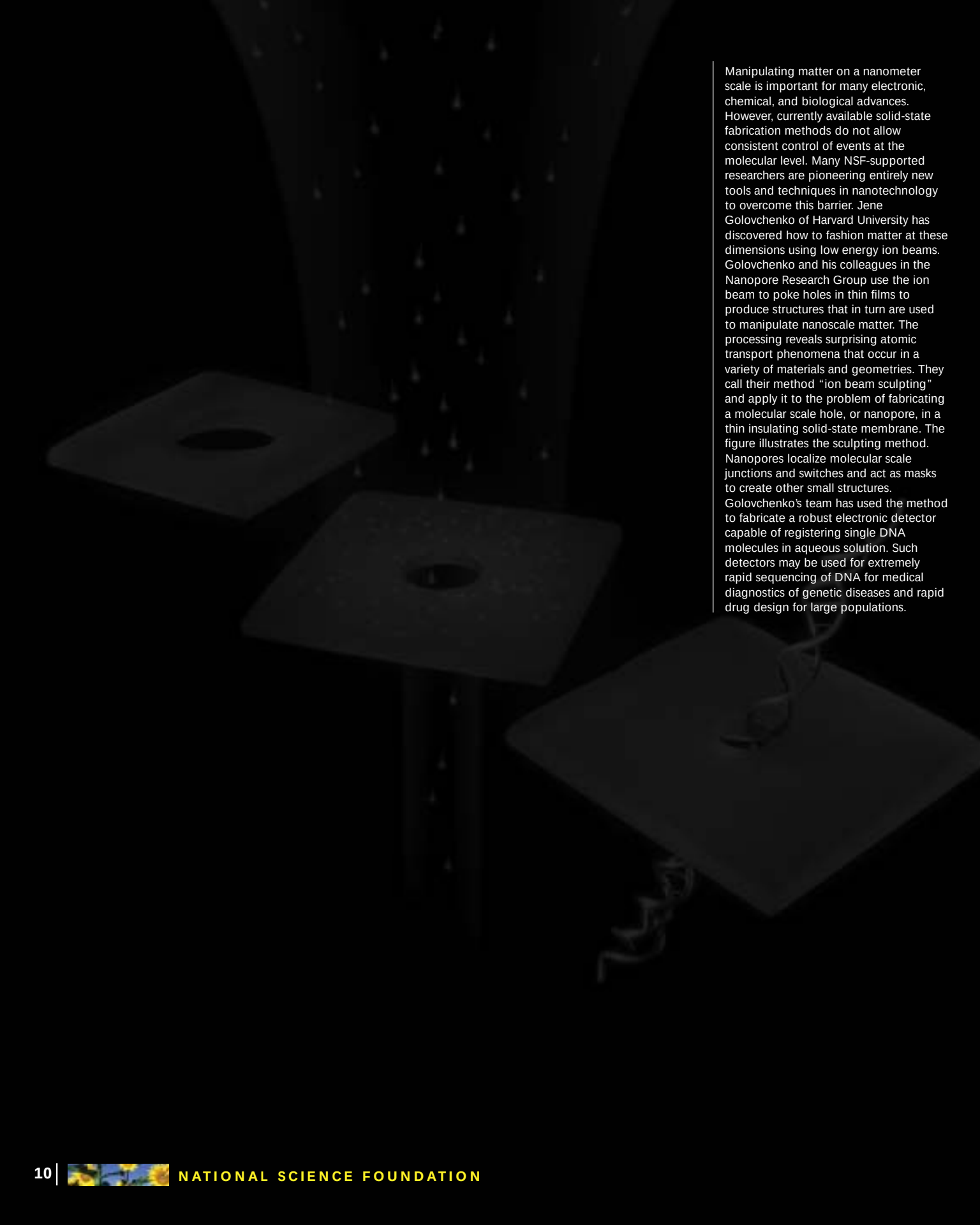

Manipulating matter on a nanometer scale is important for many electronic, chemical, and biological advances. However, currently available solid-state fabrication methods do not allow consistent control of events at the molecular level. Many NSF-supported researchers are pioneering entirely new tools and techniques in nanotechnology to overcome this barrier. Jene Golovchenko of Harvard University has discovered how to fashion matter at these dimensions using low energy ion beams. Golovchenko and his colleagues in the Nanopore Research Group use the ion beam to poke holes in thin films to produce structures that in turn are used to manipulate nanoscale matter. The processing reveals surprising atomic transport phenomena that occur in a variety of materials and geometries. They call their method "ion beam sculpting" and apply it to the problem of fabricating a molecular scale hole, or nanopore, in a thin insulating solid-state membrane. The figure illustrates the sculpting method. Nanopores localize molecular scale junctions and switches and act as masks to create other small structures. Golovchenko's team has used the method to fabricate a robust electronic detector capable of registering single DNA molecules in aqueous solution. Such detectors may be used for extremely rapid sequencing of DNA for medical diagnostics of genetic diseases and rapid drug design for large populations.

AN IMPRESSIVE RETURN ON INVESTMENT

In assessing the return on NSF's investment in the future, the Foundation is guided by the NSF *GPRA (Government Performance and Results Act of 1993) Strategic Plan FY 2001–2006.* In this plan, NSF seeks to clearly communicate its vision and ideals and to provide a framework for the future. This framework is informed by NSF's mission, as set out by Congress in the National Science Foundation Act of 1950, and by the Foundation's unique role as the only federal agency charged with strengthening the overall health of U.S. science and engineering across a broad and expanding frontier.

NSF's Strategic Plan emphasizes three areas of focus—people, ideas, and tools, and describes the three core strategies—developing intellectual capital, integrating research and education, and promoting partnerships—which, together with its core values, guide NSF in achieving its mission. The plan also sets forth NSF's implementation strategy and introduces four emerging areas that will benefit from increased attention over the next several years—Biocomplexity in the Environment, Information Technology, Nanoscale Science and Engineering, and 21st Century Workforce.

NSF-funded scientist Hans-Werner Braun of the University of California, San Diego checks on the construction of a relay station that is helping to bring wireless Internet access to Native Americans in the remote mountain reservations of the La Jolla and Pala tribes in San Diego County. This project collaborates with the Pala tribe to provide their Learning Center with high-speed Internet connectivity. The project is an interdisciplinary effort to design a network that is reliable even under very adverse conditions, including catastrophic earthquakes. The High Performance Wireless Research and Education Network (HPWREN) is developing such a system for geophysicists, astronomers, and ecologists, while demonstrating that the same tools can connect underserved users such as schools at remote locations. The Foundation has always taken a lead role in bridging the digital divide—funding the growth of the Internet from a small network linking university computer science departments to its current state as a medium for business, news, information, and entertainment used by millions around the world.

This is the third year NSF has reported GPRA performance results. The strategic outcome goals described in the *NSF GPRA Strategic Plan* provide the basis for both NSF's FY 2001 Annual Performance Plan and NSF's FY 2001 Budget, which were developed concurrently to ensure a direct link between programmatic activities and the achievement of NSF's strategic goals.

GPRA implementation has been a particular challenge for agencies like NSF whose mission involves research activities. This is primarily due to (1) the difficulty of linking research outcomes to annual investments and the agency's annual budget, because research outcomes often appear years or decades after the initial investment, and (2) the fact that assessing the results of research is inherently retrospective and requires the qualitative judgment of experts. NSF has developed an alternative format, approved by OMB, using external expert review panels to assess research results and reporting research outcome goals using a qualitative scale. The use of expert panels to review research results and outcomes is a common, long-standing practice used in the academic research community.

NSF's Performance Scorecard includes three mutually supportive sets of performance goals and measures—for Strategic Outcomes, for Management, and for Investment Process. The longer-term desired results of NSF awards are reflected in the Strategic Outcome Goals. Attaining the Investment Process Goals and Management Goals is necessary to ensure that the longer-term Strategic Outcome Goals will be achieved.

In FY 2001, NSF achieved fifteen of twenty-three performance goals, or 65 percent. Overall, these results are comparable to prior year results, when NSF achieved 64 percent of its performance goals.

NSF FY 2001 PERFORMANCE SCORECARD

STRATEGIC OUTCOME GOALS

Strategic Outcome	Performance Goal	Result
PEOPLE Develop a diverse, internationally competitive, and globally engaged workforce of scientists, engineers, and well-prepared citizens.		
Workforce Development and an Informed Citizenry	Demonstrate significant achievement in one or more of the following indicators: • Improved mathematics, science, and technology skills for U.S. students at the K-12 level and for citizens of all ages, so that they can be competitive in a technological society. • A science and technology and instructional workforce that reflects America's diversity. • Globally engaged science and engineering professionals who are among the best in the world. • A public that is provided access to the benefits of science and engineering research and education. **Result:** Reports prepared by external experts provide assessments and retrospective examples of NSF-supported projects that document significant achievement. A number of these assessments were emphatic that NSF must continue and increase its efforts toward increasing diversity.	■
K-12 Education Reform	After three years of NSF support, more than 80 percent of schools participating in systemic initiative programs will (1) implement a standards-based curriculum in science and mathematics; (2) further professional development of the instructional workforce; and (3) improve student achievement on a selected battery of tests. **Result:** The curriculum, instructional workforce, and improved achievement in science components of the goal were successful. However, fewer than 80 percent of schools met the goal of improved student achievement in mathematics. In FY 2002, appropriate technical assistance will be provided to schools not meeting the goal.	■
Teacher Development and Enhancement	Through systemic initiatives and related teacher enhancement programs, NSF will provide intensive professional development experiences for at least 65,000 pre-college teachers. **Result:** In the 1999–2000 school year, NSF awards provided intensive professional development (60+ hours) to 79,000 teachers, substantially exceeding the goal of 65,000.	■
IDEAS **Enable discovery across the frontier of science and engineering, connected to learning, innovation, and service to society.**	Demonstrate significant achievement in one or more of the following indicators: • A robust and growing fundamental knowledge base that enhances progress in all science and engineering areas, including the science of learning. • Discoveries that advance the frontiers of science, engineering, and technology. • Partnerships connecting discovery to innovation, learning, and societal advancement. • Synergistic research and education processes. **Result:** Reports prepared by external experts provide assessments and retrospective examples of NSF-supported projects that document significant achievement.	■
TOOLS **Provide broadly accessible, state-of-the art, and shared research and education tools.**	Demonstrate significant achievement in one or more of the following indicators: • Shared use platforms, facilities, instruments, and databases that enable discovery and enhance the productivity and effectiveness of the science and engineering workforce. • Networking and connectivity that take full advantage of the Internet and make science, mathematics, engineering, and technology (SMET) information available to all citizens. • Information and policy analyses that contribute to the effective use of science and engineering resources. **Result:** Reports prepared by external experts provide assessments and retrospective examples of NSF-supported projects that document significant achievement. *[Other than the Division of Science Resources Statistics, very limited contributions and limited involvement of NSF programs are used in developing information and other materials fundamental to national policy debates.]*	■

KEY
■ Indicates goal was achieved in FY 2001.
■ Indicates goal was not achieved but significant progress was made in FY 2001.
■ Indicates goal was not achieved in FY 2001.
See NSF's *FY 2001 GPRA Performance Report* (www.nsf.gov/od/gpra) for a complete discussion of NSF's FY 2001 performance goals and results.

MANAGEMENT GOALS

Performance Area	Performance Goal	Result
BUSINESS PRACTICES		
Electronic Proposal Submission	Receive 95 percent of full proposals electronically through FastLane.	
Electronic Proposal Processing	Conduct ten pilot paperless projects that manage the competitive review process in an electronic environment.	
Videoconferencing/ Long Distance Communications	Increase use of a broad range of videoconferencing and long distance communications technology by 100 percent over the FY 1999 level.	
STAFF **Diversity**	Increase over 1997 the total number of hires for science and engineering positions from underrepresented groups.	
Work Environment	Establish various baselines that will enable management to better assess the quality of work life and work environment within NSF. **Result:** Development of an employee survey is underway. This survey, which will be distributed to employees in FY 2002, will provide baseline information on the quality of work life and work environment at NSF.	

INVESTMENT PROCESS GOALS

Performance Area	Performance Goal	Result
PROPOSAL AND AWARD PROCESSES		
Merit Review	Allocate at least 85 percent of basic and applied research funds to projects that undergo merit review.	
Implementation of Merit Review Criteria: *Reviewers*	Reviewers address the elements of both generic review criteria: intellectual impact and broader impact. **Result:** Reports prepared by external experts provide an assessment of the implementation of merit review criteria for reviewers. In FY 1998–FY 2000, reviewers did not consistently address the broader impacts criterion. In FY 2001, NSF added separate review screens to FastLane to enable reviewers to address each merit review criterion separately. NSF also established an internal task force to examine strategies to improve both proposer and reviewer attention to the broader impacts criterion. A number of FY 2001 reports note that reviewers are making significant progress in utilizing both merit review criteria. In FY 2002, NSF will continue to develop and apply recommendations that focus on strategies that stress the importance of using both criteria. It will also collect and make available examples of broader impacts and develop a plan to disseminate them.	
Implementation of Merit Review Criteria: *Program Officers*	Address the elements of both generic review criteria — intellectual impact and broader impact.	
Customer Service: *Time to Prepare Proposals*	Make 95 percent of program announcements available to relevant individuals and organizations at least three months prior to the proposal deadline or target date.	

INVESTMENT PROCESS GOALS *(continued)*

Performance Area	Performance Goal	Result
Customer Service: *Time to Decision*	Tell 70 percent of applicants whether their proposal has been declined or recommended for funding within six months. **Result:** In FY 2001, 62 percent of proposals were processed within six months of receipt. This performance improves upon the FY 1998 baseline of 59 percent, but is still short of the 70 percent goal. Data show that about 77percent of proposals were processed in fewer than seven months and more than 90 percent were processed in fewer than nine months. In FY 2002, NSF will continue to focus on improving the efficiency of proposal processing, including the dissemination of best practices to program staff.	
Award Size	Increase the average annualized award size for research projects to $110,000.	
Award Duration	Increase the average award duration for research projects to at least three years. **Result:** Resource limitations affected NSF's ability to achieve both the award size and award duration goals. NSF focused its efforts on increasing average annualized award size. In FY 2002, NSF will continue to focus on increasing award size and duration to improve the efficiency of the research process.	
Maintaining Openness in the System	Award 30 percent of research grants to new investigators. **Result:** This goal remains a challenge for the Foundation. FY 2001 was the fifth consecutive year that NSF was unsuccessful in achieving this goal. In FY 2002, NSF will continue its outreach to new investigators to promote awareness of research funding and to encourage new investigators to submit proposals.	
BROADENING PARTICIPATION **Reviewers**	Begin to electronically request voluntary demographic data from all reviewers to determine participation levels of underrepresented groups.	
FACILITIES OVERSIGHT **Construction and Upgrade**	Keep construction and upgrades for 90 percent of facilities within the annual expenditure plan, not to exceed 110 percent of estimates.	
Construction and Upgrade	Meet all annual milestones by the end of the reporting period for 90 percent of facilities. **Result:** Of the twenty-five construction and upgrade projects, twenty-one (84 percent) met all annual schedule milestones by the end of the reporting period. Project delays were caused in part by circumstances beyond the control of the facility, technical problems and personnel issues. In FY 2002, NSF will work with awardees to identify obstacles to successful performance and implement plans to avoid or mitigate their consequences in the future.	
Construction and Upgrade	Keep total cost within 110 percent of estimates made at the initiation of construction for all construction and upgrade projects initiated after 1996.	
Operations and Management of Facilities	Keep operating time lost due to unscheduled downtime to less than 10 percent of the total scheduled operating time for 90 percent of facilities. **Result:** Of the twenty-nine reporting facilities, twenty-five (86 percent) met the goal of keeping unscheduled downtime to below 10 percent of the total scheduled operating time. Some causes of failure were outside the control of the facility or were related to technical problems. In FY 2002, NSF will continue to work with awardees to identify obstacles to successful performance and develop plans to avoid or mitigate their consequences in the future.	

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