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The National Institute of Standards and Technology: An Overview

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Summary

The National Institute of Standards and Technology (NIST), a laboratory of the Department of Commerce, was a major player in the Clinton Administration's strategy for civilian technology investment. However, the 104th Congress cut funding levels 18% between FY1995 and FY1997. In FY1998, this trend was temporarily reversed when the NIST budget increased 20% primarily due to additional financing for construction. FY1999 appropriations were 5% below the previous year, while FY2000 support remained constant. In FY2001, the NIST appropriation decreased 6% to $598.3 million as a result of fewer construction dollars. For FY2002, P.L. 107-77 funded NIST at $674.5 million, 13% above the prior fiscal year. Included in this was a 27% increase in support for the Advanced Technology Program (ATP). A series of Continuing Resolutions funded NIST at FY2002 levels when no relevant FY2003 appropriations legislation was passed in the second session of the 107th Congress. P.L. 108-7, enacted by the 108th Congress, provided $707.5 million in FY2003 appropriations for NIST (after the 0.65% across the board recision mandated in the legislation). Support for in-house R&D increased 11% while support for ATP and MEP remained fairly constant. The President's FY2004 budget requests $496.8 million for NIST, a 30% decrease from the current fiscal year due primarily to significant cuts in support for ATP and MEP.

Mission and Background

The National Institute of Standards and Technology, formerly the National Bureau of Standards (NBS), was established by the NBS Organic Act of 1901 (P.L. 56-177). NIST is part of the Technology Administration of the Department of Commerce. Unlike most national laboratories, NIST has a mission specified by statute (15 U.S.C. 271-282a), has its own authorization and appropriation, and is headed by a Senate-confirmed presidential appointee. Prior to 1988, the mission of NBS was to develop and maintain standards and measurement support for scientific investigations, engineering,

manufacturing, commerce and educational institutions, as well as to provide technical and advisory services to other government agencies on scientific and engineering problems.

The Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-418) changed the name of NBS to NIST, and explicitly charged the agency with providing technical services to facilitate the competitiveness of U.S. industry. The law directs NIST to support of two broad goals: (1) enhancing the competitiveness of American companies by providing appropriate support for industry's development of pre-competitive generic technologies and diffusing government-developed technological advances to users in all segments of the American economy; and (2) providing the measurements, calibrations, and quality assurance techniques which underpin U.S. commerce, technological progress, improved product reliability, manufacturing processes, and public safety.

NIST Budget

Beginning in FY1991, the NIST budget experienced marked growth as Congress funded external grant programs — the Advanced Technology Program (ATP) and the Manufacturing Extension Partnership (MEP) — authorized by P.L. 100-418. However, the 104th Congress curtailed the expansion of support for NIST and overall funding levels decreased 18% between FY1995 and FY1997. In FY1998, the NIST budget again increased as P.L. 105-119 appropriated $677.9 million (of which $5 million from the Scientific and Technical Research and Services (STRS) budget was vetoed by the President). Under P.L. 105-277, NIST received $641.1 million in funding, approximately 5% less than the previous year. For FY2000, P.L. 106-113 provided NIST with $635.8 million after the rescission mandated by law.

The FY2001 appropriations legislation, P.L. 106-553, funded NIST at $598.3 million. The total included $312.6 million for the STRS account which supports intramural R&D (an 11% increase), $105.1 million for MEP, $145.7 million for ATP (a 2% increase), and $34.9 million for construction.

In his FY2002 budget proposal, President Bush requested $487.5 million in funding for NIST, 19% less than the FY2001 appropriation due primarily to a suspension of ATP pending an evaluation of the program (although $13 million would be provided to support on-going project commitments). The final legislation, P.L. 107-77 funded NIST at $674.5 million, an increase of 13% over FY2001. Included in this was $321.1 million for the STRS account (3% above the previous fiscal year) and $291 million for ITS. Of this latter amount, MEP was financed at $106.5 million and ATP received $184.5 million, a 27% increase. Construction was funded at $62.4 million. (It should be noted that the FY2002 Defense Appropriations Act added $5 million into the STRS account for cybersecurity activities.)

The Administration's FY2003 budget requested $577.5 million for NIST, 15% below the previous appropriation due primarily to a decrease in support for ATP and MEP. Funding for the STRS account would increase 23% to $402.2 million. ATP would receive $107.9 million (35% below FY2002) and the Manufacturing Extension Partnership would be funded at $12.9 million. The 89% decline in support for MEP was due to the President's recommendation that centers operating for more than 6 years do so without federal financing. Construction activities would be funded at $54.5 million.

No relevant FY2003 appropriations legislation was enacted during the second session of the 107th Congress and a series of Continuing Resolutions NIST at FY2002 levels until the passage of P.L. 108-7. This omnibus bill appropriated $707.5 million in FY2003 funds for NIST (after the 0.65% across the board recision mandated in the legislation), an increase of almost 5% above FY2002. Included in this figure is $357.1 million for intramural R&D performed under the STRS account, $178.8 million for ATP, $105.9 million for MEP, and $65.7 million for construction. Funding for activities under the STRS account is 11% above the previous fiscal year while support for ATP and MEP remains fairly constant.

In the FY2004 budget, the Administration requests $496.8 million for NIST, 30% less than the FY2003 appropriation. The major portion of this decreased funding is due to significant cuts in support for the Advanced Technology Program and the Manufacturing Extension Partnership, two extramural programs operated by NIST. The $27 million requested for ATP is to cover on-going commitments; no new projects would be funded. The $12.6 million for MEP is to finance the operation of centers that have not reached 6 years of federal support. Internal agency R&D under the STRS account would receive $387.6 million, an increase of 8% over the previous fiscal year. The construction budget would be $69.6 million.

Table 1. NIST Appropriations, FY2001-FY2004 Request

NIST APPROPRIATION (millions of dollars)		FY2001 P.L. 106-553	FY2002 P.L.107-77	FY2003 P.L. 108-7**	FY2004 Request
Scientific and Technical Research and Services		312.6	321.1*	357.1	387.6
Industrial Technology Services	Advanced Technology Program	145.7	184.5	178.8	27
	Manufacturing Extension Partnership	105.1	106.5	105.9	12.6
	Subtotal	250.8	291	284.7	39.6
Construction of Research Facilities		34.9	62.4	65.7	69.6
Total		598.3	674.5	707.5	496.8

Figures may not add up because of rounding.

*$5 million was added to the STRS account by the FY2002 Defense Appropriations Act

**Figures include the 0.65% across the board recision mandated in the legislation

Scientific and Technical Research and Services (STRS). The NIST in-house R&D effort, involving approximately 3,300 scientists, engineers, technicians, and support personnel (plus some 1,200 visiting scientists per year from industry, academia, and other government agencies), is conducted at laboratories in Maryland and Colorado. A major emphasis is cooperative research with industry to overcome technical barriers to commercialization of emerging technologies. NIST participates with U.S. companies in collaborative R&D programs in 130 research areas.[1] Since 1988, NIST has participated

[1] Available at the National Institute of Standards and Technology web cite: [http://www.nist.gov/].

in over 960 formal Cooperative Research and Development Agreements with industry.

NIST is composed of seven internal research laboratories.[2] Much of the research is focused on measurements, evaluated data, standards, and test methods. NIST sees these activities as supporting basic "infrastructural technologies" which enable the development of advanced technologies, and which industry can use to characterize new materials, monitor production processes, and ensure the quality of new product lines. Under the President's FY2003 budget request, funding for this in-house research and development would increase 23% over the previous year (including the $5 million added for cybersecurity activities by the FY2002 Defense Appropriations Act). The new budget also includes an additional $5 million to expand homeland security of which $2 million is to develop "...standards, technology, and practices to improve the safety of buildings, occupants and emergency first responders; $2 million [is] to increase the security of infrastructures, including computer systems controlling utilities and building supervisory control systems; [and] $1 million [is] for the Computer Security Expert Assist Team (CSEAT) to help federal agencies identify and fix vulnerabilities in their information systems."

Industrial Technology Services (ITS). In response to what was perceived as the necessity of maintaining a strong manufacturing base, Title V of the Omnibus Trade and Competitiveness Act (P.L. 100-418) ". . . significantly expands the role of NIST as the Government's lead laboratory in support of U.S. industrial quality and competitiveness." To this end, NIST was given specific technology transfer functions, and several programs were created including the Advanced Technology Program, Regional Centers for the Transfer of Manufacturing Technology, and State Technology Extension. These efforts were designed to facilitate industrial activities to utilize advanced process technology; to promote cooperative ventures among industry, universities, and government laboratories; and to encourage shared risks, accelerated development, and increased skills.

The Advanced Technology Program provides seed funding, matched by private sector investment (generally of at least 50% of costs), to companies or consortia of universities, businesses, and government laboratories for development of generic technologies that have broad application across industries.[3] Awards, based on technical and business merit, are made for work which is high-risk and past the basic research stage but not yet ready for commercialization. The first awards were made in 1991; according to NIST, 581 projects have been funded. NIST restructured part of ATP to manage groups of projects in "well-defined" programmatic areas designed for long-range support which were selected in conjunction with industry. A general competition also continued. In FY1999, the focused programs were dropped in favor of one competition for all technologies.

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[2] These are: Electronics and Electrical Engineering, Manufacturing Engineering, Physics, Chemical Science and Technology, Materials Science and Engineering, Building and Fire Research, and Information Technology.

[3] For more information on the ATP, see: CRS Report 95-36, *The Advanced Technology Program*, by Wendy H. Schacht.

Initial funding for the Advanced Technology Program was $36 million in FY1991. Appropriations increased to $48 million in FY1992, $67.9 million in FY1993, and $199.5 million in FY1994. In FY1995 funding expanded significantly to $431 million; however, P.L. 104-6 rescinded $90 million from this total. Support declined to $221 million in FY1996 and P.L. 105-18 rescinded $7 million of unobligated balances from the FY1997 ATP account of $225 million. Funding for FY1998 again declined to $192.5 million, but increased 3% to $197.5 million for FY1999. This figure reflected a $6 million rescission included in the FY1999 appropriations to account for funds originally obligated for projects that were terminated early and thus available for use in other ATP competitions. For FY2000, ATP received $142.6 million, a 28% decrease in support.

As required by law, NIST created Regional Centers for the Transfer of Manufacturing Technology.[4] Expanded in 1994 to include the State Technology Extension Program, and known as the Manufacturing Extension Partnership (MEP), this activity is designed to transfer expertise and technologies developed under NIST programs to small and mid-sized U.S.-based manufacturing firms. Funded through cooperative agreements with non-profit or state and local organizations, competitive awards were originally made for up to 6 years (now extended as discussed below). Non-federal sources are required to provide 50% or more of each Center's capital and costs during this time period. P.L. 105-309 permits the federal government to support centers after the 6 years if a positive, independent evaluation is made every two years. Federal funding is limited to one-third of the capital and annual operating and maintenance costs of the center. Centers offer expertise, needs evaluation, application demonstrations for new production technologies, training, and information dissemination.

Centers are located in all 50 states and Puerto Rico with approximately 400 regional offices. NIST also assumed support of the 36 centers originally funded by the Department of Defense through its Technology Reinvestment Project when funding for this program was terminated in FY1994. Appropriations for FY1988 and FY1989 totaled $12.5 million. Further funding included $11.9 million in FY1991; $15.1 million in FY1992; and $16.9 million in FY1993. In FY1994, when the original program was expanded, appropriations for MEP increased to $30.3 million. The $90.6 million funding for FY1995 included support for a new program, LINKS, to tie together federal, state, and local agencies, the private sector, and the manufacturing outreach institutions through communications and data systems. P.L. 104-19 rescinded $16.3 million from the FY1995 appropriation for the MEP. Funding for FY1996 was $80 million and $95 million in FY1997. FY1998 support was $113.5 million. P.L. 105-277 appropriated $106.8 million for FY1999, a decrease that reflected statutory requirements reducing the federal financial commitment as centers reach 6 years of operation. FY2000 funding totaled $104.2 million.

Construction of Research Facilities. The age of the NIST laboratories engendered concerns that the facilities were technologically obsolete, preventing state-of-the-art research. In 1993, a $540 million, 10-year plan to upgrade the lab was endorsed and between FY1993 and FY1995 approximately $220 million was appropriated for construction. However, the 104th Congress rescinded $61 million of unobligated funds

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[4] For more information on the MEP, see: CRS Report 97-104, *Manufacturing Extension Partnership Program: An Overview*, by Wendy H. Schacht.

from the construction account, and recommended a reassessment of NIST's long-term facilities needs in light of reduced program and staffing levels and overall fiscal constraints. In FY1998, $95 million was appropriated for construction, while $56.7 million was made available the following year. A portion of this money was combined with FY2000 funding to build the Advanced Measurement Laboratory.

Issues for Congress

Beginning with the 104th Congress, many Members expressed skepticism over a "technology policy" based on providing federal funds to industry for development of pre-competitive generic technologies. This philosophical shift from previous Congresses, coupled with pressures to balance the federal budget, led to significant reductions in funding for NIST. The Advanced Technology Program and the Manufacturing Extension Partnership, which were key players in the former Clinton Administration's civilian technology development strategy, and which accounted for over 50% of the FY1995 NIST budget, were proposed for elimination. However, strong support by the former Administration and the Senate led to their continued financing. Yet funding for ATP remains controversial. The original FY2000, FY2001, and FY2002 appropriations bills as passed by the House did not contain any financial support for ATP, although the final legislation did fund the program. For FY2003 , the Administration did request financing for ATP (although at a level 35% below the previous year), but recommended suspension of federal support for those manufacturing extension centers in operation for more than 6 years.

While much of the legislative debate has focused on the Advanced Technology Program and the Manufacturing Extension Partnership, increases in spending for the NIST laboratories that perform the research essential to the mission responsibilities of the agency have tended to remain small: a 3.7% increase between FY1995 and FY1996, a 3.5% increase in FY1997, no increase for FY1998, and 3.1% for FY1999. During FY2000, there was less than a 1% increase in support. However, FY2001 appropriations were 11% above the previous year while the figure for FY2002 included a 2.7% increase in funding. In FY2003, support for in-house R&D was 12% more than the previous fiscal year. It remains to be seen if the expanded support for these intramural programs will continue and how this might affect financing of extramural efforts such as ATP and MEP. As the 108th Congress debates the budget for FY2004 and beyond, the resulting dispensation of funding for NIST programs may effect the ways by which the federal government supports technology development for commercial application.[5]

[5] See: CRS Report 95-50, *The Federal Role in Technology Development*, by Wendy H. Schacht.