 2006 Performance and Accountability Report* and to visit NSF's award-winning website.



Arden L. Bement, Jr.
December 2006

Right: Results of a new study provide the first clear proof that global warming is causing outbreaks of an infectious disease that is wiping out entire frog populations and driving many species to extinction.

Published in the January 12, 2006, issue of the journal ***Nature,*** the study reveals how the warming may alter the dynamics of a skin fungus that is fatal to amphibians. The climate-driven fungal disease, the authors say, has hundreds of species around the world teetering on the brink of extinction or has already pushed them into the abyss.

According to NSF-funded researcher J. Alan Pounds, the study's lead scientist affiliated with the Tropical Science Center's Monteverde Cloud Forest Preserve in Costa Rica, climate change–induced disease is killing the frogs. Pounds notes that global warming is wreaking havoc on amphibians and soon will cause staggering losses of biodiversity. According to Bruce Young, a zoologist at NatureServe who took part in the study, the good news is that these new findings open up avenues of research, which could provide scientists with the means to save the amphibians that still survive.

For more information:

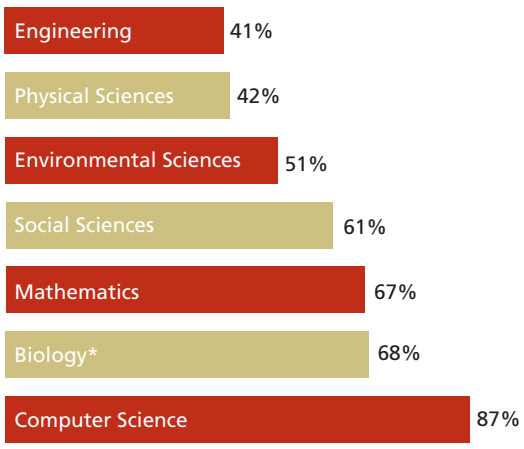
www.nsf.gov/news/news_summ.jsp?cntn_id=105707&org=OISE&from=news

ADVANCING THE FRONTIER

The National Science Foundation (NSF) is the 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. While the agency's $5.6 billion budget represents 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 computer science, mathematics, environmental sciences, the social sciences, and nonmedical biology, NSF is the primary source of federal academic support for basic research. The support of academic research is critical to sustaining future generations of world-class scientists and engineers who will develop the ideas and research tools needed to address the challenges we face now and in the future. Although NSF does not directly fund medical research, its support of basic research benefits medical science and related industries, leading to advances in diagnosis, regenerative medicine, drug delivery, and pharmaceutical design and processing.

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



*Excludes the National Institutes of Health

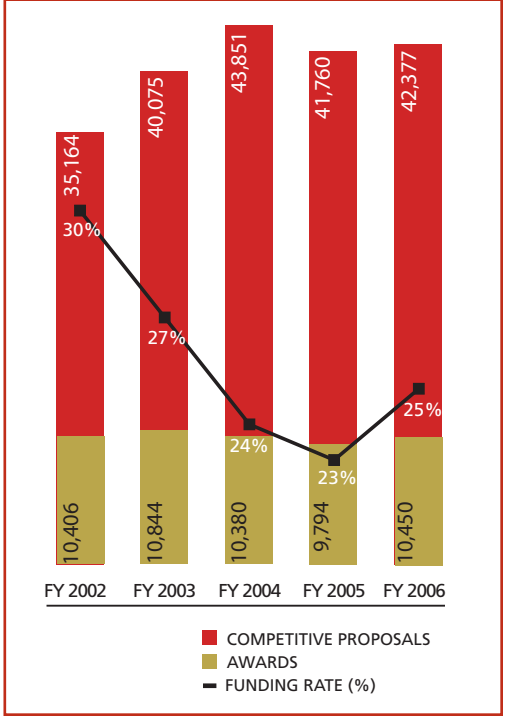
Public Benefits of a Strong Science and Technology Enterprise

The results of U.S. investments in science and technology have long driven economic growth and improved the quality of life for successive generations. Science and technology have generated new knowledge and industries, created new jobs, provided new sources of energy, developed new modes of communication and transportation, and improved medical care. This process of scientific discovery and innovation has been critical to increasing the nation's productivity and sustaining economic growth. Today, more nations follow our lead in investing in science and technology, so the United States, in keeping with the President's American Competitiveness Initiative, must maintain its leadership in scientific discovery and new technologies in order to remain globally competitive.

NSF's unique task is to search out the frontiers of science and engineering and to foster high risk endeavors that will generate important discoveries and new technology. Despite its small size, NSF has had an extraordinary impact on the nation's scientific knowledge and capacity. NSF has funded the groundbreaking research of nearly 200 Nobel Prize winners and numerous other distinguished scientists and engineers. Moreover, not since World War II have advances at the frontiers of knowledge been more critical for national security. Advanced capability in materials science research, sensors and sensor network architecture, genomics, cyber-security, and data mining, as well as knowledge of human and social dynamics, have a direct impact on present and future homeland security systems and capacity.

In the "Where Discoveries Begin" sidebars throughout this report are examples that illustrate the impact and success of NSF's investments in discovery, innovation, and education. The results of many of 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 2006.

Number of NSF Competitive Proposals and Awards, and Funding Rates



A Catalyst for Innovation

NSF directly supports scientists, engineers, and educators through their home institutions, usually colleges and universities. With the exception of polar operations, NSF does not maintain its own facilities or laboratories. Rather, NSF is a catalyst for innovation, seeking and funding the best ideas and most capable people and making it possible for them to pursue new knowledge, discoveries, and innovation.

In FY 2006, NSF received 42,377 proposals and funded 10,450 new awards to more than 1,700 colleges, universities, and other public institutions throughout the country. Nearly 90 percent of NSF funding was 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. Each year, 42,000 members of the science and engineering community serve as panelists and proposal reviewers.

In FY 2006, NSF awards directly involved nearly 170,000 people, including senior researchers, postdoctoral associates, teachers, and students from kindergarten through graduate

INTERNATIONAL POLAR YEAR

A concerted worldwide effort is underway to plan scientific and educational activities for the upcoming International Polar Year (IPY). Scheduled to officially begin in March 2007, IPY promises to advance our understanding of how the Earth's remote polar regions impact global climate systems, to bring about fundamental advances in many areas of science, and to fire the enthusiasm of young men and women for future careers in science and engineering.

The photograph above shows Aurora Australis, the Southern lights, over NSF's station at the South Pole. This image shows the atmospheric phenomenon over a wing of the new station that NSF is building. The new station, adjacent to the existing station, will replace the aluminum dome that has housed NSF's scientific facilities since the 1970s.

For more information:

www.us-ipy.gov/
www.nsf.gov/dir/index.jsp?org=OPP

WETLANDS RESTORATION

To assist managers in assessing the tradeoffs among different wetland restoration projects, an interdisciplinary team at the University of Rhode Island has developed a method to estimate the public benefits of each one.

The team, which included both social scientists and natural scientists, worked in close collaboration with state officials. They first linked how the physical attributes of wetlands contribute to habitat functions for various species, and then identified public values associated with changes in salt marsh functions. Public values were assessed regarding habitat, mosquito control, recreational access, and cost. Based on their results, the team created a web-based application that can be used by decision makers and the public to assess and prioritize restoration actions.

For more information:

http://simlab.uri.edu/saltmarsh/

school. NSF's investment portfolio is a rich mix of programs and partnerships that reach broad and diverse segments of the science and engineering research and education community, as well as the general public. NSF also supports a variety of informal science educational projects that reach millions of children and adults through films, museum exhibits, innovative television programs, radio shows, and web-based resources.

People Involved in NSF Activities *(estimated numbers for FY 2006)*	
Senior Researchers	32,000
Other Professionals	11,000
Postdoctoral Associates	5,000
Graduate Students	26,000
Undergraduate Students	27,000
K–12 Students	8,000
K–12 Teachers	59,000
TOTAL	168,000

Commitment to Excellence

NSF is widely acknowledged as a high performing organization 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 2006. The President's Management Agenda (PMA) is a government-wide effort to improve the management, performance, and accountability of federal agencies. In the fourth quarter of FY 2006, NSF was one of only five agencies to achieve "Green" status in four or more of the five primary initiatives. NSF was also one of only three agencies to achieve "Green" status on the Eliminating Improper Payments initiative. As a result of reporting low improper payments in FY 2004 and FY 2005, the Office of Management and Budget (OMB) has moved NSF from an annual to a three-year reporting cycle. In OMB's annual review of federal programs using the Program Assessment Review Tool (PART), all the NSF programs that have been evaluated under the FY 2006 strategic plan are among the 15 percent government-wide that have received the highest "Effective" rating.

NSF has long been recognized as a leader in the use of information technology, actively promoting simpler, faster, more accurate, and less expensive electronic business solutions. Virtually all of NSF's business interactions with the external grantee community have been conducted electronically since 2000. In a review of federal agency IT security practices conducted by the U.S. House Committee on Government Reform in March 2006, NSF was among five agencies that received an "A" rating. After co-chairing the Grants Management Line of Business (GMLoB) task force to develop a government-wide solution to support end-to-end grants management activities, OMB selected NSF as one of three initial "Consortia" service providers.

Meeting Future Opportunities and Challenges

NSF is well positioned to maximize the opportunities and face the challenges of the future. The President's American Competitiveness Initiative (ACI) outlines a 10-year doubling of investments in NSF and other agencies that are the principal supporters of the physical sciences and engineering. To fulfill its ACI obligations, NSF will direct its funding toward generating fundamental discoveries that produce valuable and marketable technologies, providing world-class facilities and infrastructure that will transform research and enable discovery, and helping the nation's science, technology, engineering, and mathematics workforce prepare for the 21st century while improving the quality of math and science education in U.S. schools.

As it pursues these activities, NSF will seek partners and nurture cooperation among government, industry, and academia. With discoveries emerging in many countries, it is essential that

U.S. scientists and engineers have the opportunity to interact with other top researchers, to lead major international collaborations, and to have access to the best research facilities throughout the world. With offices in Paris, Tokyo, and Beijing (the Beijing office was established in the spring of 2006), NSF can more effectively participate in the international arena and facilitate education initiatives that will help build greater capacity for multinational collaboration. As the lead federal agency for the National Nanotechnology Initiative, NSF will continue to provide critical support for efforts in fundamental nanoscale science and engineering. As the lead federal agency for the International Polar Year project that runs from March 2007 to March 2009, NSF will head an interagency, international effort to understand the Earth's extreme latitudes at scales from the global to the molecular. Of highest priority is the support of frontier research that meets pressing national needs in security, energy, the environment, and health.

The ongoing quest for organizational excellence will direct management's focus to a number of opportunities and challenges. The rise in multidisciplinary collaborative projects, international activities, and major research facility projects has increased the complexity of the workload, and although NSF's budget has increased 70 percent over the past 10 years, staffing has increased less than 10 percent. In addition, meeting new external administrative, oversight, and accountability requirements is an additional burden on limited staffing and funding resources. This year's establishment of a new internal control process to meet OMB's revised A–123 guidance was a major undertaking that will continue for the next 2 years as NSF works toward achieving an unqualified management assurance statement. In addition, NSF will remain actively engaged in supporting numerous other e-Gov activities, including GMLoB, e-Human Resources, the Integrated Acquisition Environment, e-Authentication, and the Lines of Business initiatives.

President's Management Agenda Scorecard

	Baseline	Status	Progress
	9/30/01	9/30/06	
Strategic Management of Human Capital	🔴	🟢	🟢
Competitive Sourcing	🔴	🔴	🔴
Improving Financial Performance	🟢	🟢	🟢
Expanded Electronic Government	🟡	🟢	🟢
Budget and Performance Integration	🔴	🟢	🟢
Other Agency Initiatives: Eliminating Improper Payments	N/A	🟢	🟢

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

MEASURING PERFORMANCE

Right: Is peanut butter a liquid or a solid? At times it seems like a solid: a glob of peanut butter will hold its shape over a period of time. Over a longer time, however, it will flow like a liquid. Materials that behave in this manner are called complex fluids. Some of them change from solid-like to liquid-like, and vice versa, in response to changes in pressure. Many household items are examples, such as creams, shampoo, toothpaste, and ketchup. At Emory University, NSF-funded researcher Eric Weeks and his colleagues study the physics of complex fluids to better understand their behavior. The group is interested in learning how a material's microscopic structure relates to its macroscopic behavior, such as determining how easy it is for a material to spread, flow, or compress—especially in confined spaces.

The Emory researchers have used activities involving "squishy materials" to interest schoolchildren in science. In the photo on the right, on a field trip to Dr. Weeks' laboratory, students watch as Dr. Denis Semwogerere demonstrates the properties of these materials. The laboratory has hosted groups from kindergarten through eighth grade, providing a variety of age-appropriate hands-on activities. The excitement of doing physics research is conveyed to the children during these visits. The laboratory also has a popular website that contains extensive information on using complex fluids to teach freshman students (no matter which major they are pursuing) about current physics research while providing researchers particle tracking software and associated tutorials.

For more information:

www.physics.emory.edu/~weeks/squishy

NSF's leadership in advancing the frontiers of science and engineering research and education is demonstrated, in part, through internal and external performance assessments. The results of this process provide stakeholders and taxpayers with vital information about the return on their investment. In FY 2006, performance assessment was guided by the Government Performance and Results Act of 1993 (GPRA), by OMB's Program Assessment Rating Tool (PART), and by NSF's *FY 2003–2008 Strategic Plan*. GPRA requires federal agencies to develop a strategic plan, establish annual performance goals, and report on the progress made toward achieving these goals.

NSF's *FY 2003–2008 Strategic Plan* outlined four overarching strategic outcome goals: Ideas, Tools, People, and Organizational Excellence. The Ideas, Tools, and People goals are aligned with a set of investment categories that account for 100 percent of NSF's programmatic activities. These investment categories are the programs that OMB has reviewed using the PART. The Organizational Excellence goal focuses on NSF's administration and management activities and the five PMA initiatives.

Assessing Long-Term Research

For NSF, linking outcomes to annual investments is difficult because the results from investments in basic research and education can be unpredictable. Science and engineering research projects can generate discoveries in unrelated areas, and it can take years to recognize discoveries and their impact. NSF has developed an alternative OMB-approved assessment process based on evaluation by external experts. The academic research community has used such evaluation for many years. NSF itself has used panels of external experts for decades and, over time, has developed a comprehensive process for conducting productive evaluations.

NSF has integrated the GPRA and PART processes with its long-standing external expert evaluation process through Advisory Committees (ACs) and Committees of Visitors (COVs). The Foundation relies on the judgment of these external experts to maintain high standards of program management, to provide advice on continuous improvement of performance, and to ensure openness to the research and education community served by the Foundation.

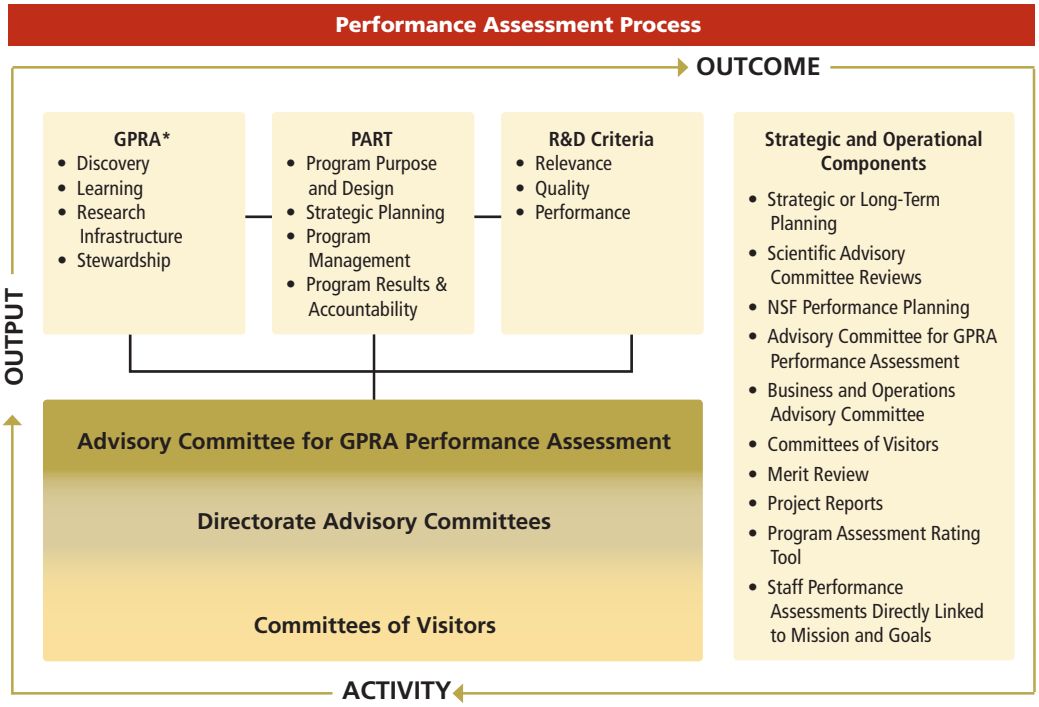
For more information:

NSF FY 2006–2011 Strategic Plan
www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf0648

NSF FY 2006 Performance and Accountability Report
www.nsf.gov/publications/pub_summ.jsp?ods_key=par

President's Management Agenda
www.whitehouse.gov/omb/budintegration/pma_index.html

Program Assessment Rating Tool (PART)
www.expectmore.gov



GPRA: The Government Performance and Results Act of 1993; *PART:* Program Assessment Rating Tool; *R&D:* Research and Development

* The new strategic outcome goals of Discovery, Learning, Research Infrastructure, and Stewardship align with the Ideas, People, Tools, and Organizational Excellence goals from the previous strategic plan.

COVs are responsible for evaluating and reporting on one-third of NSF's programs every year. These reports serve as important input for the Advisory Committee for GPRA Performance Assessment (AC/GPA), which is responsible for conducting an annual evaluation of NSF's strategic outcome goals. In addition, COV reports provide important information for evaluation of NSF's PART programs. The program assessment process is depicted in the chart above.

PART Evaluations

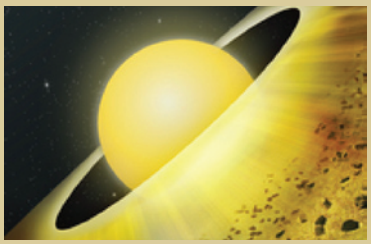
In 2002, OMB developed the PART, a systematic method for assessing the performance of program activities across the federal government. Each year, about 20 percent of an agency's programs undergo PART review. As indicated in the chart on the right, all NSF programs that have been evaluated under the FY 2006 strategic plan have received the highest "Effective" rating. Of the more than 800 federal programs that have been evaluated to date, the PART has rated only 15 percent as effective.

NSF PART Evaluations

Investment Category/Priority Area	Budget Year	Result
IDEAS		
Fundamental Science and Engineering	FY 2007	Effective
FFRDC*	FY 2007	Effective
TOOLS		
Facilities	FY 2005	Effective
Polar Tools, Facilities, and Logistics	FY 2006	Effective
PEOPLE		
Individuals	FY 2005	Effective
Institutions	FY 2006	Effective
Collaborations	FY 2006	Effective
PRIORITY AREAS		
Information Technology Research	FY 2005	Effective
Nanoscale Science and Engineering	FY 2005	Effective
Biocomplexity in the Environment	FY 2006	Effective

**FFRDC: Federally Funded Research and Development Centers*
For more information, visit www.whitehouse.gov/omb/expectmore.

PLANET UNDER CONSTRUCTION



Future interstellar travelers might want to detour around the star system TW Hydrae to avoid a messy planetary construction site. Researchers at the Harvard-Smithsonian Center for Astrophysics have discovered that the gaseous disk surrounding TW Hydrae holds vast swaths of pebbles extending outward for at least one billion miles. The researchers used NSF's Very Large Array to measure radio emissions from TW Hydrae. They detected radiation from a cold, extended dust disk suffused with centimeter-sized pebbles, something no one had seen before. Such pebbles, created as dust collects into larger and larger clumps, are a prerequisite for planet formation, a process that takes millions of years. The image above is an artist's conception of a dusty disk around the young star TW Hydrae.

For more information:

www.nrao.edu/pr/2005/twhydrae/

IMPROVING COMMUNICATION

NSF-supported researcher Alexandra Duel-Hallen of North Carolina State University and her colleagues have developed a suite of adaptive tools to improve the capacity and quality of wireless communication. Channels change rapidly in mobile communications; most transmitters and receivers are not optimized for the onditions they encounter, and the devices cannot exploit the full potential of the wireless channel. The new tools predict information about a fading wireless channel to allow more efficient use of power and frequency. By collaborating with an industry partner, the researchers were able to validate the tools using realistic modeling and field measurements. In 2005, more than one billion consumers worldwide owned and used wireless telephones. The tremendous growth in demand for wireless communication capacity has created a need for new transmission and receiving methods to enhance quality of service for users.

For more information:

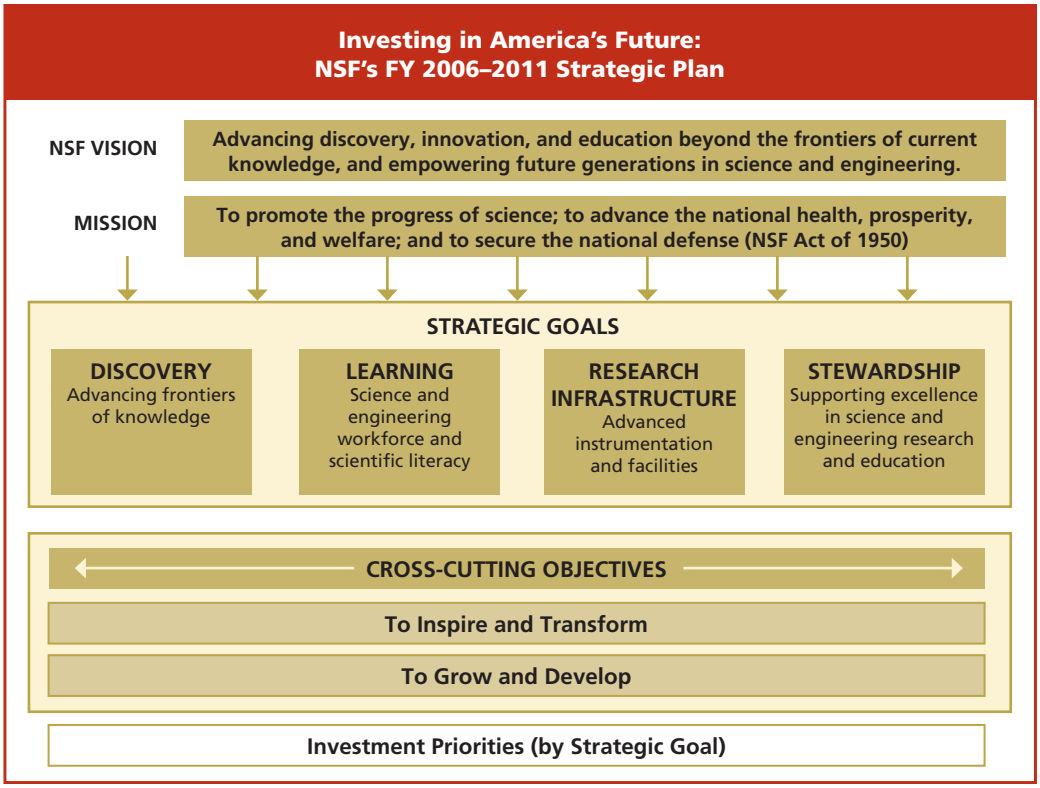
www.physics.ncsu.edu/optics/wireless/wireless.html

Investing in America's Future: NSF's New Strategic Plan

On September 30, 2006, NSF released a new strategic plan that will guide programmatic activities for the next five years. The new strategic plan was developed through a collaborative process that involved significant input from staff, the research and education community, and other key stakeholders, including Congress and OMB. The plan outlines four interrelated goals—Discovery, Learning, Research Infrastructure, and Stewardship—that provide an integrated strategy for delivering new knowledge at the frontiers, meeting vital national needs, and achieving the NSF vision.

The new goals align with the previous strategic goals—Ideas, People, Tools, and Organizational Excellence—and the three strategic priorities in the National Science Board's *2020 Vision for the National Science Foundation*. The Stewardship goal aims for excellence in science and engineering research and education through a capable and responsive organization.

The framework of the new strategic plan is shown below. Two objectives cut across the four strategic goals: "To Inspire and Transform" and "To Grow and Develop." The plan also establishes well-defined priorities for allocating investment funds and internal resources.



FY 2006 Performance Scorecard

NSF's FY 2006 performance activities were guided by the *FY 2003–2008 Strategic Plan*. NSF's FY 2006 performance goals fall into two broad areas:

Strategic Outcome Goals focus on the long-term results of NSF grants and programs. They represent what the Foundation seeks to accomplish with its investments in science and engineering research and education. The results from NSF awards illustrate the success of the Foundation's investments. In a transparent public process, the AC/GPA uses input from grantee project reports, COV reports, and highlights from NSF-funded research to assess the Foundation's

annual progress toward achieving each of the long-term Strategic Outcome Goals. In the sidebars throughout this report are examples illustrating the impact and success of NSF's long-term investments in Ideas, Tools, and People that were reported in FY 2006.

Annual Performance Goals include performance measures from NSF's PART evaluations, as well as time-to-decision and facilities construction and operations goals related to agency effectiveness and efficiency.

In FY 2006, NSF achieved 19 of 26 performance goals (73 percent), including all four strategic outcome goals. A list of NSF's FY 2006 performance goals and results follows. For a more comprehensive discussion of each goal, see NSF's *FY 2006 Performance and Accountability Report*.

FY 2001–2006 Performance Results: Goals Achieved

	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006
Strategic Outcome Goals	4 of 4 (100%)	4 of 4 (100%)	4 of 4 (100%)	4 of 4 (100%)	4 of 4 (100%)
Other Performance Goals	14 of 19 (74%)	10 of 16 (63%)	23 of 26 (88%)	14 of 17 (82%)	15 of 22 (68%)
TOTAL	18 of 23 (78%)	14 of 20 (70%)	27 of 30 (90%)	18 of 21 (86%)	19 of 26 (73%)

FY 2006 Performance Goals and Results

Strategic Outcome Goals

Performance Goal	Performance Indicator	Result
IDEAS: Discovery across the frontier of science and engineering, connected to learning, innovation, and service to society	NSF's performance is successful when, in the aggregate, results reported in FY 2006 demonstrate significant achievement in the majority of the following performance indicators: • Contributions—Enable people who work at the forefront of discovery to make important and significant contributions to science and engineering knowledge. • Collaborations—Encourage collaborative research and education efforts across organizations, disciplines, sectors, and international boundaries. • Connections—Foster connections between discoveries and their use in the service of society. • Underrepresented Individuals and Institutions—Increase opportunities for underrepresented individuals and institutions to conduct high quality, competitive research and education. • Identifying New Opportunities—Provide leadership in identifying and developing new research and education opportunities within and across science and engineering fields. • Cross-disciplinary—Accelerate progress in selected high-priority science and engineering areas by creating new integrative and cross-disciplinary knowledge and tools and by providing people with new skills and perspectives. • Identifying New Opportunities—Support innovative research on learning and teaching that provides a scientific basis for improving science, technology, engineering, and mathematics education at all levels. **Explanation of result:** Assessments by external experts determined that NSF has demonstrated significant achievement in each of the performance indicators associated with this goal.	

SERVING FIRST RESPONDERS

The NSF-funded High Performance Wireless Research and Education Network (HPWREN) is a prototype system now operating in California's San Diego and Riverside counties.

HPWREN is partly intended as a testbed for several of NSF's large-scale sensor network initiatives. These include EarthScope, the Ocean Observatories Initiative, the National Ecological Observatory Network, and the Network for Earthquake Engineering Simulation.

At the same time, however, HPWREN is a working system, with multiple remote sites that are providing high-speed Internet access to field scientists in a variety of disciplines. Recently, astronomers from around the world used HPWREN to analyze the flood of data produced by a 161-megapixel camera at the Palomar Observatory—and in the process, discovered a "tenth planet" in our solar system. Other remote HPWREN nodes include seismometers and ecological sensors.

HPWREN also serves the first-responder community. For example, the California Department of Forestry and Fire Protection routinely accesses HPWREN's mountaintop cameras and sensors to monitor the notoriously fire-prone region. And firefighters at the scene of a blaze can rapidly deploy a wireless HPWREN node to access maps, aerial imagery, and telemetry data.

HPWREN also provides educational opportunities for rural Native American learning centers and schools in the area.

For more information:

www.nsf.gov/news/news_summ.jsp?cntn_id=107121&org=NSF&from=news

FY 2006 Performance Goals and Results

Strategic Outcome Goals

Performance Goal	Performance Indicator	Result
TOOLS: Broadly accessible state-of-the-art science and engineering facilities, tools, and other infrastructure that enable discovery, learning, and innovation.	NSF's performance is successful when, in the aggregate, results reported in FY 2006 demonstrate significant achievement in the majority of the following performance indicators: • Expand Access—Expand opportunities for U.S. researchers, educators, and students at all levels to access state-of-the-art science and engineering facilities, tools, databases, and other infrastructure. • Next Generation Facilities and Platforms—Provide leadership in the development, construction, and operation of major, next-generation facilities and other large research and education platforms. • Cyberinfrastructure—Develop and deploy an advanced cyberinfrastructure to enable all fields of science and engineering to fully utilize state-of-the-art computation. • Data Collection/Analysis—Provide for the collection and analysis of the scientific and technical resources of the United States and other nations to inform policy formulation and resource allocation. • Instrument Technology—Support research that advances instrument technology and leads to the development of next-generation research and education tools. **Explanation of result:** Assessments by external experts determined that NSF has demonstrated significant achievement in each of the performance indicators associated with this goal.	●
PEOPLE: A diverse, competitive, and globally engaged U.S. workforce of scientists, engineers, technologists and well-prepared citizens.	NSF's performance is successful when, in the aggregate, results reported in FY 2006 demonstrate significant achievement in the majority of the following performance indicators: • Greater Diversity—Promote greater diversity in the science and engineering workforce through increased participation of underrepresented groups in NSF activities. • Global S&E Workforce—Support programs that attract and prepare U.S. students to be highly qualified members of the global science and engineering workforce; programs should include opportunities for international study, collaborations, and partnerships. • Continuous Learning—Develop the nation's capability to provide K–12 and higher education faculty with opportunities for continuous learning and career development in science, technology, engineering, and mathematics. • Public Understanding of Science—Promote public understanding and appreciation of science, technology, engineering, and mathematics. **Explanation of result:** Assessments by external experts determined that NSF has demonstrated significant achievement in each of the performance indicators associated with this goal.	●
ORGANIZATIONAL EXCELLENCE: An agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices.	NSF's performance is successful when, in the aggregate, results reported in FY 2006 demonstrate significant achievement in the majority of the following performance indicators: • Human Capital Management—Develop a diverse, capable, motivated staff that operates with efficiency and integrity. • Technology-enabled Business Process—Utilize and sustain broad access to new and emerging technologies for business application. • Performance Assessment—Develop and use performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness. • Merit Review—Operate a credible, efficient merit review system. **Explanation of result:** Assessments by external experts determined that NSF has demonstrated significant achievement in each of the performance indicators associated with this goal.	●

FY 2006 Performance Goals and Results		
Annual Performance Goals		
Performance Area	**Performance Goal**	**Result**
Time-to-Decision	For 70 percent of proposals, inform applicants about funding decisions within 6 months of proposal receipt or deadline or target date, whichever is later, while maintaining a credible and efficient competitive merit review system.	●
Facilities Construction, Acquisition, and Upgrades	Keep negative cost and schedule variances at less than 10 percent of the approved project plan for 90 percent of construction, acquisition, and upgrading projects. **Explanation of result:** Three of 11 construction projects did not meet this goal. One of the projects did not meet the cost goal due to scope and schedule changes and unplanned costs. Two of the projects did not meet the schedule goal: one due to errors in time distribution on the project, and the other principally due to deferral of some equipment purchases in order to manage risk until firm pricing for all project activities could be established.	■
Facilities Operation and Management	Keep operating time lost due to unscheduled downtime to less than 10 percent of the total scheduled operating time for 90 percent of operational facilities.	●
Polar Research Support	Provide the necessary research support for Antarctic researchers at least 90 percent of the time. [Research support includes lab operation; facilities engineering, maintenance, and construction; communications operations; remote field camp support; cargo and passenger transportation; and housing management and janitorial services.]	●
Polar Research Facilities	Keep the construction cost and schedule variances of major Polar facilities projects as monitored by Earned Value Management at 8 percent or less. **Explanation of result:** Two of the three Polar facilities projects did not meet this goal. One was due to reporting against an outdated cost and schedule baseline that will be revised when NSF receives its FY 2007 appropriation. The other was due to unplanned work that caused cost increases and schedule delays.	■
Graduate Research Fellowships: Broadening Participation	Increase the number of Graduate Research Fellowship applicants from groups that are underrepresented in the science and engineering workforce to 1,014 in FY 2006. **Explanation of result:** Although the number of applicants from groups that are underrepresented in the science and engineering workforce did not increase from FY 2005 to FY 2006, the percentage of applicants increased. In FY 2005, NSF received 9,133 applications, of which 1,013, or 11.09 percent were from groups that are underrepresented in the science and engineering workforce. In FY 2006, the number of applicants was only 8,162, of which 929, or 11.38 percent, were from those groups. There was a surge of applicants following the increase of the stipend to $30,000 in FY 2004, which lowered the success rate. The FY 2006 data suggest a decline in the number of applicants that is consistent with the community's awareness of the reduced success rate for this program. These trends are mirrored in the underrepresented populations. NSF will continue to encourage proposals from these groups.	■
CAREER Award: Broadening Participation	Increase the number of applicants for CAREER (Faculty Early Career Development) awards from minority-serving institutions to 93 in FY 2006.	●
U.S. Students Receiving Fellowships	Increase the number of recipients of Graduate Research Fellowships, Integrative Graduate Education and Research Traineeships, and Graduate Teaching Fellows in K–12 Education to 4,525.	●
Individual Researchers: Time-to-Decision	For 70 percent of proposals submitted to the Individuals Program, inform applicants about funding decisions within 6 months of proposal receipt or deadline or target date, whichever is later, while maintaining a credible and efficient competitive merit review system.	●

IMPROVING ACHIEVEMENT

Oglala Lakota College (OLC), on South Dakota's Pine Ridge Reservation, is using NSF funding to improve its curriculum in science, technology, engineering, and mathematics education, with an emphasis on environmental sciences and related analytical fields. The project's impact on the enrollment of American Indian students has been significant, particularly in information technology, where student enrollment has quadrupled in the past four years. The project has had a similar impact on academic achievement. In Calculus I, for example, the rate of successful completion has grown from 21 percent before the project started to approximately 70 percent in recent years. Currently, 14 American Indian students are involved in undergraduate research projects.

Many of the program's graduates, highly skilled scientists and technicians, work in their communities, contributing to the economic growth of the reservation. The college's Lakota Center for Science and Technology, developed through support from NSF's Tribal Colleges and Universities Program (TCUP) and other sources, received EPA certification and is now employing OLC graduates to perform water quality analyses for the reservation's water and sewer agencies.

The TCUP project is also engaged in preparing the next generation of K–12 teachers for reservation schools, as well as working with current K–12 teachers to improve their knowledge and skills in areas such as robotics. The robotics project will be implemented in about six area schools this academic year. Shown in the photo above are students in the Oglala Lakota College robotics project.

For more information:

www.nsf.gov/about/partners/states/sd.jsp

FY 2006 Performance Goals and Results

Annual Performance Goals

Performance Area	Performance Goal	Result
Research Institutions: Proposals from Outside the Top 100 Institutions NSF Funds	Increase the percentage of proposals received from academic institutions not in the top 100 of NSF funding recipients to 73 percent. **Explanation of result:** This goal was adopted in FY 2004 for the Research Institutions PART Program. The goal is ambitious, and it was made more challenging by the recent agency-wide effort to decrease the number of program solicitations for research opportunities in an attempt to improve the NSF-wide funding rate for proposals. There is also a lag time between taking action to increase broadening participation (e.g. through outreach) and receiving proposals. NSF will continue its efforts to encourage proposals from investigators at academic institutions not in the top 100 of NSF funding recipients.	■
Research Institutions: Time-to-Decision	For 70 percent of proposals submitted to the Research Institutions Program, inform applicants about funding decisions within 6 months of proposal receipt or deadline or target date, whichever is later, while maintaining a credible and efficient competitive merit review system.	●
Research Collaborations: Proposals from Outside the Top 100 Institutions NSF Funds	Increase the percentage of Research Collaborations proposals received from academic institutions not in the top 100 of NSF funding recipients to 63 percent. **Explanation of result:** This goal was adopted in FY 2004 for the Small Research Collaborations PART Program. The result for FY 2006 is an improvement over that for FY 2005. The goal is ambitious, and it was made more challenging by the recent agency-wide effort to decrease the number of program solicitations for research opportunities in an attempt to improve the NSF-wide funding rate for proposals. There is also a lag time between taking action to increase broadening participation (e.g. through outreach) and receiving proposals. NSF will continue its efforts to encourage proposals from investigators at academic institutions not in the top 100 of NSF funding recipients.	■
Research Collaborations: Time-to-Decision	For 70 percent of proposals submitted to the Research Collaborations Program, inform applicants about funding decisions within 6 months of proposal receipt or deadline or target date, whichever is later, while maintaining a credible and efficient competitive merit review system.	●
Nanotechnology Network Users	Establish an infrastructure to improve access to nanotechnology facilities and services thereby increasing the number of users. For FY 2006, increase the number of users to 12,500, from 4,000 in FY 2005.	●
Nanotechnology Network Nodes	Support and enhance the nanotechnology infrastructure through increasing the number of nodes within the nanotechnology networks funded by NSF from 14 in FY 2005 to 20 in FY 2006.	●
Nanoscale Science and Engineering (S&E): Time-to-Decision	For 70 percent of proposals submitted to the Nanoscale Science and Engineering Program, inform applicants about funding decisions within 6 months of proposal receipt or deadline or target date, whichever is later, while maintaining a credible and efficient competitive merit review system.	●
Nanoscale S&E: Proposals with Female Investigators	Maintain the percentage of proposals to the Nanoscale Science and Engineering Program with female principal or co-principal investigators at 25 percent.	●
Nanoscale S&E: Proposals with Minority Investigators	Maintain the percentage of Nanoscale Science and Engineering proposals from minority and/or underrepresented principal or co-principal investigators at 13 percent.	●
Nanoscale S&E: Proposals with Multiple Investigators	Maintain the percentage of Nanoscale Science and Engineering proposals that are multi-investigator proposals at 75 percent.	●

FY 2006 Performance Goals and Results		
Annual Performance Goals		
Performance Area	**Performance Goal**	**Result**
Biocomplexity in the Environment (BE): Proposals with Female Investigators	Maintain the percentage of proposals to the BE Program with at least one female principal or co-principal investigator at 53 percent. **Explanation of result:** The BE program was established as a priority area for the Foundation in FY 2000, with the intention that it would extend through FY 2007. The goal of increasing the percentage of proposals from female investigators was established in FY 2004, and the goal was met that year as well as in FY 2005. Since three of the five BE programs did not request proposals in FY 2006 and the only solicitations that did were in the engineering and geoscience areas, the drop in percentage of proposals from female investigators in FY 2006 was not unexpected. Renewed attempts were made to encourage proposals from female investigators in the last series of program solicitations held in FY 2006 for awards that would begin during FY 2007.	■
Biocomplexity in the Environment: Proposals with Minority Investigators	Maintain the percentage of proposals to the BE Program from minority investigators at 17 percent. **Explanation of result:** The BE program was established as a priority area for the Foundation in FY 2000, with the intention that it would extend through FY 2007. The goal of increasing the percentage of proposals from minority investigators was established in FY 2004, and the goal was met that year as well as in FY 2005. Since three of the five BE programs did not request proposals in FY 2006 and the only solicitations that did were in the engineering and geoscience areas, the drop in percentage of proposals from minority investigators in FY 2006 was not unexpected. Renewed attempts were made to encourage proposals from minority investigators in the last series of program solicitations held in FY 2006 for awards that would begin during FY 2007.	■
Biocomplexity in the Environment: Time-to-Decision	For 70 percent of proposals submitted to the BE Program, inform applicants about funding decisions within 6 months of proposal receipt or deadline or target date, whichever is later, while maintaining a credible and efficient competitive merit review system.	●

Note: Green indicates goal was achieved; red indicates goal was not achieved.

Right: Researchers have discovered an entirely unexpected ecosystem in the lightless depths just off the coast of the Antarctic Peninsula. When the Larsen Ice Shelf collapsed there in 2002, it suddenly revealed the seabed beneath, giving NSF-supported scientists a chance to survey the contents. They found marine life forms, such as thick bacterial mats, that were able to subsist without sunlight—which had been blocked by the ice above—and therefore without photosynthesis.

Such communities, called "chemotrophic" because their members obtain energy from oxidation of chemical compounds rather than deriving it from sunshine, had previously been seen only at warm volcanic locations and hydrothermal vent areas on the sea floor. Eugene Domack of Hamilton College and colleagues described their findings in publications during 2005. The scientists speculate that the bacteria may feed on seepage of methane gas from the seabed. The research also serves to further understanding of how ice shelves collapse and provides insight into potential sea level change associated with global warming.

For more information:

www.nsf.gov/od/opp/gpra/cov_materials/cov2006/ant_nuggets_06.pdf

FINANCIAL HIGHLIGHTS

"Sound stewardship and innovative financial management enable the National Science Foundation to pursue the critical investments in science and engineering research and education that strengthen the nation's security, prosperity, and well being."

Thomas N. Cooley

For more information:

NSF Budget Requests
www.nsf.gov/about/budget/

Thomas N. Cooley
Chief Financial Officer

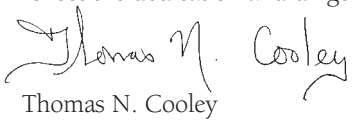
From the Chief Financial Officer

I am pleased to report NSF received a clean audit opinion in FY 2006, maintaining our record of excellence in financial management. This is a testament to our outstanding staff. A firm working with NSF for the first time, Clifton Gunderson LLP, performed an independent audit and issued NSF's ninth consecutive unqualified audit opinion. The audit report repeated two prior year reportable conditions: post-award monitoring and contract monitoring. Over the past year, significant progress has been made in both, and we will enhance our efforts to complete the activities highlighted in their respective corrective action plans.

NSF's longstanding commitment to organizational excellence and sound financial management practices continues to serve us well. Notable achievements of the past year include:

- Maintaining "Green" ratings for both the Financial Performance and the Budget and Performance Integration initiatives on the President's Management Agenda scorecard. NSF has successfully sustained a "Green" rating for Financial Performance for 18 consecutive quarters.
- Moving from an annual to a three-year reporting cycle for improper payments with OMB approval, as a result of the low improper payment rates reported in our *FY 2004* and *FY 2005 Performance and Accountability Reports*.
- Recovering $3.19 million in excess cash held by grant recipients, and reducing erroneous program income reporting by grantees from $3.99 million to $0.77 million through the post-award monitoring efforts.
- Providing flat rate travel reimbursements through our new Guest Travel System to our numerous merit review panelists in 16 days, on average.
- Receiving a League of American Communications Professionals Honors Award for our *FY 2005 Performance Highlights* report. NSF is proud to be the only federal agency to be honored for five consecutive years of distinction in its annual reports—a recognition that reflects the agency's continuing commitment to be accountable to our stakeholders and the public for sound stewardship of the public's resources.

Excellence in financial management enables NSF to pursue critical investments in science and engineering research and education that ultimately help ensure the nation's security, prosperity, and well being. NSF's commitment to managing programs in an informed and fiscally responsible manner, to ensuring resources are used efficiently and effectively, and to accountability and transparency reflect the dedication and diligence of a premier staff. I am proud of their accomplishments.



Thomas N. Cooley
December 2006

NANOJAPAN

As part of the Rice University NanoJapan Program, a group of sixteen freshman and sophomore engineering majors is spending the summer conducting nanotechnology research in the best laboratories in Japan. By involving students in cutting-edge research projects early in their studies, NanoJapan aims to increase the number of U.S. students who choose to pursue graduate study in a nanotech-related field, while also cultivating a globally aware science and engineering workforce. The United States and Japan account for 57 percent of worldwide nanotechnology R&D spending, with Japan leading the way. U.S. leadership in frontier nanoscale science will require young American scientists and engineers to network with their Japanese peers. Students spend ten weeks in Japan participating in intensive Japanese language and intercultural skills training and hands-on research at a prestigious Japanese university or corporate or national laboratory. Students then build on their overseas experience with research presentations at a special one-week technology symposium in Texas. The NanoJapan Program is part of an innovative Partnership for International Research and Education award to Rice University. Eighty students will participate in the NanoJapan Program in 2006–2010.

For more information:

http://nanojapan.rice.edu/

Financial Highlights

NSF's commitment to excellence, results-oriented management, and stewardship encompasses the agency's financial management arena. NSF's goal of excellence in financial management focuses on providing the highest quality business services to our customers, stakeholders, and staff through effective financial control, prompt and streamlined work processes, and reliable and timely financial information to support sound management decisions. The result has been a long-standing agency record of achievement in federal financial management.

NSF successfully maintained "green" ratings in both the President's Management Agenda and the Department of the Treasury's Financial Management scorecards in FY 2006. In addition, NSF achieved top scores in government-wide Chief Financial Officers Council's financial management metrics. Moreover, after reporting low improper payment rates in FY 2004 and FY 2005, NSF has now moved from a one- to a three-year improper payments reporting cycle with OMB approval.

NSF's Financial Accounting System is an online, real time system that provides the full spectrum of financial transaction functionality required by a grant-making agency. The system allows NSF to consistently meet financial reporting deadlines, helps ensure compliance with the Federal Financial Management Improvement Act and OMB A–127 (financial management systems), and provides accurate, on-demand financial information to NSF staff. NSF's three primary data systems—the Financial Accounting System, the Enterprise Information System, and Report Web—provide comprehensive financial, budgetary, merit review, and awards management data to NSF decision makers.

NSF continued to build on its record as a leader in government business practices, particularly in electronic business and grants management. Because NSF has a highly integrated financial and grants management process that has the flexibility to provide services to other agencies, OMB selected NSF to be a shared service provider within the Grants Management Line of Business, in a fee-for-service environment to other federal research agencies. Potential service offerings include grant payments and grantee financial reporting.

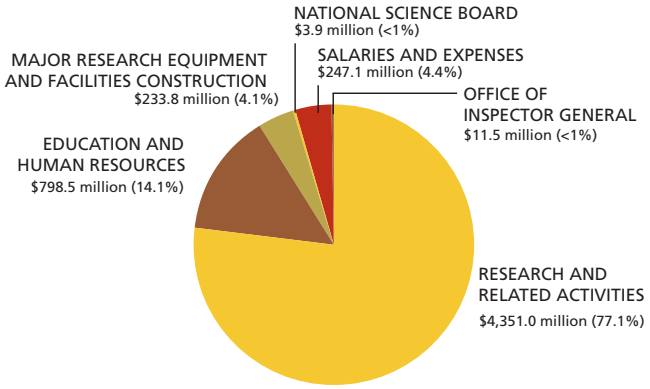
In FY 2006, updated OMB guidance on internal control (OMB Circular A–123) required most federal agencies, including NSF, to undertake a significant effort to implement a more rigorous and extensive internal control review process. The process of institutionalizing the updated internal review process does not depend solely on the annual internal control review and test results; it also depends on achieving an overall level of confidence and experience over time. Therefore, in FY 2006 NSF opted for a limited scope of testing internal controls over financial reporting for fiscal years 2006, 2007, and 2008, to allow the agency time to build a level of confidence into the review process.

NSF prepares annual financial statements in conformity with generally accepted accounting principles of the United States and subjects them to an independent audit to ensure their reliability in assessing performance. In FY 2006, NSF received its ninth unqualified "clean" audit opinion. An unqualified audit opinion is a measure of the fair presentation of our financial statements. The Foundation prepares a Balance Sheet, Statement of Net Cost, Statement of Changes in Net Position, Statement of Budgetary Resources, and Statement of Financing. Supplementary statements prepared include Budgetary Resources by Major Budgetary Accounts, Deferred Maintenance, and Stewardship Investments. The following pages feature highlights of NSF's FY 2006 financial condition. The statement on Stewardship Investments is shown on page 21. A more detailed discussion of NSF's financial performance and a complete set of financial statements, accompanying notes, and the audit opinion can be found in NSF's *FY 2006 Performance and Accountability Report*.

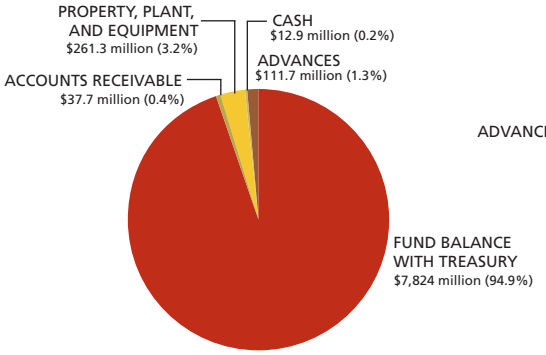
NSF is funded primarily through six congressional appropriations that totaled $5.6 billion in FY 2006, as shown on the chart on the following page. NSF appropriations funded four strategic outcome goals: Ideas, Tools, People, and Organizational Excellence. Organizational

Excellence focuses on the administrative and management activities that enable NSF to achieve its programmatic activities and mission. Funding for Organizational Excellence has been allocated among Ideas, Tools, and People to capture the (net) cost of each of these outcome goals, shown on the statement on page 20.

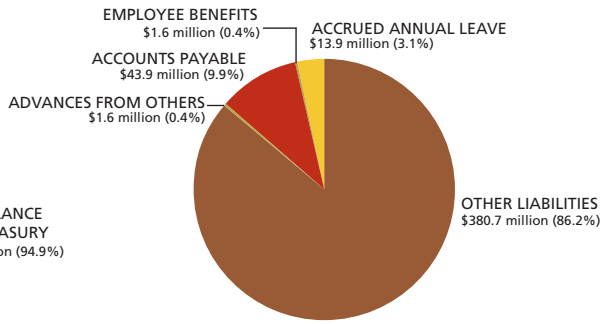
FY 2006 Budget Obligations by Account ($5.646 million)



FY 2006 Assets



FY 2006 Liabilities



FY 2006 Assets and Liabilities

The three line items consisting of *Fund Balance with Treasury; Property, Plant, and Equipment;* and *Advances* represent 99 percent of NSF's current year assets. *Fund Balance with Treasury* is funding available through the Department of the Treasury accounts from which NSF is authorized to make expenditures and pay amounts due. *Property, Plant, and Equipment* comprises capitalized property located at NSF headquarters and NSF-owned property in New Zealand and Antarctica that support the U.S. Antarctic Program. *Advances* are funds advanced to NSF grantees, contractors, and other government agencies.

The three line items *Accounts Payable, Accrued Liabilities (Other Liabilities), and Accrued Annual Leave* represent 99 percent of NSF's current year liabilities. *Accounts Payable* includes liabilities to NSF vendors for unpaid goods and services received. *Accrued Liabilities* are amounts recorded for NSF's grants and contracts for which work has been completed and payment has not been made, as well as accrued payroll and benefits. *Accrued Annual Leave* represents annual leave earned by NSF employees but not yet taken.

NSF's Net Position increased to $7.8 billion in FY 2006, a one percent increase due to the increase in *Unexpended Appropriations and Cumulative Results of Operations*. *Unexpended Appropriations* is affected mainly by *Appropriations Received* and *Appropriations Used*, with minor impact from *Appropriation Transfers* from the U.S. Agency for International Development (USAID) and from *Other Adjustments*, which includes appropriation rescissions and cancellations.

EARTHQUAKE PROTECTION

By applying innovative, intelligent design strategies, structural engineers at the University of California, San Diego (UCSD), have successfully shown that new light-weight construction techniques are as earthquake resistant as bulkier, more expensive methods. By erecting a seven-story test building on a giant outdoor shake table—which is part of the NSF-supported Network for Earthquake Engineering Simulation (NEES)—the engineers duplicated the force of California's devastating 1994 Northridge earthquake. Data from this test confirmed that novel designs and carefully placed reinforcements are just as effective at withstanding earthquake damage as the heavily reinforced, "hardened" buildings required by California building codes. Full-scale tests of such large buildings have previously not been possible because of weight, space, and technical limitations of smaller indoor shake tables. The NEES shake table at UCSD can actually support a building roughly 10 times heavier than the one tested in this study. The picture above shows NEES investigators at the UCSD seven-story test model.

For more information:

www.nees.org/

Information about *Net Cost* is taken from NSF's Statement of Net Cost for Years Ended September 30, 2006 and 2005. Information about *Stewardship Investments* is taken from NSF's FY 2006 Stewardship Investments statement. Both can be found in the financial statements of NSF's *FY 2006 Performance and Accountability Report*.

Changes in Financial Position in FY 2006
(amounts in thousands)

Net Financial Condition	FY 2006	FY 2005	Increase/ Decrease	% Change
Assets	$8,247,611	$8,075,059	$172,552	2%
Liabilities	$441,720	$377,543	$64,177	17%
Net Position	$7,805,891	$7,697,516	$108,375	1%
Net Cost	$5,595,761	$5,408,174	$187,587	3%

FY 2006 Net Cost of Investment Categories
(amounts in thousands)

Ideas		
Fundamental Science & Engineering	$	2,333,848
Centers		182,486
Capability Enhancement		214,013
Total Ideas Program Costs		2,730,347
Less: Earned Revenue		(78,944)
Net Ideas Program Costs		**2,651,403**
Tools		
Large Facilities	$	535,284
Infrastructure and Instrumentation		418,095
Polar Tools, Facilities, and Logistics		361,910
Federally Funded Research & Development Centers		227,158
Total Tools Program Costs		1,542,447
Less: Earned Revenue		(31,954)
Net Tools Program Costs		**1,510,493**
People		
Individuals	$	863,438
Institutions		158,259
Collaborations		427,089
Total People Program Costs		1,448,786
Less: Earned Revenue		(14,921)
Net People Program Costs		**1,433,865**
Net Cost of Operations	$	**5,595,761**

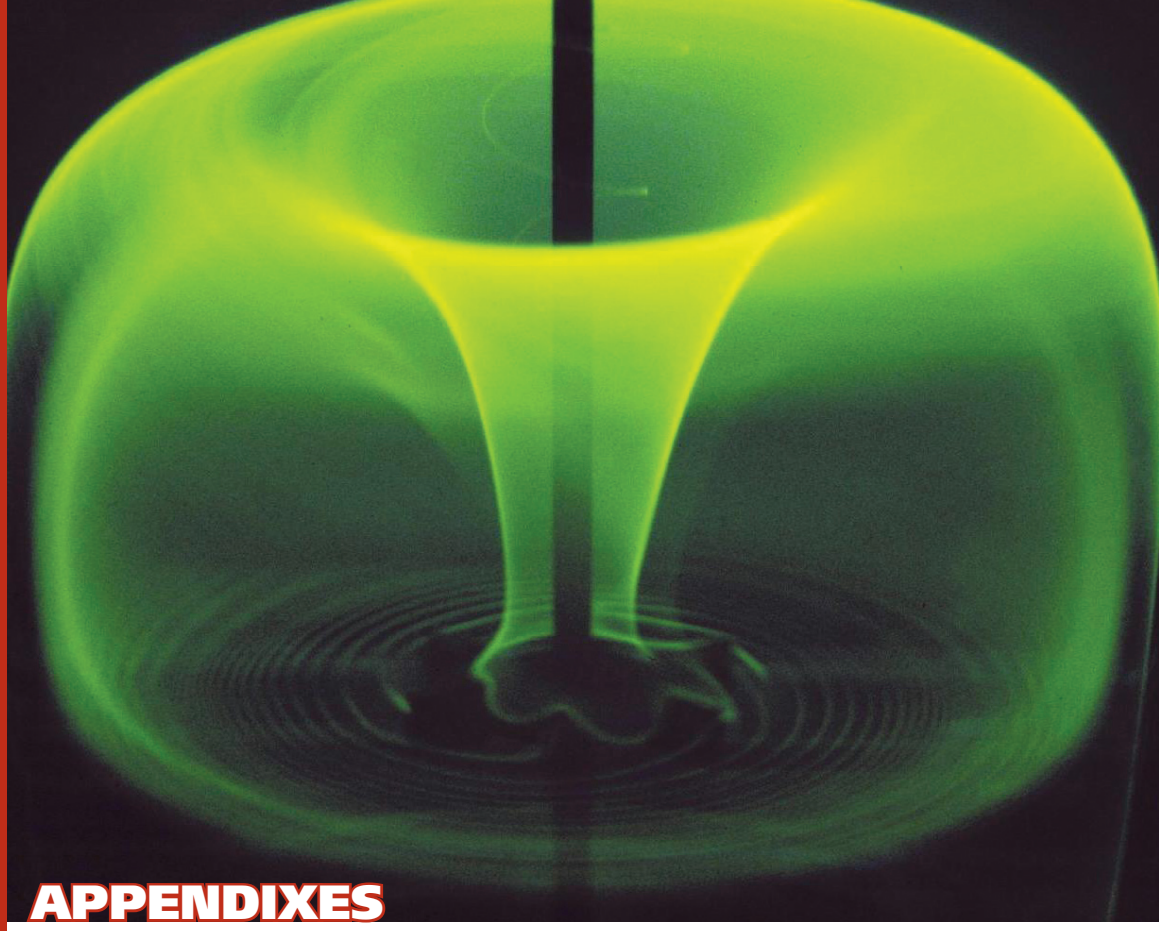
Stewardship Investments: Research and Human Capital
(amounts in thousands) (unaudited)

	2006	2005	2004	2003	2002
RESEARCH AND HUMAN CAPITAL ACTIVITIES					
Basic Research	$ 3,682,266	$ 3,564,093	$ 3,494,302	$ 3,519,159	$ 3,092,060
Applied Research	339,757	291,169	209,225	218,152	193,788
Education and Training	1,378,472	1,386,952	1,224,058	867,489	767,734
Non-Investing Activities	321,085	292,426	268,298	196,363	183,887
Total Research & Human Capital Activities	$ 5,721,580	$ 5,534,640	$ 5,195,883	$ 4,801,163	$ 4,237,469
INPUTS, OUTPUTS AND/OR OUTCOMES					
Research and Human Capital Activities					
Investments in					
Universities	$ 3,994,682	$ 3,970,851	$ 3,705,751	$ 3,310,365	$ 2,919,897
Industry	199,523	223,563	196,260	178,000	185,062
Federal Agencies	221,002	143,316	107,212	144,792	106,458
Small Business	218,334	193,199	200,995	186,400	144,844
Federally Funded R&D Centers	1,088,039	1,003,711	985,665	981,606	881,208
	$ 5,721,580	$ 5,534,640	$ 5,195,883	$ 4,801,163	$ 4,237,469
Support to					
Scientists	$ 473,457	$ 454,053	$ 477,970	$ 427,304	$ 394,144
Postdoctoral Programs	158,528	162,132	175,680	163,239	148,334
Graduate Students	544,513	538,233	546,084	475,315	402,620
	$ 1,176,498	$ 1,154,418	$ 1,199,734	$ 1,065,858	$ 945,098
Outputs & Outcomes					
Number of					
Awards Actions	22,000	22,000	23,000	23,000	21,000
Senior Researchers	32,000	32,000	31,000	30,000	28,000
Other Professionals	11,000	12,000	15,000	12,000	11,000
Postdoctoral Associates	5,000	6,000	6,000	6,000	6,000
Graduate Students	26,000	27,000	29,000	27,000	26,000
Undergraduate Students	27,000	33,000	35,000	32,000	32,000
K–12 Students	8,000	11,000	14,000	14,000	11,000
K–12 Teachers	59,000	74,000	86,000	85,000	84,000

NSF's mission is to support basic scientific research and research fundamental to the engineering process as well as science and engineering education programs. Toward this end, NSF's Stewardship Investments fall principally into the categories of Research and Human Capital. In Research, most NSF funding is devoted to basic research, with a relatively small share going to applied research. This funding supports both the conduct of research and the necessary supporting infrastructure, including state-of-the-art instrumentation, equipment, computing resources, and multi-user facilities such as digital libraries, observatories, and research vessels and aircraft. Basic and applied research costs are determined by prorating the program costs of *Tools* and *Ideas* reported on the *Statement of Net Cost*. The proration uses the basic and applied research percentages of total estimated research and development obligations reported in the current year Budget Request to OMB. The actual numbers are not available until later in the following fiscal year. Education and Training costs equate to *People* costs and Non-Investing Activities reflect *Organizational Excellence costs*.

The data provided for Scientists, Postdoctoral Associates, and Graduate Students are obtained from NSF's proposal system and is information reported by each Principal Investigator. The number of award actions are actual values from NSF's Enterprise Information System (EIS). The remaining outputs and outcomes are estimates obtained annually from the NSF Directorates. They are reported in the annual Budget Request to OMB.

NSF's Human Capital investments focus principally on education and training, toward a goal of creating a diverse, internationally competitive and globally engaged workforce of scientists, engineers, and well-prepared citizens. NSF supports activities to improve formal and informal science, mathematics, engineering, and technology education at all levels, as well as public science literacy projects that engage people of all ages in life-long learning. The decrease in the number of people involved in NSF activities in FY 2006 reflects decreased funding for programmatic activities related to science and engineering education.



Right: In FY 2006, NSF awarded $75.3 million for five new Engineering Research Centers (ERCs) that will develop cross-disciplinary programs to advance technologies to address major societal problems and provide the basis for new industries. Scientists and engineers from a variety of disciplines collaborate on broad-based high-risk engineering research, developing fundamental knowledge and test beds for emerging technologies. The ERCs also provide rich educational and research environments for preparing new generations of engineering leaders. The five centers will pursue breakthroughs in synthetic biology, fluid power, air monitoring, drug manufacturing, and technologies for older adults and people with disabilities. In the image at the right, a fluorescent dye injected into a tank of stirred liquid creates a pattern that resembles a green apple. The demonstration, conducted by Rutgers researchers from the NSF Engineering Research Center for Structured Organic Composites, shows how liquids mix in a typical pharmaceutical manufacturing operation. This research will help enhance drug quality while reducing the cost of developing and manufacturing new drugs.

For more information:

http://nsf.gov/news/news_summ.jsp?cntn_id=107939&org=NSF&from=news

APPENDIXES

Appendix 1:
DESCRIPTION OF NSF DIRECTORATES AND MANAGEMENT OFFICES

The **Directorate for Biological Sciences (BIO)** provides support for research to advance understanding of the underlying principles and mechanisms governing life. Research ranges from the study of the structure and dynamics of biological molecules, such as proteins and nucleic acids, through cells, organs, and organisms, to studies of populations and ecosystems. It encompasses all processes that are internal to the organism as well as those that are external, and includes temporal frameworks ranging from measurements in real-time through individual life spans, to the full scope of evolutionary time. BIO plays a major role in support of research resources for the biological sciences including multi-user instrumentation, living stock centers, systematics collections, biological field stations, and computerized databases, including sequence databases for plants and microorganisms. As part of the National Plant Genome Initiative (NPGI), BIO plays a major role through support for research infrastructure to enable a broad community and for research to understand the structure, organization, and function of plant genomes. For more information, go to *www.nsf.gov/dir/index.jsp?org=BIO*.

The **Directorate for Computer and Information Science and Engineering (CISE)** supports research in all areas of computer and information science and engineering, helps develop and maintain cutting-edge national computing and information infrastructure for research and education, and contributes to the education and training of the next generation of computer scientists and engineers. CISE supports projects designed to establish the scientific foundations of computing and communication devices and to explore their usage. For example, CISE funds advances in computing and communication theory, algorithms for computer and computational sciences, architecture and design of computers and software, and revolutionary computing paradigms based on emerging scientific ideas. At the systems level, CISE supports projects to better understand the fundamental properties of computer and network systems and to create better abstractions and tools for designing, building, analyzing, and measuring future systems. CISE programs also support advances in our understanding of the effective integration and co-evolution of social and computing systems; the capabilities of human beings and computing machines to create, discover, and reason with knowledge; the application of information technology to science and engineering problems; and the potential of computational systems to perform tasks autonomously, robustly, and flexibly. For more information, go to *www.nsf.gov/dir/index.jsp?org=CISE*.

For more information:

Office of the Director
www.nsf.gov/od/index.jsp

National Science Board
www.nsf.gov/nsb/

The **Directorate for Education and Human Resources (EHR)** supports activities that promote excellence in U.S. science, technology, engineering, and mathematics (STEM) education at all levels and in all settings, both formal and informal. The goal of these activities is to develop a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians, and educators, as well as a well-informed citizenry with access to the ideas and tools of science and engineering. EHR supports education research and infrastructure development in all science and engineering disciplines. Support is provided for individuals to pursue advanced study, for institutions to build their capacity to provide excellent STEM education, and for collaborations to strengthen STEM education at all levels by fostering alliances and partnerships among colleges, universities, school districts, and other institutions in the public and private sectors. For more information, go to *www.nsf.gov/dir/index.jsp?org=EHR*.

The **Directorate for Engineering (ENG)** supports research and education activities that provide a foundation for our nation's global leadership in technology and innovation. This leadership is the key to our continued economic growth and national security. ENG investments include such emerging technologies as sensors and sensor systems, molecular electronics, photonics, cyberinfrastructure, metabolic engineering, bioengineering, manufacturing innovation, and nanotechnology. Fundamental engineering research has a profound impact on areas such as protecting the environment, improving human health, enabling science to better understand the natural world, and enhancing our standard of living. For more information, go to *www.nsf.gov/dir/index.jsp?org=ENG*.

The **Directorate for Geosciences (GEO)** supports research in the atmospheric, earth, and ocean sciences. Basic research in the geosciences advances our scientific knowledge of the Earth and advances our ability to predict natural phenomena of economic and human significance, such as climate change, weather, earthquakes, fish-stock fluctuations, and disruptive events in the solar-terrestrial environment. GEO also supports the operation of national user facilities. For more information, go to *www.nsf.gov/dir/index.jsp?org=GEO*.

The **Directorate for Mathematical and Physical Sciences (MPS)** supports research and education in astronomical sciences, chemistry, materials research, mathematical sciences, and physics. Major equipment and instrumentation such as telescopes and particle accelerators are provided to support the needs of individual investigators. MPS also supports state-of-the-art facilities that enable research at the cutting edge of science and research opportunities in totally new directions. For more information, go to *www.nsf.gov/dir/index.jsp?org=MPS*.

The **Directorate for Social, Behavioral, and Economic Sciences (SBE)** supports research and education to build fundamental scientific knowledge about human cognition, language, social behavior, and culture and on economic, legal, political, and social systems, organizations, and institutions. To improve understanding of the science and engineering enterprise, SBE also supports science resources studies that are the nation's primary source of data on the science and engineering enterprise. For more information, go to *www.nsf.gov/dir/index.jsp?org=SBE*.

The **Office of Cyberinfrastructure (OCI)** coordinates and supports the acquisition, development, and provision of state-of-the-art cyberinfrastructure resources, tools, and services essential to the conduct of 21st century science and engineering research and education. OCI supports cyberinfrastructure, such as supercomputers, high-capacity mass-storage systems, system software suites and programming environments, scalable interactive visualization tools, productivity software libraries and tools, large-scale data repositories and digitized scientific data management systems, networks of various reach and granularity, and an array of software tools and services that hide the complexities and heterogeneity of contemporary cyberinfrastructure while providing broad access and enhanced usability. OCI supports the preparation and training of current and future generations of researchers and educators to use cyberinfrastructure to further their research and education goals, while also supporting the scientific and engineering professionals who create and maintain these IT-based resources and systems and who provide essential customer services to the national science and engineering user community. For more information, go to *www.nsf.gov/dir/index.jsp?org=OCI*.

The **Office of International Science and Engineering (OISE)** serves as the focal point, both within and outside NSF, for international science and engineering activities. OISE promotes the development of an integrated, Foundation-wide international strategy and manages international programs that are innovative, catalytic, and responsive to a broad range of NSF interests. OISE also supports programs that provide international research experiences to students and young investigators, preparing them for full participation in the global research enterprise. In addition, OISE manages cooperative relationships with partner countries around the world and with international scientific organizations on behalf of NSF. For more information, go to *www.nsf.gov/div/index.jsp?org=OISE*.

FUTURE SCIENTISTS

Researcher Alan Smith and his team at California State University, San Bernardino have completed an ambitious project to recruit and retain underrepresented ethnic groups in the earth sciences from 6th grade to post-college. In an initial survey asking minority students why they were not majoring in geology, the top reasons were lack of exposure to the geosciences and lack of knowledge about geoscience careers.

Armed with these results, the team conducted 169 outreach sessions over a three-year period that involved more than 12,000 contact hours with 5,700 students. Most students were middle- or high-school students, and three quarters were from underrepresented groups in the geosciences (52 percent were Hispanic, 13 percent African American, 5 percent Native American, and 4 percent Pacific Islander).

Group activities included hikes to the San Andreas fault and hands-on exercises related to plate tectonics and earthquakes. Hands-on activities were modified to enhance students' familiarity with the scientific method. Students began by making observations from and asking questions about maps of the Earth. One of the observations they often noted was that the coastlines of Africa and South America look like they would fit together. They also noticed the mid-ocean ridges and trenches on the sea floor. A computer animation of world seismicity was shown so that students could make observations about where earthquakes occur.

Another activity was a biannual Global Positioning System (GPS) campaign. This campaign allowed students to work with scientists and use state-of-the-art GPS receivers to precisely determine the location of benchmarks on both sides of the San Andreas and San Jacinto faults. From these measurements, the students determined the bending of the tectonic plates that will eventually lead to slip along these faults as major earthquakes. Students worked with scientists to interpret the GPS data in terms of how fast the faults were slipping. Results were presented at meetings of the American Geophysical Union and the Southern California Earthquake Center. The data were also shared with the Southern California Earthquake Data Center ***(www.scecdc.scec.org)*** for use by other scientists around the country and around the world.

The **Office of Polar Programs (OPP)**, which includes the U.S. Polar Research Programs and U.S. Antarctic Logistical Support Activities, supports multidisciplinary research in the Arctic and Antarctic regions. These geographic frontiers—premier natural laboratories—are the areas predicted to be the first affected by global change. They are vital to understanding past, present, and future responses of Earth systems to natural and man-made changes. OPP support provides unique research opportunities ranging from studies of Earth's ice and oceans to research in atmospheric sciences and astronomy. For more information, go to *www.nsf.gov/dir/index.jsp?org=OPP*.

The **Office of Budget, Finance, and Award Management (BFA)** is headed by the Chief Financial Officer, who has responsibility for budget, financial management, grants administration and procurement operations, and related policy. Budget responsibilities include the development of the Foundation's annual budget, long-range planning, and budget operations and control. BFA's financial, grants, and other administrative management systems ensure that the Foundation's resources are well managed and that efficient, streamlined business and management practices are in place. NSF has been acknowledged as a leader in the federal research administration community, especially in its pursuit of a paperless environment that provides more timely and efficient awards administration. For more information, go to *www.nsf.gov/bfa/*.

The **Office of Information and Resource Management (OIRM)** provides human capital management, information technology solutions, continuous learning opportunities, and general administrative services to the NSF community of scientists, engineers, and educators. OIRM also provides logistical support functions for NSF staff as well as the general public. It is responsible for recruiting, staffing, and other human resource service requirements for all NSF staff and visiting personnel. OIRM is responsible for the management of NSF's physical infrastructure and conference facilities, the administration of its sophisticated technology infrastructure, and the dissemination of information about NSF programs to the external community through the agency's website. It is also responsible for delivery of the hardware, software, and support systems necessary to manage the Foundation's grant-making process and to maintain advanced financial and accounting systems. For more information, go to *www.nsf.gov/oirm/*.

Appendix 2:
EXECUTIVE STAFF AND OFFICERS

NSF Executive Staff

Office of the Director
Arden L. Bement, Jr., Director

Office of the Deputy Director
Kathie L. Olsen, Deputy Director

National Science Board
Steven C. Beering, Chair
Kathryn D. Sullivan, Vice Chair

Directorate for Biological Sciences
James Collins, Assistant Director

Directorate for Computer and Information Science and Engineering
Peter A. Freeman, Assistant Director

Directorate for Education and Human Resources
Wanda Ward, Assistant Director (Acting)

Directorate for Engineering
Richard Buckius, Assistant Director

Directorate for Geosciences
Margaret S. Leinen, Assistant Director

Directorate for Mathematical and Physical Sciences
Tony F. Chan, Assistant Director

Directorate for Social, Behavioral, and Economic Sciences
David W. Lightfoot, Assistant Director

Office of Cyberinfrastructure
Daniel E. Atkins, Director

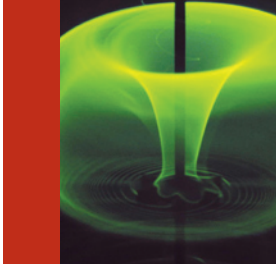
Office of International Science and Education
Thomas Weber, Director

Office of Polar Programs
Karl A. Erb, Director

Office of Equal Opportunity Programs
Ronald D. Branch, Director

Office of the General Counsel
Lawrence Rudolph, General Counsel

Office of Inspector General
Christine C. Boesz, Inspector General



Office of Integrative Activities
Nathaniel G. Pitts, Director

Office of Legislative and Public Affairs
Jeff Nesbit, Director

Office of Budget, Finance, and Award Management
Thomas N. Cooley, Director

Office of Information and Resource Management
Anthony A. Arnolie, Director

Officers

Chief Financial Officer
Thomas N. Cooley (Office of Budget, Finance, and Award Management)

Chief Information Officer/Chief Privacy Officer
George O. Strawn (Office of Information and Resource Management)

Chief Human Capital Officer
Anthony A. Arnolie (Office of Information and Resource Management)

NSF Affirmative Action Officer
Consuelo Roberts (Office of Equal Opportunity Programs)

Appendix 3: NATIONAL SCIENCE BOARD MEMBERS DURING FY 2006

Steven C. Beering (Chair)[1]
President Emeritus
Purdue University

Kathryn D. Sullivan (Vice Chair)
Science Advisor
Center of Science and Industry (COSI)

Mark R. Abbott[2]
Dean and Professor
College of Oceanic and Atmospheric Sciences
Oregon State University

Dan E. Arvizu
Director
National Renewable Energy Laboratory

Barry C. Barish
Linde Professor of Physics
California Institute of Technology

Camilla P. Benbow
Patricia and Rodes Hart Dean of Education and Human Development
Peabody College of Education and Human Development
Vanderbilt University

Ray M. Bowen
Former President
Texas A&M University

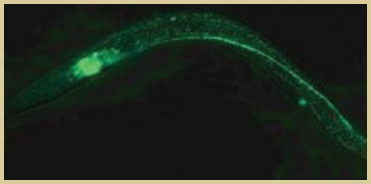
John T. Bruer[2]
President
James S. McDonnell Foundation
St. Louis, MO

G. Wayne Clough
President
Georgia Institute of Technology

Kelvin K. Droegemeier
Regent's Professor and Roger and Sherry Teigen Presidential Professor
Weathernews Chair of Applied Meteorology
Director, Center for Analysis and Prediction of Storms
Director, Sasaki Institute
University of Oklahoma

[1] Board member as of May 2006.
[2] Board member as of July 31, 2006.

UNDERSTANDING NEURONS



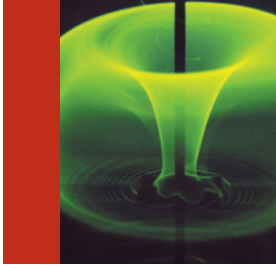
There are hundreds of millions of neurons in the mammalian nervous system, more than the number of stars in the Milky Way. So neuroscientists often use less dauntingly complex organisms for their research—among them the roundworm *Caenorhabditis elegans,* which has just 302 neurons. Despite the many differences between roundworms and mammals, the neurons of these organisms share many properties. Among these is the presence of a nucleus, with common genes and a common genetic code.

Now, Guy Caldwell, Associate Professor in the Department of Biological Sciences at the University of Alabama and an NSF CAREER awardee, has discovered a family of genes in *C. elegans,* above, that controls the position of the nucleus within the cell. Moreover, he has found that when these genes are turned on, the nucleus shifts position and impairs the neuron's ability to communicate with other neurons.

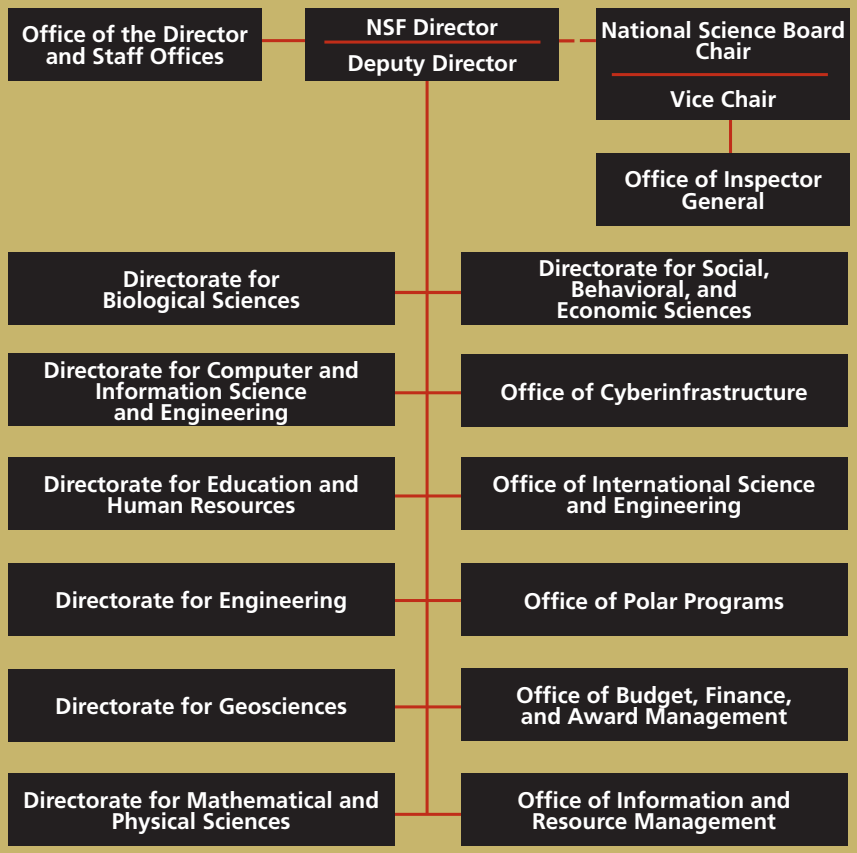
This discovery is not only of fundamental interest to cell biologists, but has potential implications for understanding human neurological diseases. One of the earliest responses of neurons to injury or disease is movement of the nucleus to the edge of the cell. Understanding how and why such movements occur may suggest ways to prevent or reduce the devastating behavioral consequences of damage to the nervous system.

For more information:

http://www.bama.ua.edu/~gcaldwel/



FY 2006 Organization Chart



NSF is headed by a Director who is appointed by the President and confirmed by the U.S. Senate. A description of each directorate and management office and a listing of NSF's executive staff and officers can be found in appendixes 1 and 2. A 24-member National Science Board (NSB), also appointed by the President with the consent of the Senate, meets about six times a year to establish the overall policies of the Foundation. The NSB, made up of prominent contributors to the science, mathematics, engineering, and education communities, also serves the President and the Congress as an independent advisory body on policies related to the U.S. science and engineering enterprise. A listing of the FY 2006 NSB members can be found in appendix 3.

The NSF workforce includes approximately 1,400 full-time staff. To complement the permanent staff, NSF regularly recruits visiting scientists, engineers, and educators who are leaders in their fields. Recruiting active researchers and educators to fill rotating assignments infuses new talent and expertise into NSF and is integral to the Foundation's mission of supporting the entire spectrum of science and engineering research and education, particularly research at the frontier. Rotators make up about 15 percent of NSF's workforce. In addition, NSF employs contractors who are engaged in commercial administrative activities.

Right: Forecasting hazards posed by the "weather" in space can be as important—and as difficult—as forecasting thunderstorms, tornadoes, and hurricanes on the ground. The highly energetic charged particles emitted by the Sun can endanger astronauts, damage the electronics on satellites and planetary probes, increase the radiation exposure of crews and passengers in high-altitude aircraft, and even affect electrical systems on the Earth's surface.

Now, however, Ilia Roussev at the University of Hawaii has developed a computer model that could improve space weather forecasts significantly. Based on a well-established, but highly complex physical theory known as magnetohydrodynamics, Roussev's model, right, accurately simulates the flares and other solar eruptions that emit the high-energy particles..

For more information:

www.ifa.hawaii.edu/users/iroussev

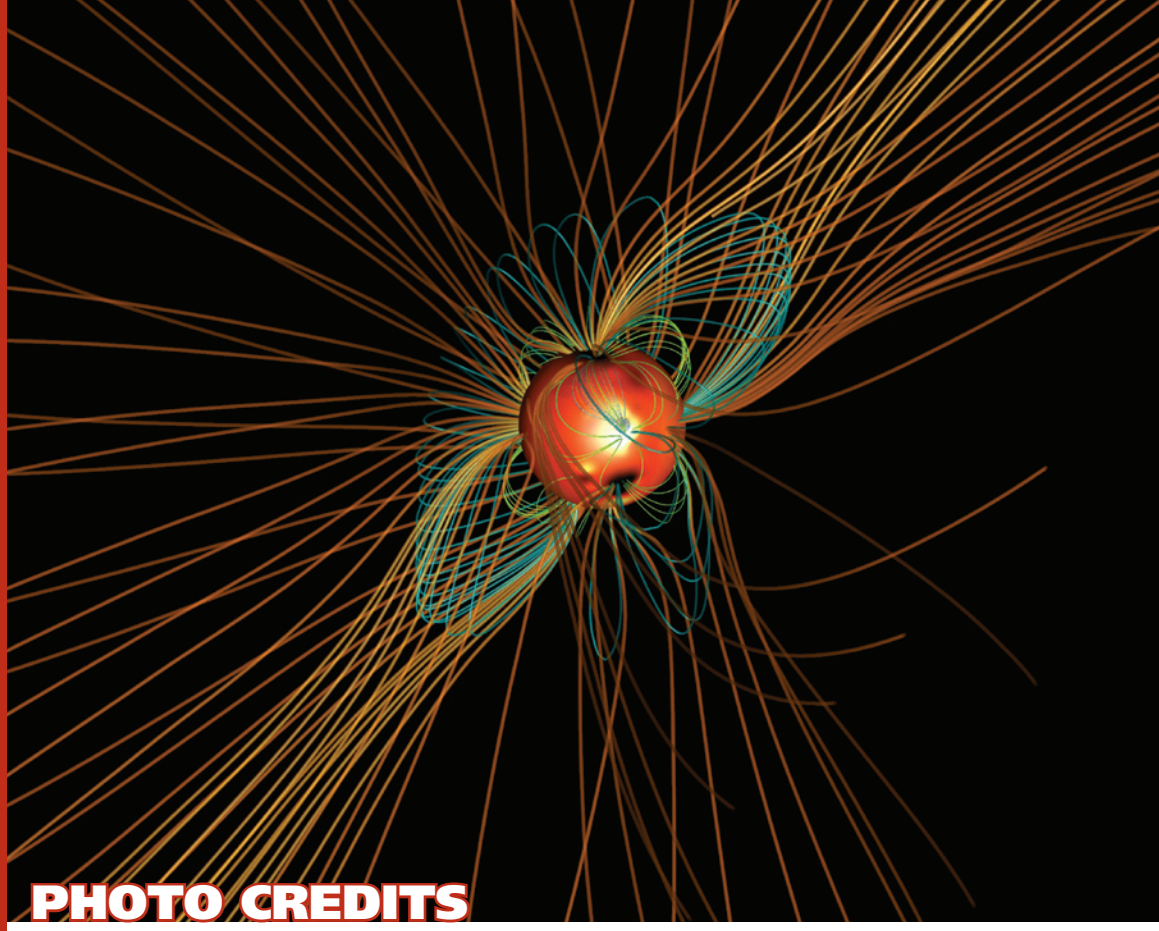


PHOTO CREDITS

Page 1
Security screening at the nation's airports is expanding beyond searches for knives or liquid explosives to determining the intent of a would-be criminal through next-generation monitoring systems and analyzing culturally independent behavioral cues. Currently in the testing phase, the technologies should dramatically improve the safety, speed, and efficiency of a trip through the airport.

In September 2006, experts in sensor technology, behavioral screening, and biometrics discussed the latest developments in airport security in a telephone interview hosted by the National Science Foundation (NSF). The show is available online in its entirety. Moderated by NSF's Richard McCourt, the program featured NSF grantees Richard P. Donovan from Montana Tech of the University of Montana, Butte; Mark G. Frank from the University at Buffalo, State University of New York; and Arun A. Ross from West Virginia University.

For more information:

www.nsf.gov/news/news_summ.jsp?cntn_id=108133&org=NSF&from=news

Page 2
Credit: Leroy N. Sanchez, Los Alamos National Laboratory

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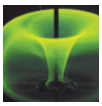
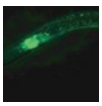
Page 18
Credit: Dvir Kafri

Page 20
Credit: Professor Jose Restrepo, Department of Structural Engineering, University of California, San Diego



Page 22
Credit: M.M. Alvarez, T. Shinbrot, and F. J. Muzzio, Rutgers University Engineering Research Center for Structured Organic Composites

Page 24
Credit: Sally McGill



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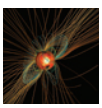
Credit: Kim Caldwell



Page 28
Credit: Ilia Roussev, University of Hawaii

FY 2006 Research Highlights

The following are some results reported by NSF-supported researchers in FY 2006:

- Conducted extensive onsite research in and around New Orleans following Hurricane Katrina and published an analysis explaining how and why numerous levees failed, allowing engineers to improve plans for repairs
- Observed the astronomical results of a two-galaxy smashup and announced the first "direct detection" of the mysterious, invisible "dark matter" that is a major component of the universe but neither emits nor reflects light
- Provided novel telecommunications and computerized early-warning systems that gave critical information to separate teams fighting a dangerous outbreak of wildfires in California
- Issued advance warning of the increased risk of a potentially lethal microbe called Hantavirus that has plagued the Four Corners area of the southwest United States
- Launched a major, multiyear program to record and study dozens of dying languages—those spoken by only a few people and doomed to soon disappear completely—so that knowledge will not be lost to humanity
- Compiled a forecast indicating that the next 11-year sunspot cycle, with associated "solar storms" that can damage key communications satellites and cause widespread blackouts in power grids, will be at least 30 percent stronger than the last cycle
- Showed that there is a direct link between the number of species in an ecosystem and its ability to survive environmental and other threats
- Uncovered a new method of detecting and identifying cancer genes by mathematically analyzing the output of "gene chips" and tested the method successfully in lung cancer cases
- Undertook a wholesale reevaluation of high school advanced placement courses in math and science, which are now in drastic need of updating to give students the information and insight they will need in college
- Discovered and characterized a "super glue" produced by bacteria that is completely waterproof and three to five times stronger than any commercial adhesive available—capable of withstanding a pull of 5 tons per square inch
- Unearthed a remarkable fossil—unlike anything else ever discovered in the region—that is the oldest example of a creature that inhabited the evolutionary gap between fish and land animals
- Devised an ultra-tiny electrical valve (or diode) that is made of only a single molecule—a thousand times smaller than its current counterparts—thus raising the possibility of an entirely new era of miniaturization in electronic components
- Determined that infants less than one year of age have an innate sense of numbers that they are able to employ many months before they are even able to talk, much less do arithmetic
- Produced the first computer simulation of the workings of every atom in a virus, the first time any complete life form has been mapped in its entirety
- Sent a new high-altitude research plane, built to fly miles above commercial jets, on its first successful science mission to examine the contents and activity of atmosphere at previously unreachable heights
- Constructed a new generation of two-legged robots that can walk like human beings

For more information on the results of NSF-funded research, visit *www.nsf.gov/discoveries/*.

www.nsf.gov

NSF–07–11

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4201 Wilson Boulevard
Arlington, VA 22230
Phone (703) 292–5111
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