

EXECUTIVE SUMMARY

This report, prepared pursuant to the Government Performance and Results Act (1993), covers activities of the National Science Foundation during Fiscal Year 2001.

The National Science Foundation (NSF) Act of 1950 charges NSF with supporting scientific and engineering research and education programs at all levels. Over time, other responsibilities have been added such as supporting the development and use of computers and other technologies, providing Antarctic research facilities and logistics support, and addressing issues of equal opportunity in science and engineering research and education.

NSF represents about four percent of the total federal budget for research and development, but accounts for one-fifth of all federal support for basic research and 40% of non-life science basic research at academic institutions. About 95% of our funding supports the work of the nation's researchers and educators; the agency's administrative overhead is only five percent.

NSF goals are divided into three broad areas: Strategic Outcome Goals, Management Goals, and Investment Process Goals.

Outcome Goals: Our outcome goals focus on PEOPLE, IDEAS, and TOOLS and concern the practical, concrete, long-term results of NSF grants and programs. They represent what we seek to accomplish with the investments we make in science and engineering research and education.

Management Goals: Our management goals relate to the effectiveness and efficiency of our activities.

Investment Process Goals: Our investment process goals relate to the

procedures we use to make awards, fund and manage capital projects, and otherwise serve our customers.

FY 2001 Results: We met 15 of our 23 goals. Foundation staff verified and validated all NSF performance data. In addition, PricewaterhouseCoopers LLP, an independent examiner engaged by NSF, verified and validated selected performance information and data.

Outcome Goals: We were successful for four of our five outcome goals (80%) related to:

- Developing "a diverse, internationally competitive and globally-engaged workforce of scientists, engineers, and well-prepared citizens" (PEOPLE);
- Providing intensive professional development programs for at least 65,000 K-12 teachers (PEOPLE);
- Enabling "discovery across the frontier of science and engineering, connected to learning, innovation and service to society" (IDEAS); and,
- Providing "broadly accessible, state-of-the-art and shared research and education tools." (TOOLS)

We were not successful in achieving the goal involving systemic reform in K-12 schools. While we accomplished two of the three indicators required for successful attainment of this goal, we did not accomplish the third.

Examples of accomplishments achieved during this reporting period:

- New planets were discovered in orbit around far-off stars, in a quest to find planetary systems similar to Earth.
- Computer scientists created what may be the most intrusion-proof system invented so far. It has successfully

repelled more than 13,000 hacker attacks from around the world.

- Researchers designed the first autonomous vehicle to work under the Arctic ice.
- Robotics advanced in numerous ways, with robot scouts used to search for victims at the World Trade Center site.
- The “Deep Green” project revealed major discoveries about the history of plant life on Earth.
- Climate researchers uncovered an apparent self-regulating feedback relationship between sea-surface temperature and cloud formation that could prompt drastic changes in the way scientists model climate.
- The Macrogalleria, a pioneering educational polymer web site, is continuing to garner broad recognition. The worldwide popularity is so high it has already been translated into Afrikaans, French, and Spanish, and is being translated into Italian and Portuguese.
- *Sounds of the Sea* is an NSF informal science education project that serves diverse students and engages diverse communities directly in the scientific enterprise. It created a national model for engaging blind and visually impaired students and adults in experiencing hands-on science.
- The new Terascale Computing System (TCS) has begun operation well ahead of schedule and is exceeding performance. The combined peak power of the full computer system will be 6 Teraflops, making it the most powerful computer available to academic scientists and engineers in the U.S.
- A Lightning Mapping Array (LMA) has been developed that provides added lead-time for use in forecasting the onset of lightning strokes hitting the ground (one of the deadliest weather phenomena occurring today).

Additional examples of accomplishments for each of the outcome goals are provided

within the body of the report. They represent only a small fraction of the results identified by external experts.

Management Goals: We were successful for four of our five goals (80%) in this area: We were able to:

- Ensure that at least 95% of full proposals are submitted electronically through the computer-based “FastLane” system. In fact, more than 99% were submitted electronically;
- Increase the total number of science and engineering hires at NSF from under-represented groups, as judged against an FY 1997 baseline. NSF achieved a 138% increase in female hires and a 47% increase in minority hires;
- Increase usage of a broad range of video-conferencing/long distance communications technology by 100 percent over the FY 1999 level. The increase achieved was 184%; and
- Meet the goal of having the technological capability to move competitive proposals submitted electronically through the entire review process without generating paperwork. A pilot project involving 10 programs was successful.

We were not successful in meeting a management goal related to distributing a survey to help establish baselines to enable us to better assess the quality of the work environment. A survey will be administered in FY 2002.

Investment Process Goals: We achieved 7 of 13 (54%) of these goals. These are:

- Allocating at least 85% of funds to projects reviewed by external peer groups and selected through merit-based competition.
- Ensuring that 95% of program announcements and solicitations are available at least three months prior to proposal deadlines. We achieved 100%.

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- Increasing our average annualized award size for research projects to \$110,000. We exceeded our goal, achieving an average annualized award size of \$113,000.
- Developing the capability and implementing electronic approaches that request voluntary demographic data from all reviewers to determine participation levels of members of underrepresented groups in the NSF reviewer pool.
- Ensuring that NSF Program Officers address both generic review criteria when making award decisions.
- Keeping annual construction and upgrades expenditures at 90% of our facilities within 110% of estimates. Ninety-six percent of the projects were within 110%.
- Keeping total cost of construction and upgrade projects initiated after 1996 within 110% of estimates made at the initiation of construction. One project was completed and its actual cost was equal to the total estimated cost.

We were not successful for six of our investment process goals. These were:

- Awarding at least 30% of competitive research grants to new investigators. We awarded 28%, and will continue our efforts in reaching out to new investigators to promote awareness of funding opportunities and to encourage new investigators to submit proposals.
- Ensuring that external merit reviewers take *both* NSF criteria into account when evaluating proposals. The two generic criteria are intrinsic merit and broader impacts of the proposed activity. We have taken several steps, including revising the Grant Proposal Guide, to ensure that both the proposer and reviewer communities are aware of the importance we attach to both criteria.
- Processing 70% of our proposals processed within six months of receipt. Although we did not achieve our goal,

we showed significant improvement, rising from 54% in FY 2000 to 62% in FY 2001. This improvement took place even though the number of proposals received in FY 2001 represented an 8.5% increase over FY 2000 and was the largest annual percentage increase in over a decade.

- Increasing the average duration of awards for research projects to at least three years. Sufficient resources were not available to achieve both the average annualized award size and the average duration goals. We focused on increasing our average annualized award size. We will continue to focus on increasing both award size and duration.
- Having 90% of our facilities meet all annual schedule milestones by the end of the reporting period. Of 25 construction and upgrade projects supported by NSF, 21 (or 84%) met this goal (compared with 64% achieving the goal in FY 2000).
- Holding operating time lost due to unscheduled downtime at 90% of NSF-funded facilities to less than 10% of total scheduled operating time. Of 29 reporting facilities, 25 (86%) met the goal

Management Challenges: The NSF Office of the Inspector General listed 10 major management challenges for FY 2001:

- FastLane
- GPRA Data Quality
- Merit Review
- Cost Sharing
- Award Administration
- Management of Large Infrastructure Projects
- Management of U.S. Antarctic Program
- Work Force Planning and Training
- Fostering a Diverse Scientific Workforce
- Data Security

Our responses and focused NSF activities in these areas are provided within the report.