FY 2006 Annual Performance Plan

Technology Administration

Mission Statement

The Technology Administration's mission is to work with U.S. industry to maximize technology's contribution to U.S. economic growth by maintaining and improving key components of the Nation's technological infrastructure; fostering the development, diffusion, and adoption of new technologies and leading business practices; creating a business and policy environment conducive to innovation; and disseminating technical information.

The Technology Administration (TA) works with industry and other stakeholders to maximize technology's contribution to U.S. economic growth. Through its two component bureaus, the National Institute of Standards and Technology (NIST) and the National Technical Information Service (NTIS), TA fulfills its broad responsibilities and contributes to the Department's strategic goal of fostering science and technological leadership by promoting new models of technology transfer and R&D collaboration, identifying problems and barriers to technological innovation, developing and offering solutions and draft legislation to take advantage of opportunities presented by technological advancement, protecting intellectual property, enhancing technical standards, advancing measurement science, and making scientific and technical information available to other agencies and the public

National Institute of Standards and Technology (NIST)

The National Institute of Standards and Technology (NIST) develops and disseminates measurement techniques, reference data, test methods, standards, and other infrastructural technologies and services required by U.S. industry to compete in the twenty-first century. In addition to its core measurement, testing, and standards functions, NIST also conducts several extramural programs, including the Advanced Technology Program, to stimulate the development of high-risk, broad-impact technologies by U.S. firms; the Hollings Manufacturing Extension Partnership, to help smaller firms adopt new manufacturing and management technologies and improve their overall competitiveness; and the Baldrige National Quality Program, to help U.S. businesses and other organizations improve the performance and quality of their operations by providing clear standards and benchmarks of quality.

Each of NIST's major programs and their corresponding strategic goals (outlined below), contribute to the Department's mission to promote U.S. competitiveness by strenghting and safeguarding the U.S. economic infrastructure.

NIST: Programs, Core Functions, and Strategic Goals

Program	Core Functions	Strategic Goals
Laboratories	Traceability to the seven basic measurement units, measurement and test methods, calibration services, Standard Reference Materials, evaluated scientific data, impartial expertise and leadership in standards development, and research in support of these areas	1. Promote innovation, facilitate trade, ensure public safety and security, and help create jobs by strengthening the Nation's measurement and standards infrastructure
ATP	R&D grants to industry and universities	2. Accelerate private investment in and development of high-risk, broad-impact technologies
HMEP	Technical assistance to smaller manufacturers	3. Raise the productivity and competitiveness of small manufacturers
Baldrige	Framework for evaluating and improving organizational quality and performance, and an award program to recognize role models	4. Catalyze, recognize, and reward quality and performance improvement practices in U.S. businesses and other organizations

National Technical Information Service (NTIS)

NTIS provides the American public with permanent and ready access to scientific, technical and business research through the acquisition, organization, and preservation of data added to its permanent collection. NTIS collects, classifies, coordinates, integrates, records and catalogs scientific and technical information form whatever sources, foreign and domestic that may stimulate innovation and discovery and then disseminates that information to the public. In an effort to provide the American public with increased access to the vast collection of government information NTIS has utilized advanced e-commerce channels, including free downloads of any item in its collection that is in electronic format for a single low fee, or at no charge if under 20 pages. NTIS also helps other Federal agencies interact with and better serve the information needs of their own constituents by providing information management services.

Priorities/Management Challenges

NIST: Strategic Priorities for FY 2006

Based on its long-term strategic planning efforts and an analysis of the most pressing needs related to the coming fiscal year, TA/NIST senior leadership identified several key priorities for FY 2006. These are:

- **Improve NIST's Facilities and Infrastructure*:*** As technology advances, the need for more sophisticated and demanding measurements and standards also grows. NIST can develop and provide these capabilities and services only in stable, productive, and safe research and measurement laboratories. But many NIST laboratory facilities are decades old and are no longer capable of providing the stable research environment needed to efficiently conduct the advanced measurement research in many crucial areas—nanotechnology, information technology, communications, health care, homeland security, and others. To fulfill its mission requirements, NIST must invest in critical improvements in its Boulder and Gaithersburg facilities.

- **Develop New Measurement and Standards Infrastructure Technologies:** Through its broad and vigorous measurement research, NIST works to anticipate the infrastructure needs of next-generation technologies and industries in the U.S. This forward-looking research not only yields improvements in NIST's measurement services, but also generates new knowledge, capabilities, and techniques that are transferred to industry,

universities, and government. Next-generation measurement and standards needs require NIST to focus its long-term research efforts on specific interdisciplinary technology areas where inadequate technical infrastructure is a barrier to development, commercialization, and public benefit, including nanometrology for the future electronics and semiconductor industries; biometrology for chemical, drug, agriculture, forensics, and healthcare industries; and quantum computing.

- **Respond to New National Priorities:** New national needs have been identified to which NIST is uniquely positioned to respond because of its multidisciplinary technical expertise, objectivity, and mission and because of its ability to develop objective and technically rigorous standards. NIST will use these abilities to develop, test, and deploy enterprise integration standards and other national and international standards and expand access to global markets.

- **Contribute to the Security of Our Homeland:** The Nation's physical and economic vulnerability to terrorist attacks remains as a top national priority. Our ability to strengthen national security will result from research, development, and production of new or improved products, services, and scientific and technological advances in areas such as the security of information technology systems, in building construction and safety, and by improving biometrics identification standards.

NTIS: Strategic Priorities for FY 2006

NTIS' priority is to contribute successfully to the Department of Commerce's strategic goal to foster science and technological leadership through improved productivity, quality, dissemination, and efficiency of research. To that end, NTIS is committed to increasing the number of new items it makes available, increasing the number of information products disseminated annually, and enhancing customer satisfaction.

Unit Cost Measures

NIST

OMB recognized during the course of the FY 2005 PART assessment of the NIST laboratories that "R&D-performing organizations typically cannot provide unit cost measures of efficiency due to the long time frame for research, multivariate inputs, and diverse sets of outputs that derive from R&D activities". For similar reasons, unit costs measures are not available for the ATP and HMEP programs. NIST has agreed to collaborate with OMB to identify alternative measures of programmatic efficiency.

NTIS

NTIS' primary objective is to collect and disseminate scientific and technical information. This valuable information is made available for distribution in a variety of formats designed to accommodate customer's needs. Two of these formats are representative of the shift of information dissemination from the traditional paper product to electronic dissemination. The average cost to disseminate this information to the public is reflected in the unit cost measures below.

	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Unit cost to disseminate a paper product	$76.89	$83.31	$85.00	$90.00	$95.00	$100.00
Unit cost to disseminate an electronic product	$7.34	$5.88	$5.50	$5.25	$5.00	$4.75

As more information is disseminated electronically and advances in e-government continue to be made, unit cost of electronic dissemination is expected to continue to decline. Conversely, the larger size documents are still requested in print while the smaller size documents are electronically disseminated. Larger size documents, because of their size, color and print requirements, are more costly on a unit cost basis.

PART Assessment

NIST

- **NIST Laboratory Program**
  OMB applied the Program Assessment Rating Tool to the NIST laboratories during the FY 2005 budget cycle, and concluded the assessment by rating the laboratories as "effective". Details on OMB's findings and NIST's response are provided in the sections pertaining to NIST's performance goal 1.

- **Advanced Technology Program**
  OMB applied the Program Assessment Rating Tool to the NIST Advanced Technology Program during the FY 2004 budget cycle, and concluded the assessment by rating the ATP as "adequate". Details on OMB's findings are provided in the section pertaining to NIST's performance goal 2.

- **Hollings Manufacturing Extension Partnership**
  OMB applied the Program Assessment Rating Tool to the NIST Hollings Manufacturing Extension Partnership Program during the FY 2004 budget cycle, and concluded the assessment by rating the HMEP Program as "moderately effective". Details on OMB's findings are provided in the section pertaining to NIST's performance goal 3.

NTIS

OMB has not conducted a PART assessment for NTIS.

FY 2006 Program Changes

The FY 2006 budget request for the Technology Administration reflects the challenges facing the nation's technological infrastructure and the resources needed to directly contribute to the Department's goals of fostering science and technological leadership by protecting intellectual property, enhancing technical standards, and advancing measurement science.

		Base		Increase/Decrease	
	Name of Program	**FTE**	**Amount ($M)**	**FTE**	**Amount ($M)**
National Institute of Standards and Technology	**NIST Laboratories**	**2,771**	**$593.0**	**124**	**$72.8**
	Advanced Technology Program	**244**	**$140.4**	**-244**	**-$140.4**
	Hollings Manufacturing Extension Partnership	**64**	**$108.2**	**-18**	**-$60.7**
National Technical Information Service	**National Technical Information Service**	**200**	**$0**	**0**	**$0**

Note: Dollar amounts reflect direct obligations, and base FTE include reimbursable FTE.

Target and Performance Summary

NIST Performance Goal 1: Promote innovation, facilitate trade, enable public safety and security, and help create jobs by strengthening the nation's measurements and standards infrastructure

	FY2001 Target	FY2001 Actual	FY2002 Target	FY2002 Actual	FY2003 Target	FY2003 Actual	FY2004 Target	FY2004 Actual	FY2005 Target	FY2006 Target
Qualitative assessment and review of technical quality and merit using peer review	Complete	Completed	Complete	Completed	Complete	Completed	Complete	Completed	Complete	Complete
Peer-reviewed technical publications	New	New	New	New	New	1,267	1,300	1,070	1,100	1,100
Standard Reference Materials Sold	New	31,985	New	30,906	New	29,527	29,500	30,490	29,500	29,500
NIST-maintained datasets downloaded	New	New	New	New	New	55,653,972	56,000,000	73,601,352	80,000,000	80,000,000
Number of items calibrated	3,100	3,192	2,900	2,924	2,900	3,194	2,800	3,373	2,700	2,700

NIST Performance Goal 2: Accelerate private investment in and development of high-risk, broad-impact technologies[1]

	FY2001 Target	FY2001 Actual	FY2002 Target	FY2002 Actual	FY2003 Target	FY2003 Actual	FY2004 Target	FY2004 Actual	FY2005 Target	FY2006 Target
Cumulative number of publications	720	747	770	969	840	1,245	990	Available May 2005	1,400	1,570
Cumulative number of patents.	790	800	930	939	1,020	1,171	1,220	Available May 2005	1,340	1,500
Cumulative number of projects with technologies under commercialization	180	195	190	244	210	271	250	Available May 2005	280	310

NIST Performance Goal 3: Raise the productivity and competitiveness of small manufacturers

	FY2001 Target	FY2001 Actual	FY2002 Target	FY2002 Actual	FY2003 Target	FY2003 Actual	FY2004 Target[3,4]	FY2004 Actual	FY2005 Target[5]	FY2006 Target[6]
Number of clients served by HMEP Centers receiving Federal funding[2]	New	21,420	21,543	18,748	16,684	18,422	6,517	Available Dec 2005	16,640	7,345
Increased sales attributed to HMEP Centers receiving Federal funding	$708M	$636M	$726M	$953M	$522M	$1,483M	$228M	Available Dec 2005	$591M	$261M
Capital investment attributed to HMEP Centers receiving Federal funding	$913M	$680M	$910M	$940M	$559M	$912M	$285M	Available Dec 2005	$740M	$327M
Cost savings attributed to HMEP Centers receiving Federal funding	$576M	$442M	$497M	$681M	$363M	$686M	$156M	Available Dec 2005	$405M	$179M

NTIS Performance Goal 1: Enhance public access to worldwide scientific and technical information through improved acquisition and dissemination activities

	FY2001 Target	FY2001 Actual	FY2002 Target	FY2002 Actual	FY2003 Target	FY2003 Actual	FY2004 Target	FY2004 Actual	FY2005 Target	FY2006 Target
Number of New Items Available (Annual)	New	505,068	510,000	514,129	520,000	530,910	525,000	553,235	530,000	532,000
Number of Information Products Disseminated (Annual)	New	14,542,307	16,000,000	16,074,862	17,000,000	29,134,050	18,000,000	25,476,424	25,800,000	26,200,000
Customer Satisfaction	New	97%	97%	98%	98%	97%	98%	96%	95% - 98%	95% - 98%

[1]Due to the cumulative nature of ATP's performance measures, there is a 3-5 year lag from initial project funding to the generation of measurable outputs and outcomes; performance data will continue to cumulate through the next several fiscal years before reflecting the budgetary changes proposed for FY 2006.

[2]FY 2001 and FY 2002 data for this measure have been adjusted from previously reported figures. Actual counts reported in the FY 2004 Annual Performance Plan were the result of a reporting error.

[3]FY 2004 actuals are not yet available due to data collection requirements (lag is one year). Final FY 2004 data will be available December 2005.

[4]FY 2004 targets are based on the FY 2004 Consolidated Appropriations bill, which included an annual level for MEP of $39.6M (which, less recessions, netted $38.7M).

[5]FY 2005 targets are based on an appropriation of $106M.

[6]FY 2006 targets assume a funding level of $46.8M.

Resource Requirements Summary

(Dollars in Millions. Funding amounts reflect total obligations.)
Information Technology (IT)
Full Time Equivalent (FTE)

NIST Laboratory Performance Goal: Promote innovation, facilitate trade, ensure public safety and security, and help create jobs by strengthening the Nation's measurement and standards infrastructure

	FY 2001 Actual	FY 2002 Actual	FY 2003 Actual	FY 2004 Actual	FY 2005 Estimate	FY 2006 Base	Increase/ Decrease	FY 2006 Request
Total Funding	502.0	579.2	614.2	576.9	663.9	593.0	72.8	665.8
IT Funding	55.2	64.6	67.5	63.1	64.6			66.5
FTE	2,685	2,707	2,725	2,672	2,751	2,771	124	2,895

ATP Performance Goal: Accelerate private investment and development of high-risk, broad-impact technologies

	FY 2001 Actual	FY 2002 Actual	FY 2003 Actual	FY 2004 Actual	FY 2005 Estimate	FY 2006 Base	Increase/ Decrease	FY 2006 Request
Total Funding	175.8	198.1	199.7	187.2	144.4	140.4	-140.4	0.0
IT Funding	4.0	5.0	5.3	2.1	2.2	0.0		0.0
FTE	239	249	247	204	244	244	-244	0

HMEP Performance Goal: Raise the productivity and competitiveness of small manufacturers

	FY 2001 Actual	FY 2002 Actual	FY 2003 Actual	FY 2004 Actual	FY 2005 Estimate	FY 2006 Base	Increase/ Decrease	FY 2006 Request
Total Funding	106.4	108.5	111.3	46.9	119.8	108.2	-60.7	47.5
IT Funding	1.5	3.1	2.6	1.5	1.6			1.6
FTE	87	89	89	68	64	64	-18	46

NTIS Performance Goal: Enhance public access to world wide scientific and technical information through improved acquisition and dissemination activities

	FY 2001 Actual	FY 2002 Actual	FY 2003 Actual	FY 2004 Actual	FY 2005 Estimate	FY 2006 Base	Increase/ Decrease	FY 2006 Request
Total Funding	34.7	27.7	27.7	19.2	51.0	40.5	0.0	40.5
IT Funding	9.8	10.7	5.7	5.4				
FTE	196	186	181	165	200	200	0	200

Grand Total	FY 2001 Actual	FY 2002 Actual	FY 2003 Actual	FY 2004 Actual	FY 2005 Estimate	FY 2006 Base	Increase/ Decrease	FY 2006 Request
Total Funding	818.9	913.5	952.8	830.1	979.1	882.1	-128.3	753.8
IT Funding	70.5	83.4	81.1	72.1	68.4			68.1
FTE	3,207	3,231	3,242	3,109	3,259	3,279	-138	3,141

Skill Summary:

At the end of FY 2004, the staffs of the three component bureaus of TA reflected the following levels of educational attainment:

- Total OTP staff included 7% Ph.D., 20% M.A. or M.S., and 40% B.A. or B.S. holders.
- Total NIST staff included 31% Ph.D., 15% M.A. or M.S., and 19% B.A. or B.S. holders. The breakdown of professional staff by major NIST organization was:
  - NIST Laboratories: 59% Ph.D., 19% M.A. or M.S., 16% B.A. or B.S. holders
  - Advanced Technology Program: 50% Ph.D., 30% M.A. or M.S., 18% B.A. or B.S. holders
  - Hollings Manufacturing Extension Partnership: 6% Ph.D., 61% M.A. or M.S., 22% B.A. or B.S. holders
  - Baldrige National Quality Program: 25% Ph.D., 25% M.A. or M.S., 38% B.A. or B.S. holders
- Total NTIS staff included 6% M.A. or M.S. and 22% B.A. or B.S. holders.

NIST Performance Goal 1: Promote innovation, facilitate trade, ensure public safety and security, and help create jobs by strengthening the Nation's measurement and standards infrastructure

Corresponding DOC Strategic Goal and Objective:

Strategic Goal 2: Foster science and technological leadership by protecting intellectual property, enhancing technical standards, and advancing measurement science.

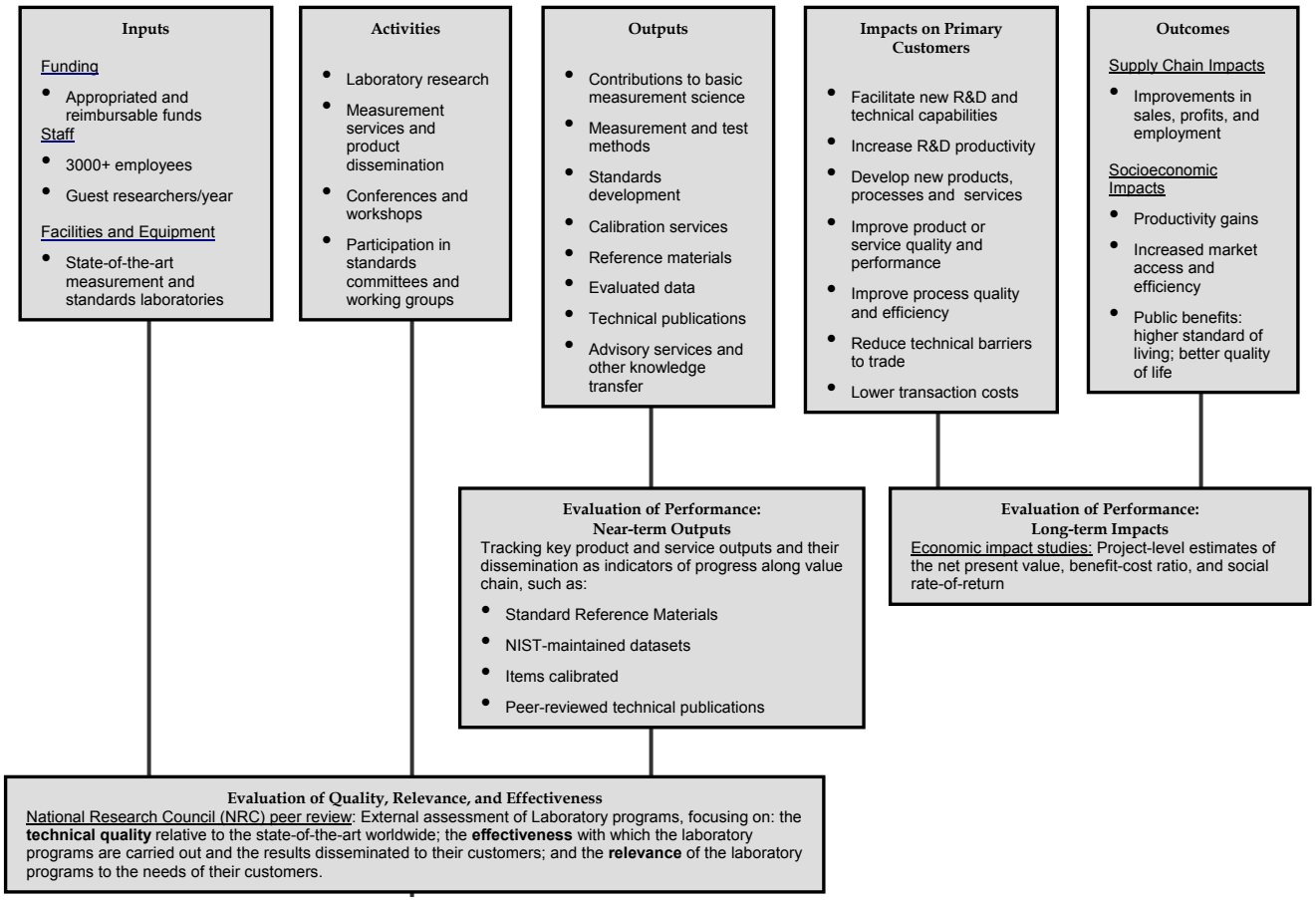
General Goal/Objective 2.1: Develop tools and capabilities that improve the productivity, quality, dissemination, and efficiency of research

Rationale for Performance Goal:

As the National Measurement Institute for the United States, NIST is uniquely responsible for establishing and maintaining an efficient system that links the fundamental units of measurement to the measurement methods used by industry, universities, and other government agencies. The nation's ability to innovate, grow, and create high value jobs relies on a robust scientific and technical infrastructure – including the measurement and standards provided by the NIST Laboratories. The NIST Laboratories perform research to develop the measurement tools, data, and models for advanced science and technology. The model below depicts the NIST Laboratory Program's value-creation chain--from inputs like funding and staff to outcomes like productivity gains and improved quality of life. The model also includes the methods and measures used to evaluate quality, relevance, and performance along the impact path, each of which is described in more detail in the sections that follow.

NIST has designed its performance evaluation system to accommodate the organization's unique mission and impact path as well as to respond to the intrinsic difficulty of measuring the results of investments in science and technology. Like other Federal science organizations, the primary output of NIST's laboratory research is scientific and technical knowledge, which is inherently difficult to measure directly and comprehensively. In addition, the outcomes from research often do not begin to accrue until several years after the research program has been completed, and the diffusion of benefits often affects broad segments of industry and society over long time periods. Given these challenges, the NIST Laboratory Program evaluates its performance using an appropriate mix of specific output tracking, peer review, and economic impact analyses. Taken together, these evaluation tools, combined with continual feedback from customers, provide NIST management and external stakeholders with a detailed and broad view of NIST's performance toward its long-term goal.

NIST Laboratory Program: Impact and Evaluation Logic Model



FY 2006 Program Changes:

Program Initiatives	Funding Request	Anticipated Impact	Location of Program Justification in the Budget Document
Advances in Manufacturing	$19,600,000	**Manufacturing Enterprise Integration:** Reduced time-to-market and information technology costs for manufacturers. Improved productivity and global competitiveness for manufacturers. **Expanding Access to Global Markets Through Measurements and Standards:** Enhanced competitiveness and improved market access for U.S. businesses. **Nanomanufacturing Research:** Improved productivity and global competitiveness in the nanomanufacturing sector. **National Nanomanufacturing and Nanometrology Facility**: Improved measurement capabilities and research efficiencies in nanotechnology infrastructure to enhance R&D productivity and innovation in multiple industry sectors.	Scientific and Technical Research and Services Appropriation; NIST Laboratories Activity
Measurements and Standards for Homeland Security	$3,000,000	**Improved Standards and Guidelines for Buildings and First Responders:** Enhanced safety, structural integrity and reduced risk for building occupants. Improved emergency response and mobility. **Biometrics:** Strengthened homeland security through the development of improved measurements for effective and efficient facial recognition and fingerprint identification.	Scientific and Technical Research and Services Appropriation; NIST Laboratories Activity

New Measurement Horizons for the U.S. Economy and Science	$17,195,000	**Biosystems and Health:** Reduced and eliminated technical barriers and accelerated commercialization of bio-based products and services. **Interoperability and Security for Emerging Scientific Systems:** Lower costs and improved reliability and performance of complex IT systems used in government, industry, and other organizations. **Quantum Processing - Beyond High End Computing:** Development of the measurement infrastructure necessary for new advanced information processing systems. **Building Competence for Advanced Measurements:** Development of state-of-the-art measurements and standards for both advanced technology and mature industries as well as support for future industry measurement needs.	Scientific and Technical Research and Services Appropriation; NIST Laboratories Activity
Facilities Improvement Plan	$31,964,000	Improvements in the infrastructure necessary for accurate measurement research at NIST, as needed to foster technological innovation and enable new generations of science, technology, and competitive products.	Construction of Research Facilities Appropriation; Construction and Major Renovations Activity
Maintenance for the Advanced Measurements Laboratory	$3,400,000	Infrastructure support necessary to enable NIST advances in nanotechnology, biotechnology, information technology, advanced materials, and new manufacturing technology.	Construction of Research Facilities Appropriation; Construction and Major Renovations Activity

The program changes for the NIST Laboratory Programs represent specific "projects" or research areas NIST will develop in support of the Nation's technical infrastructure. While these projects link directly to the goals of the NIST Laboratory Programs, progress and performance is measured at the individual project level through milestone tracking of major project outputs, such as those described in the budget narratives. Without funding, those outputs will be forgone along with the associated benefits (outcomes) described in each narrative.

Measure 1a: Qualitative assessment of technical quality, merit or relevance, and performance using peer review

Explanation of Performance Measure:

Since 1959, the NIST Laboratories have been reviewed annually by the National Research Council (NRC). The annual NRC Board on Assessment of NIST Programs review is independent, technically sophisticated, and extensive. The assessment process focuses on the quality, relevance, and technical merit of the NIST Laboratories Program to ensure they are developing and promoting the infrastructure tools and measurement standards needed by industry, academia, and other government agencies.

The review Board consists of approximately 150 scientists and engineers, organized into seven panels (one for each of the seven NIST Laboratories) plus two sub-panels for specialized programs. Each year the lab-specific panels conduct a two to three-day on-site review of each laboratory's technical quality, paying particular attention to the following factors, as charged by the NIST Director:

- The technical quality and merit of the laboratory programs relative to the state-of-the-art worldwide
- The effectiveness with which the laboratory programs are carried out and the results disseminated to their customers
- The relevance of the laboratory programs to the needs of their customers
- The ability of the Laboratories' facilities, equipment, and human resources to enable the Laboratories to fulfill their mission and meet their customers' needs.

Starting in FY 2004, the reporting process was modified to allow additional focus on the technical exchange between NIST staff and the reviewers as well as increased interactions among external reviewers. While the NRC BOA continues to conduct on-site annual reviews and feedback, they produce a biennial report that includes findings over the two year evaluation period. The table below provides summary statements for the laboratories, excerpted from NRC's 2003 report. The entire report is available at http://www.nap.edu/catalog/10820.html.

Sample Statements from NRC Peer Review, FY 2003

LABORATORY	
Electronics and Electrical Engineering (EEEL)	"The work in EEEL continues to be of very high technical merit and quality. Many staff members are recognized as world leaders in their fields. In general, there is significant linkage between EEEL projects and the goals of the laboratory supporting NIST's mission… EEEL divisions are doing an excellent job of providing services, interacting with their customers, performing scientific research, and circulating the results of their investigations…The extended period of excessively lean budgets for the support of current laboratory activities now clearly has an influence on its present and future capabilities and effectiveness… Succession planning factored with strategic planning is critical to the future health and survivability of the [EEEL] divisions." (pp. 17, 20, 22).
Manufacturing Engineering (MEL)	"The [MEL] has a unique role to play in U.S. manufacturing through its expertise in measurements and standards… The quality of research in the [MEL] is high overall… In some areas, MEL work is state of the art relative to work being performed worldwide… MEL is working effectively to broaden its customer base and is establishing processes to identify best initiatives to help customers... A formal process and format should be established for planning and reporting project time lines and displaying a clear roadmap of current and planned activities, with a focus on continual process improvement." (pp. 28, 30).
Chemical Science and Technology (CSTL)	"CSTL's research and standards programs are technically excellent overall… CSTL has clearly demonstrated both the relevance and effectiveness of its programs to its customers, primarily U.S. industry, government, and academia, but also to international science, technology, and commerce… [CSTL's] innovative practices and successful partnering have sustained exceptional productivity and the continuation of its high visibility, recognition, and world leadership in the development of measurement standards… CSTL has implemented an excellent strategic planning process that is closely aligned with the goals and objectives of the overall NIST strategic plan…" (pp. 37-38).

Physics (PL)	"The NIST Physics Laboratory has long been known among its technical peers for the outstanding level of its scientific research. The laboratory has a tradition of world leadership in many of its areas of activity… continues to serve as a central, impartial presence in metrology and calibrations for commercial and scientific development... The Physics Laboratory continues to reach out through a variety of efforts to ensure that its programs are responsive to customer and national needs and that reliable experimental and theoretical information is maintained to support emerging technological and scientific directions…The Physics Laboratory must continue to develop a strategic plan and prioritization process that results in clear laboratory goals…" (pp. 45-46, 48).
Materials Science and Engineering (MSEL)	"The technical quality of MSEL continues at a very high level, as evidence by its quality contributions and impact on emerging science and technologies… The panel determined that [MSEL] is enhancing its relevance and effectiveness through reliance on its strategic plan for the allocation of limited resources to a growing set of national needs…The panel commends the laboratory for maintaining a balance between these new focus areas and continued service to its historical constituency groups… The panel noted in particular that the laboratory is making better use of collaborations both within and outside of NIST… Continued attention is needed… [on] the potential for subcritical staffing of important programs and the maintenance of key areas of investigation to secure the laboratory's role in the strategic mission of NIST." (pp. 56-57, 60).
Building and Fire Research (BFRL)	"The panel continues to be impressed by the high quality of scientific and technical work produced in the [BFRL]… BFRL staff takes advantage of the special tools and expertise that exist in the laboratory to provide their customers with unbiased, technically excellent work focused on the measurement and testing needed to improve the quality of materials and technologies… The National Construction Safety Team Act presents a tremendous opportunity for BFRL. The laboratory still has to define a strategy for deploying resources to an investigation and, once completed, for disseminating the results… The laboratory has taken early steps toward the development of a strategic plan and of performance metrics. Next steps should include the specification of time lines, milestones, and interdependencies." (p. 64).
Information Technology (ITL)	"The overall technical quality and the merit, relevance, and effectiveness of the Information Technology Laboratory's programs and staff remain strong… There is ample evidence of outstanding work in leveraging technology ideas across customer areas for industry, academia, government, and within NIST…. ITL has worked hard and effectively to develop metrics for its performance. ITL should work with customers… to further develop means of assessing the effectiveness of ITL projects and products. ITL's interactions with and impact on industrial customers continue to be strong, and the panel applauds the laboratory's ability to produce and disseminate results of value to a broad audience." (pp. 74, 77).

Measure 1b: Peer-reviewed technical publications

Technical publications represent one of the major mechanisms NIST uses to transfer the results of its research to support the technical infrastructure and provide measurements and standards – vital components of leading-edge research and innovation - to those in industry, academia and other government agencies. Each year, NIST's technical staff produces a total of 2,000 to 2,200 publications with approximately 50-60 percent appearing in prestigious scientific peer-reviewed journals. This measure represents the annual number of high quality, peer-reviewed technical publications produced by the NIST Laboratories staff. The number is a direct count of the peer-reviewed technical publications approved by the NIST Editorial Review Board at both the Gaithersburg, and Boulder sites.

In addition to peer-reviewed journals, NIST publishes its measurement methods and standards through conference proceedings, NIST interagency reports and special publications. For example, the NIST Journal of Research highlights NIST's research and development in the area of metrology and related fields of physical science, engineering, applied mathematics, statistics, biotechnology, and information technology. Also, special publications such as NIST Recommended Practice Guides target specific industries and provide users with valuable guidance on specialized measurement techniques and methods for interpreting results.

FY 2005 and FY 2006 Targets: During the FY 2005 budget cycle, NIST revised many of its output measures to reflect more on the quality and demand for NIST research results and standards services. While NIST expects to produce a consistent number of technical publications peer-reviewed publications overtime, it is difficult to develop target estimates without additional trend data and FY 2006 targets may need to be adjusted.

Measure 1c. Standard Reference Materials (SRMs) sold

Standard Reference Materials are the definitive source of measurement traceability in the United States; all measurements using SRMs can be traced to a common and recognized set of basic standards that provides the basis for compatibility of measurements among different laboratories. SRMs are certified in the NIST Laboratories for their specific chemical and material properties. Customers use SRMs to achieve measurement quality and conformance to process requirements that address both national and international needs for commerce and trade and public safety and health. For example, NIST recently developed a new SRM that will aid in arson investigations. SRM 2285 contains 15 compounds from common accelerants that will be used to calibrate instruments that help analysts classify fire scene residues into six categories of fuels. The SRM will help investigators accurately identify the components of the original fuel used to set a fire.

FY 2005 and FY 2006 Targets: This measure represents a direct count of the number of SRM units sold to customers in industry, academia, and other government agencies. Recent trends illustrate dissemination of a high (roughly 30,000 per year) but slightly declining number of SRMs due predominantly to technological improvements in equipment and testing methods will continue to reduce the overall frequency with which test equipment and methods are calibrated using reference materials. NIST expects this trend to level and to disseminate a consistent number of SRMs.

Measure 1e. Downloads of NIST-maintained datasets

NIST provides on-line access to over 70 scientific and technical databases. These databases cover a broad range of substances and properties from a variety of scientific disciplines. Some datasets - such as the NIST Chemistry WebBook, NIST Physical Reference Data Systems, and the NIST Ceramics WebBook - are comprehensive and contain a large number of databases, while others serve very specific applications. NIST's on-line data systems are heavily used by industry, academia, other government agencies, and the general public and represent another method NIST uses to deliver its measurements and standards tools, data, and information. This measure is a direct count of the average annual number of downloads of NIST-maintained data. While this count demonstrates a very high level of data dissemination, it does not capture the distinct number of users that have accessed the databases. (NIST cannot and does not collect user-specific data on web transactions.)

FY 2005 and FY 2006 Targets: This measure was developed and incorporated into the FY 2005 annual performance plan. While over time NIST expects a consistent level of on-line data dissemination, it is difficult to develop long-term target estimates without additional trend data and FY 2006 targets may need to be adjusted.

Measure 1f. Number of items calibrated

NIST offers more than 500 different types of physical calibrations in areas as diverse as radiance temperature, surface finish characterization, and impedance. NIST calibration services and special tests are characterizations of particular instruments, devices, and sets of standards with respect to international and national standards. NIST calibration services provide the customer with direct traceability to national and international primary standards. This measure illustrates the

quantity of physical measurement services provided by NIST for its customers, including calibration services, special tests, and Measurement Assurance Programs (MAPs). MAPs are quality control programs for calibrating entire measurement systems.

The output data represent a direct count of the number of items external customers sent to NIST for formal calibration services. The data provide information on service output levels only and represent a measure of throughput but not workload per se, as the number of tests and/or the time and calibration effort required can vary substantially across items. As with SRMs and NIST-maintained data, downstream impact is a function of the nature of individual calibration services more than the sheer volume of items calibrated.

FY 2005 and FY 2006 Targets: While the annual demand for calibrations can fluctuate due to several factors outside NIST's control, including changes in the calibration intervals of large customers, changes in the average calibration interval rate in any given year, consolidation of calibration activities within large R&D organizations, and industry consolidation (as, for example, in defense-related industries), NIST expects to calibrate a consistently high number (2,700-2,800) of items annually.

External Program Evaluation:

Visiting Committee on Advanced Technology

The programmatic goals, strategic direction, and management policies of NIST as a whole, including each of its major programs, are reviewed regularly by the Visiting Committee on Advanced Technology (VCAT). The VCAT is a legislatively mandated panel of external advisors that meets quarterly to review NIST's general policy, organization, budget, and programs. Refer to the text box for the current list of VCAT members; see also: http://www.nist.gov/director/vcat/index.htm for additional information on the VCAT, including its most recent annual report.

NIST Visiting Committee on Advanced Technology (VCAT): Current Membership - 2004		
Mr. Scott Donnelly, Senior Vice President, General Electric Co.	**Mr. Gary D. Floss**, Managing Director Bluefire Partners, Inc.	**Dr. Richard M. Gross**, Corporate Vice President, Research & Development, The Dow Chemical Co.
Dr. Deborah L. Grubbe, P.E., VCAT Vice Chair, Corporate Director, Safety & Health, DuPont Safety, Health, Environment	**Dr. Lou Ann Heimbrook**, Vice President Global Operations, Merck Research Laboratories	**Dr. Jennie Hunter-Cevera**, President University of Maryland Biotechnology Institute
Dr. Donald B. Keck, Chief Technology Officer Infotonic Technology Center, Inc. and Retired Vice President, Research Director Corning Incorporated	**Dr. Thomas A. Manuel**, Retired President Council for Chemical Research	**Mr. Edward J. Noha**, Chairman Emeritus CNA Financial Corporation
Dr. F. Raymond Salemme, Retired President and Chief Scientific Officer 3-Dimensional Pharmaceuticals, Inc.	**Dr. Juan M. Sanchez**, Vice President for Research University of Texas, Austin	**Mr. Thomas A. Saponas**, Retired Senior Vice President and Chief Technology Officer Agilent Technologies
Dr. April M. Schweighart, VCAT Chair, Retired Product Business Manager Motorola	**Dr. James W. Serum**, President SciTek Ventures	**Mr. Robert T. Williams**, Director Manufacturing Operations Support and Technology Caterpillar, Inc.

Program Assessment Rating Tool

During the FY 2005 budget cycle, the NIST Laboratory Programs were assessed using OMB's Program Assessment Rating Tool (PART). OMB's evaluation of the NIST Laboratory Programs was positive, with an overall rating of "effective". Through the PART assessment, OMB highlighted the following:

- The NIST Laboratory Programs have a clear, well-defined, and unique purpose. The measurement and standards capabilities provided by the NIST Laboratory Programs are a critical component of the Nation's scientific, technical, and economic infrastructure.

- The NIST Laboratory Programs are well-managed with strong strategic planning, program management, and performance evaluation processes. NIST's external advisory committees and peer review system are a particularly strong component of its management and evaluation system.

- During the course of the PART review, OMB encouraged NIST to revise its long-term goals and improve some of its quantitative output metrics. NIST made a number of corresponding revisions in time for the new goals and metrics to appear in this integrated budget submission and performance plan for FY 2005.

Responses to OMB recommendations related to long-term goals and quantitative output metrics were implemented in the FY 2005 combined budget and performance plan. NIST will continue to work with OMB, as requested, to continuously improve its performance measures and identify useful measures of efficiency. OMB recognizes that R&D-performing organizations typically cannot provide unit cost measures of efficiency due to the long time frame for research, multivariate inputs, and diverse sets of outputs that derive from R&D activities.

Crosscutting Activities:

Intra-Department of Commerce

- **NOAA:** NIST works with NOAA on the Federal Natural Disaster Reduction Initiative, which is focused on reducing the costs of natural disasters and saving lives through improved warnings and forecasts and information dissemination. Also, NIST and NOAA are among a group of Federal agencies focused on the global climate change initiative to accelerate new global observation technologies to improve the understanding of global climate change.
- **NTIA:** NIST and NTIA cooperate to support development of ultrawideband signal technology, a new wireless technology that will improve communications for emergency services and other applications.
- **ITA:** NIST has a long history of collaboration with ITA on technical barriers to trade. Currently, NIST & ITA are collaborating closely under the terms of the DOC Standards Initiative.

Other government agencies

NIST provides research and services in measurement and standards to almost every other agency in the Federal government with scientific missions contracted through specific Interagency Agreements or memoranda of understanding. NIST measurement research, services, and facilities have long contributed to national defense and security, to the nationwide safety and quality assurance systems that ensure the accuracy of health care measurements, to the accuracy of environmental measurements, and to law enforcement standards. NIST plays a large role in a wide variety of intragovernmental and government–industry coordination committees. For example, NIST has leadership positions on the committees, subcommittees, and working groups of the National Science and Technology Council (NSTC).

Private sector

NIST's mission is to work with industry to develop and apply technology, measurements, and standards. As such, the NIST Laboratories have extensive and diverse interactions with industry, which provide an important source of information about the quality, direction, and future demand for NIST products and services. Many of the laboratories' primary outputs, such as Standard Reference Materials and calibration services, are critically important to the quality and cost efficiency of products and production processes throughout U.S. industry. In addition, the NIST staff use technical publications, conferences, and workshops as mechanisms to transfer the results of their work to the U.S. private sector that need cutting-edge measurements and standards.

External Factors and Mitigating Circumstances:

Industry-specific business conditions and technological developments affect the level and range of demand for NIST products and services over time. In general, NIST seeks to mitigate the effects of external technological and market uncertainties by maintaining varied and close relationships with its customer base. Through conferences, workshops, technology roadmaps, and many other forms of interaction with its customers, NIST regularly evaluates and adjusts to the direction and level of demand for measurements, standards, reference data, test methods, and related infrastructural technologies and services.

NIST Performance Goal 2: Accelerate private investment in and development of high-risk, broad-impact technologies

Corresponding DOC Strategic Goal and Objectives:

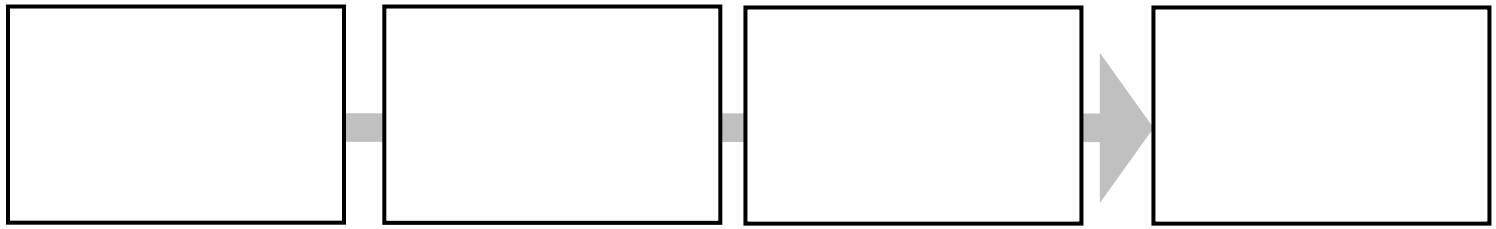
Strategic Goal 2: Foster science and technological leadership by protecting intellectual property, enhancing technical standards and advancing measurement science.

General Goal/Objective 2.1: Develop tools and capabilities that improve the productivity, quality, dissemination, and efficiency of research

Rationale for Performance Goal:

The Advanced Technology Program (ATP) encourages industry to identify and invest resources in high-risk, broad impact technologies—technologies with significant economic and societal promise, but with inadequate levels of private investment. The Program generates broad-based economic benefits by stimulating industry-led partnerships to develop new technologies. The ATP uses joint ventures, subcontracts, and informal teaming arrangements to combine private investment and the best available scientific and technological talent in industry, universities, and government.

The "impact path" for the ATP–-from inputs like appropriated funds and industry matching funds to long-term economic benefits–-is illustrated below.



From the start of the program, evaluation has been a central part of ATP operations, as a management tool to provide feedback to project selection and program operations and to demonstrate program results to stakeholders and the public.

The ATP has developed a multi-component evaluation strategy to provide measures of progress and performance at various stages of its impact path: for the short-term, from the time of project selection and over the course of the ATP-funding period (inputs and initial outputs); for the mid-term, as commercial applications are pursued, early products reach the market, and dissemination of knowledge created in the R&D projects occurs (outcomes); and for the longer-term, as more fully-developed technologies diffuse across multiple products and industries, with related net impacts on the formation of new industries, job creation, and U.S. economic growth (impacts).

Explanation of Performance Measures:

In the early and mid stages of project evolution, ATP tracks key outputs from projects through its Business Reporting System, a unique internal database created in 1993, which draws data from regular, systematic electronic project surveys and supplementary telephone surveys. Key indicators used to represent the generation and diffusion of new commercially relevant technical knowledge are patents and technical publications generated by ATP-funded projects. Taken together, these two indicators illustrate the generation and diffusion of technical knowledge created by ATP-funded R&D partnerships.

Measure 2a: Cumulative Number of Publications

Publications represent a major channel for the diffusion of technical knowledge that results from ATP investment in the development of new technologies and participants in more than half of ATP-funded projects have published and presented papers in technical professional journals. The cumulative count of publications generated by all ATP-funded research through the close of a given fiscal year represents a major channel for the diffusion of technical knowledge that results from ATP funding.

FY 2005 and FY 2006 Targets: Projections are based on extrapolations of past publication rates and projections of projects initiated and completed over time and are updated to reflect all currently available data. These targeting mechanisms are not perfectly accurate for several reasons. The publication data are impacted by delays in ATP project completion and/or project terminations, both of which are difficult to predict years in advance. In addition, publication rates vary significantly across technology areas. As a result, publication activity will be affected by changes in ATP's completed project portfolio. While these factors and others make perfectly accurate targeting difficult, ATP will continue to track its publications count closely, and also will analyze any trends that may indicate necessary adjustments to its projection models.

Measure 2b. Cumulative Number of Patents

The second of ATP's output measures focuses on the creation of new knowledge resulting from ATP-funded projects and adding to the nation's technical knowledge base on one of ATP's central missions. The measure represents a cumulative direct count of the number of patents filed by all ATP-funded research project participants through the close of a given fiscal year.

FY 2005 and FY 2006 Targets: Projections are based on extrapolations of past patenting rates and projections of projects initiated and completed over time, and are updated to reflect all currently available data. These targeting mechanisms are not perfectly accurate for several reasons. First, the patenting process is difficult to predict, and thus, for example, it is possible that patents projected to materialize in one fiscal year might not occur (or be reported) until the following year. Second, the patenting data are impacted by delays in ATP project completion and/or project terminations, both of which are difficult to predict years in advance, and the proclivity to patent varies significantly across technology areas and markets, due in part to differences in the utility and role of intellectual property protection. While these factors and others make perfectly accurate targeting difficult, ATP will continue to track its patent count closely, and also will analyze any trends that may indicate necessary adjustments to its projection models.

Measure 2c. Technologies Under Commercialization

In addition to tracking patents and technical publications, ATP's Business Reporting System also tracks mid-course outcomes of ATP-funded technology development projects up through six years after ATP funding ends. A key indicator is the number of projects with technologies under commercialization. This metric tabulates the cumulative number of projects with new technologies under commercialization that are traceable to all ATP funded projects through the close of a given fiscal year. The measure indicates the extent to which ATP-funded research and development has either leveraged or catalyzed new products and services, which in turn improve the prospects for technology-led economic growth.

NIST uses this metric in combination with patent and publication data to assess ATP's impact on the generation and diffusion of new commercially relevant technologies and technical knowledge. Commercialization is broadly defined as any group of activities undertaken to bring products, services, and processes into commercial applications, including development of commercial prototypes, adoption of processes for in-house production, development of spin-off products and processes, and the sale and licensing of products and services derived from the technology base created by the ATP-funded project.

FY 2005 and FY 2006 Targets: Out-year projections are based on extrapolations of past commercialization rates and projections of projects initiated and completed. Similar to the publication and patent metrics, the number of projects with technologies under commercialization may be impacted by delays in ATP project completion and/or project terminations.

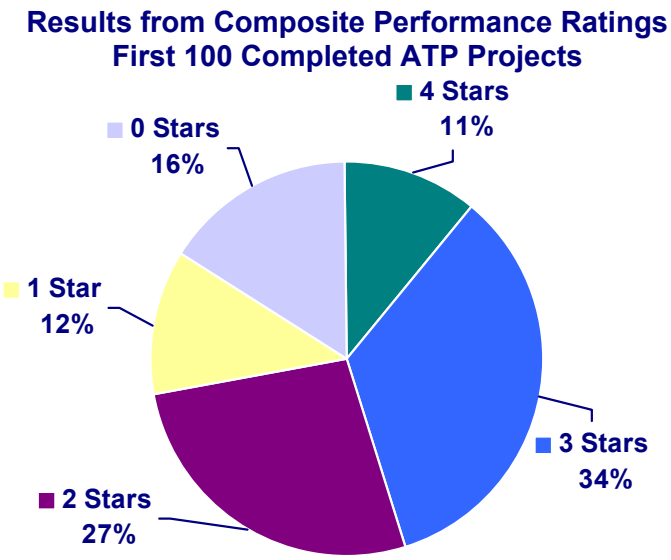
Program Evaluation:

To provide a more comprehensive measure of mid-term outcomes from ATP funding, the program implemented a Composite Performance Rating System and has compiled and published ratings of the first 100 completed ATP projects. Under the Composite Performance Rating System, each project is scored on a set of measures of knowledge creation and dissemination and progress toward commercial goals; these are summarized in the table below.

ATP's Composite Performance Rating System: Component measures of rating

Knowledge Creation and Dissemination Measures	Commercialization Progress Measures
▪ Technical awards ▪ Collaborations ▪ Patent filings ▪ Publications and presentations ▪ New product/process in market or expected soon	▪ New product/process in market or expected soon ▪ Attraction of capital ▪ Employment gains ▪ Business awards ▪ Outlook

The results from all these measures are used to construct a composite performance score to indicate the overall project effectiveness against ATP's mission (measured two to three years after the end of ATP funding). The result is a four-star system of ratings, with scores ranging from zero to four stars. The results of this analysis for the first 100 completed ATP projects found that 11 percent of the projects are top-rated in terms of overall project performance, with four stars. Twenty-eight percent are in the bottom group of zero or one stars. Sixty-one percent make up the middle group.



Given the program's focus on funding high-risk, technology development that the private sector is unwilling and unable to fund alone, not all ATP projects are fully successful. Some projects are stopped before completion of the funding period. Others fail to meet all their technical goals, or encounter business difficulties before the technologies are commercialized.

Measuring Impacts

Fully successful ATP projects are expected to contribute significantly to the U.S. scientific and technical knowledge base, yield private benefits to the innovators, and ultimately yield benefits to others in the United States through market, knowledge, and/or network spillovers. The measurement of long-term economic outcomes requires well-established projects with technological outputs that have been in the market for long time periods. To measure long-term economic impacts that derive from the set of funded ATP projects, the program conducts or contracts detailed and rigorous case studies. Where possible, these studies also estimate long-term project outcomes. For instance, one recent study of ATP-funded projects focused on composites manufacturing technologies estimates a public rate of return of at least 44 percent and a benefit-to cost ratio of at least 83:1.

External Program Evaluation:

Visiting Committee on Advanced Technology

To supplement its comprehensive internal evaluation methods, the ATP also receives external review and evaluation. The programmatic objectives and management of ATP are reviewed regularly by the Visiting Committee on Advanced Technology (VCAT) and by the Advanced Technology Program Advisory Committee. The ATP Advisory Committee is charged with (1) providing advice on ATP programs, plans, and policies; (2) reviewing ATP's efforts to assess the economic impact of the program; (3) reporting on the general health of the program and its effectiveness in achieving its legislatively mandated mission; and (4) functioning solely as an advisory body, in accordance with the provisions of the Federal Advisory Committee Act. Additional information on the ATP Advisory Committee, including its most recent annual report, is available at http://www.atp.nist.gov/atp/adv_com/ac_menu.htm.

National Research Council

Over the past decade, ATP has been the subject of external reviews focused on program performance, including two broad programmatic reviews by the National Research Council (NRC) Board on Science, Technology, and Economic Policy (STEP). The results of the first NRC review are available in a report entitled *The*

Advanced Technology Program: Challenges and Opportunities, published in 1999 and online at http://www.nap.edu/books/0309067758/html/. The report from the second NRC review was published in 2001 and is available online at http://www.nap.edu/books/030907410X/html/.

The NRC found, among other things, that:

- " . . . the Advanced Technology Program is an effective Federal partnership program . . . Its cost-shared, industry-driven approach to funding promising new technological opportunities has shown considerable success in advancing technologies that can contribute to important societal goals such as improved health diagnosis (e.g., breast cancer detection), developing tools to exploit the human genome (e.g., colon cancer protection), and improving the efficiency and competitiveness of U.S. manufacturing" (Summary of Findings, p. 87).

- "The extensive assessments of the program show that it appears to have been successful in achieving its core objective, that is, enabling or facilitating private sector R&D projects of a type, or in an area, where social returns are likely to exceed private returns to private investors" (p. 88).

Program Assessment Rating Tool (PART)

During the FY 2004 budget cycle, ATP was among the first programs evaluated by OMB using the new Program Assessment Rating Tool (PART). Overall OMB rated ATP "adequate", with an overall score above the government-wide average for all programs rated at that time. Through the PART assessment, OMB highlighted the following:

- ATP is a well-managed program with adequate strategic planning and regular performance reviews;
- ATP has an open and competitive grant process; and
- ATP's annual performance measures are adequate and suggest some progress over time; however, OMB noted, "it is difficult to identify the extent to which ATP funding was required for projects".

ATP scored lowest in the "program purpose and design" and "results" section of the PART, reflecting OMB's assessment that the need for the program is unclear and that the program's results, while showing progress, may not indicate "unique or significant impact." OMB did not make any specific recommendations for ATP program management to implement.

Cross-cutting Activities:

Other government agencies

The Advanced Technology Program (ATP) leverages the expertise of scientists and engineers from a wide variety of government agencies and laboratories participating on ATP Source Evaluation Boards. In addition, ATP program managers work with program managers from other government agencies to ensure that projects are complementary and relevant: coordination committees in several disciplines have been brought together for this purpose. This also creates an opportunity to examine government R&D from a high level for specific technologies.

Private sector

The Advanced Technology Program was established to co-fund with the private sector a broad array of path-breaking new industrial technologies. The program solicits proposals for innovative, high-risk R&D in any industry or field of technology that offers the potential for widespread benefits for the U.S. economy and society as a whole. ATP projects range from aquaculture to X-ray lithography, and the program has contributed significantly to technological advances in fields

as diverse as automated DNA analysis, automobile assembly, tissue engineering and software systems. Companies of any size may apply to ATP and many successful projects have been developed by small companies.

External Factors and Mitigating Circumstances:

ATP is designed to fund high-risk technologies through partnerships with industry; both the nature of the projects and the location of the research performance intrinsically convey a high degree of uncertainty and a relatively low degree of control. For instance, the rate at which ATP-funded technologies are commercialized will vary in part due to technological uncertainties intrinsic to the R&D enterprise and in part to the particular strategies and efforts of the businesses performing the research. Other metrics, such as publication and patenting rates, will be affected not only by the success of the technology development effort but also by company-specific strategies and market conditions. For example, patenting is more common in some industries than others, and a variety of factors affect the patenting and/or publishing choices of individual firms. Variation in growth rates and development trajectories add additional uncertainty: some technologies are commercialized rapidly once the research is completed, while others require extensive product development and clinical trials before significant commercialization can occur. There are no practical mitigation strategies for these external sources of uncertainty other than maintaining robust program management and data collection systems. Over the course of ATP funding, companies are required to abide by the terms and conditions of the cooperative agreement, which include intellectual property and commercialization provisions.

NIST Performance Goal 3: Raise the productivity and competitiveness of small manufacturers

Corresponding DOC Strategic Goal and Objective:

Strategic Goal 2: Foster science and technological leadership by protecting intellectual property, enhancing technical standards and advancing measurement science

General Goal/Objective 2.1: Develop tools and capabilities that improve the productivity, quality, dissemination, and efficiency of research

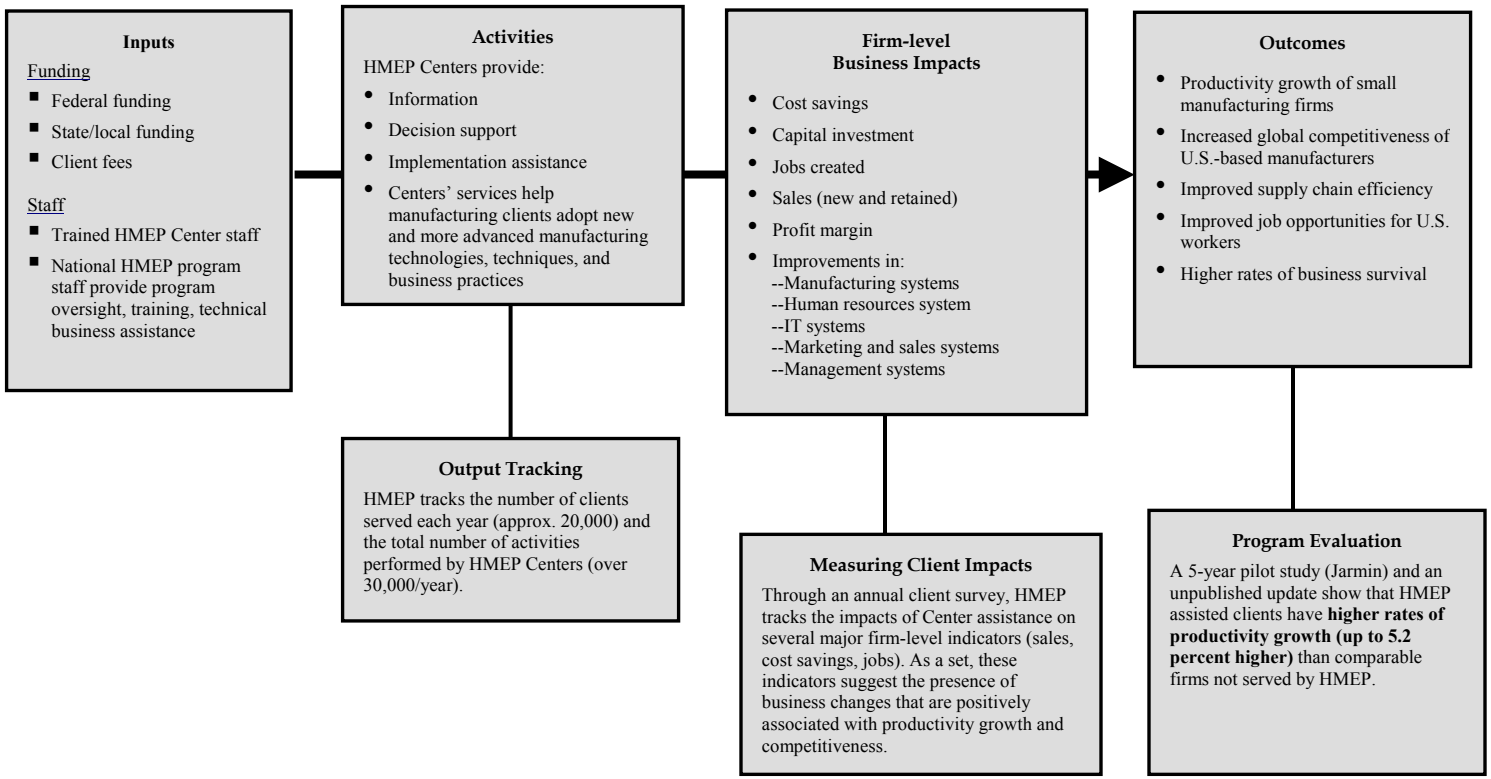
Rationale for Performance Goal:

Operating under the authority of 15 U.S.C. 278k, the Hollings Manufacturing Extension Partnership (HMEP) is a federal-state-local partnership program that provides small U.S. manufacturers with access to manufacturing technologies, resources, and expertise. The HMEP program consists of a nationwide network of manufacturing extension centers which are linked to state, university, and private sources of technology and expertise to assist small manufacturers in adopting new and advanced manufacturing technologies, techniques, and business practices.

The Nation's 361,000 small manufacturers employ approximately twelve million people—about two-thirds of the manufacturing workforce—and produce intermediate parts and equipment that contribute more than half of the value of U.S. manufacturing production. Their role in manufacturing supply chains is crucial and the Nation's future manufacturing productivity and competitiveness will rest largely on the ability of these small establishments to improve their quality, raise their efficiency, and lower their costs. The national HMEP network helps small companies transform themselves into high performance enterprises – productive, innovative, customer-driven, and competitive – by efficiently providing high value technical and advisory services including access to industry best practices.

HMEP's ultimate goal is to measureably improve the productivity and competitiveness of all its clients. The model below demonstrates the impact path (or value creation chain) of the HMEP program – from inputs such as appropriated funds and staff to end-outcomes such as productivity improvements for the small manufacturing sector. In addition, the model also depicts how NIST measures the progress of the HMEP program along its impact chain.

HMEP's Impact Path and Evaluation Methods: Results-based Management for Advisory Services



Explanation of Performance Measures:

HMEP's nationwide network of manufacturing assistance centers work at the grassroots level with each HMEP center providing their local manufacturers with expertise and services tailor to their most critical needs. The program uses the measures below to demonstrate both a level of activity as well as the outcomes resulting from the services HMEP Centers provide.

Measure 3a. Number of clients served by HMEP Centers receiving Federal funding

HMEP works with the Nation's small manufacturing firms to provide assistance to overcome barriers to productivity growth and competitiveness. This measure represents the annual number of new and repeat clients served by HMEP Centers and received training, technical, and business assistance ranging from informational seminars and training classes to in-depth technical assistance in areas such as lean implementation, ISO 9000, and quality improvement practices.

FY 2005 and FY 2006 Targets: The FY 2005 target estimates are based on an appropriation of $106M. The FY 2006 targets are based on a funding level of $46.8M which reflects the Administration's policy and funding priorities to address the Nation's most pressing needs while continuing a program that maximizes service impact.

Measure 3b. Increased sales attributed to HMEP Centers receiving Federal funding
Measure 3c. Capital investment attributed to HMEP Centers receiving Federal funding
Measure 3d. Cost savings attributed to HMEP Centers receiving Federal funding

Together the measures above – increased sales, capital investments, and cost savings, all attributed to HMEP Centers receiving Federal funding – provide quantitative indicators of the bottom-line impacts HMEP services provide. As a set, these measures indicate changes that are positively associated with productivity growth and competitiveness – two factors that are crucial for American manufacturers to manage and succeed in the rapidly changing manufacturing environment. Data are collected through an annual survey of clients receiving services from HMEP Centers.

FY 2005 and FY 2006 Targets: The FY 2005 target estimates are based on an appropriation of $106M. The FY 2006 targets are based on a funding level of $46.8M which reflects the Administration's policy and funding priorities to address the Nation's most pressing needs while continuing a program that maximizes service impact.

External Program Evaluation:

Economic Studies

The HMEP program provides resources needed by small manufacturing establishments to overcome cost and knowledge barriers to realizing productivity growth and improvements in business performance. The program's progress toward achieving its fundamental objective has been evaluated through rigorous, controlled-comparison studies that evaluate the productivity of MEP-served clients relative to similar companies that did not receive MEP assistance. One study, a five-year pilot study conducted by R.S. Jarmin of the Center for Economic Studies (U.S. Census Bureau), showed that MEP-assisted clients had significantly

higher rates of productivity growth than non-MEP clients ($484M in additional value added for client firms).[1] An unpublished update to this original study also prepared by the Center for Economic Studies found that the average MEP client experienced 5.2 percent higher productivity growth between 1996 and 1997 and 4.7 percent faster employment growth compared to non-MEP clients. The findings cover a larger subset of all MEP clients.

National Academy of Public Administration (NAPA)

NAPA, an independent, nonpartisan organization chartered by Congress to improve government performance, recently completed the second part of a two-phase review of the MEP program. The first phase focused on re-examining MEP's core premise and NAPA found: "…barriers to improving the productivity of small manufacturers identified by earlier studies remain, although they have changed in their relative impacts.... The Panel finds that the core premise of the Program remains viable as it is fulfilling its mission by leveraging both public and private resources to assist the nation's small manufacturers." The second phase evaluated alternative business models for the program. NAPA provided several recommendations including:

- Emphasize technology diffusion, product development, and supply chain integration services.
- Build an integrated national network.
- Improve the national coordination of state level organization partnering.
- Review and adopt business best practices used by other federal/state programs.
- Improve the system-wide sharing of knowledge and information and the systems for measuring performance.
- Coordinate with other DOC manufacturing related programs.
- Include structural and operational changes in the strategic planning processes.

Full text versions of the reports is available at http://www.napawash.org/Pubs/NIST0903.pdf and http://www.napawash.org/Pubs/NIST6-2-04.pdf

Visiting Committee on Advanced Technology (VCAT)/MEP National Advisory Board

As with other NIST programs, the programmatic objectives and management of HMEP are reviewed regularly by the Visiting Committee on Advanced Technology (VCAT) and its National Advisory Board (MEPNAB), which was established by the Secretary of Commerce in October 1996, The Board meets three times a year to 1) provide advice on HMEP programs, plans, and policies; 2) assess the soundness of HMEP plans and strategies; 3) assess current performance against HMEP program plans; and 4) function solely in an advisory capacity, and in accordance with the provisions of the Federal Advisory Committee Act. The MEPNAB members bring a variety of manufacturing backgrounds to the Board, including small and large manufacturing, labor, academia, economic development, consulting and state government. This mix provides HMEP with the outside advice critical to maintaining and enhancing the program's focus on its customers—the U.S. small manufacturers. Additional information on HMEP's National Advisory Board, including its most recent annual report, is available at http://www.mep.nist.gov/about-mep/advisory-board.html#annualreport.

Program Assessment Rating Tool (PART)

In conjunction with the FY 2004 budget, MEP was evaluated by OMB using the PART instrument. OMB's evaluation of MEP was positive, with an overall rating of "moderately effective" (only 30 percent of all programs evaluated in FY 2004 were rated moderately effective or effective). Through the PART assessment, OMB highlighted the following:

- MEP is a well-managed program with adequate strategic planning and regular performance reviews;

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[1] R.S. Jarmin, "Evaluating The Impact Of Manufacturing Extension On Productivity Growth," *Journal of Policy Analysis and Management*, Vol 18, No. 1, Winter 1999, pp. 99-119.

- MEP has an open and competitive process for the establishment of new centers; and
- MEP's annual performance measures are adequate and demonstrate benefits to MEP clients; however, OMB noted, "it is difficult to identify the impact of MEP on the manufacturing community as a whole".

MEP scored lowest in the "program purpose and design" section of the PART, reflecting OMB's assessment that "it is not evident that there is a need for a Federal response in this area". OMB did not make any specific recommendations for MEP program management to implement.

Cross-cutting Activities:

Intra-Department of Commerce

HMEP has collaborated with the International Trade Administration (ITA), the Minority Business Development Agency (MBDA), and the Economic Development Administration (EDA) on a number of projects. For example, HMEP has worked with ITA on efforts to open global markets to American small and medium-sized manufacturers interested in but inexperienced with exporting activities.

Other government agencies

HMEP collaborates with a wide range of agencies that regulate or provide programs and services that affect small manufacturing businesses, including the Departments of Agriculture, Defense, Energy, Health and Human Services, Housing and Urban Development, and Labor, as well as with the Environmental Protection Agency, National Aeronautics and Space Administration, and the Small Business Administration.

Private sector

HMEP provides a nationwide network of manufacturing extension centers that work directly with small and medium-sized manufacturing establishments—typically, those with fewer than 500 employees. Because the HMEP Centers are joined together in a network through NIST, even the smallest firms are able to tap into the expertise of knowledgeable manufacturing and business specialists throughout the United States. HMEP Centers assist firms in areas such as quality management systems, business management systems, human resource development, market development, materials engineering, plant layout, energy audits, and environmental studies.

External Factors and Mitigating Circumstances:

The economic and technological environment for small manufacturers in the United States continues to change rapidly. To maximize its effectiveness, HMEP must not only respond rapidly to its clients' changing needs, but also must anticipate changes in the business environment facing smaller manufacturers.

NTIS Performance Goal 1: Enhance public access to worldwide scientific and technical information through improved acquisition and dissemination activities

Corresponding DOC Strategic Goal

Strategic Goal 2: Foster science and technological leadership by protecting intellectual property, enhancing technical standards, and advancing measurement science

General Goal/Objective 2.1: Develop tools and capabilities that improve the productivity, quality, dissemination, and efficiency of research

Rationale for Performance Goal:

The National Technical Information Service (NTIS) operates a central clearinghouse of scientific and technical information that is useful to U.S. business and industry. Without appropriated funds, NTIS collects scientific and technical information; catalogs, abstracts, indexes, and permanently archives the information; disseminates products in the forms and formats most useful to its customers; develops electronic and other new media to disseminate information; and provides information processing services to other Federal agencies. NTIS's revenue comes from (1) the sale of technical reports to business and industry, schools and universities, state and local government offices, and the public at large; and (2) services to Federal agencies that help them communicate more effectively with their employees and constituents.

NTIS promotes the development and application of science and technology by providing technologically advanced global e-commerce channels for dissemination of its specialized information to business, industry, government, and the public. NTIS' recently implemented business plan was designed to provide access to NTIS' collection of scientific and technical information to the non-traditional customers (students, small business, general public, etc.). The NTIS bibliographic database (from 1990 to the present) is available via the Internet free of charge. Users are allowed to download items in the collection in electronic format for a single low fee, or at no charge if it has fewer than twenty pages. These initiatives are a result of NTIS's innovative business model that maximizes utilization of the World Wide Web and e-commerce in its information collection and dissemination activities.

Explanation of Performance Measures

Measure 1a: Number of New Items Available (annual)

The number of items available for sale to the public from NTIS includes scientific, technical, and engineering information products added to the permanent collection, as well as items made available through online electronic subscriptions.

Each publication added to the permanent collection is abstracted, catalogued, and indexed so that it can be identified and merged into the permanent bibliographic database for future generations of researchers and the public who may benefit from this valuable research. Other information products are available as full text documents in electronic format through numerous NTIS online information services. This material is acquired primarily from U.S. government agencies, their contractors and grantees, and also from international sources. NTIS collects approximately 25,000 scientific and technical reports annually and another 505,000 items in the form of articles, updates, advisories, etc. that are contained in various subscription products and databases it distributes. The

number of new information products available each year from NTIS is approximately 530,000, but the number largely depends on input from other government agencies.

Measure 1b. Number of Information Products Disseminated (annual)

This measure represents information disseminated and includes compact discs, diskettes, tapes, online subscriptions, Web site pages, as well as traditional paper and microfiche products.

The shift in information dissemination practices from traditional paper copy to electronic-based dissemination has improved NTIS's ability to provide quality products, increase the number of products distributed, and increase the number of customers that have access to valuable scientific and technical information. NTIS is continually striving to stay abreast of the latest technological advances in information dissemination processes to improve its ability to meet the demands of the public. NTIS continues to enhance its ability to stay current in the e-commerce environment, while continuing to serve customers that require the more traditional distribution methods, as demonstrated in our targets above.

FY 2005 and FY 2006 Targets:
The FY2005 and FY 2006 targets have been increased to reflect increases in expected dissemination activity, as demonstrated in the FY 2003 actual data.

Measure 1c. Customer Satisfaction

This measure represents the percentage of NTIS customers that are satisfied with the quality of their order, the ease of order placement, and the timely processing of that order. Orders for NTIS's vast collection of scientific and technical information are received by phone, fax, mail, and online, and are filled in a variety of formats. NTIS's continual efforts to maintain and possibly improve this very high rate of customer satisfaction are essential to the success of NTIS's performance and mission to collect and disseminate scientific and business-related information.

The percentage of satisfied customers is derived from the number of customer complaints compared to the total number of orders taken. It does not take into account inquires about the status of an order or other general questions.

Program Evaluations:
The Office of the Inspector General (OIG) contracted with KPMG and prepared their audit (Audit Report No. FSD-16698-5-0001/November 2004) of NTIS' FY 2004 Financial Statements that includes a review of the Annual Report detailing NTIS' program activity. The audit results indicated that NTIS has established an internal control structure that facilitates the preparation of reliable financial and performance information.

Cross-cutting Activities:

Other government agencies
NTIS provides a variety of services that assist other agencies in developing, producing, and disseminating their information. These services include fax management services; reproduction of paper, computer, and microfiche products; billing and collection services; product storage and distribution; Web hosting; and database management and distribution. Specific examples are listed below:

- Department of Agriculture (Team Nutrition) - NTIS provides USDA with bulk order processing and distribution of its nutrition education materials to its constituents.
- Department of Treasury (U.S. Customs) - NTIS hosts a Web site on behalf of U. S. Customs Service allowing the dissemination of information on legal rulings.
- Department of Defense (Defense Acquisition University) - NTIS provides DAU with hardware, a database platform and technical help desk support for their web based distance-learning site.

External Factors and Mitigating Circumstances:

NTIS's requirement to operate on a substantially self-sustaining basis precludes it from making all information in its collection available on the Web for free, despite the public's desire for this information and its aversion to paying for government information on the Web. NTIS is currently addressing this concern by putting its bibliographic database, from 1990 to the present, on the Internet for free. In addition, if available, documents smaller than twenty pages can be downloaded for free from NTIS's Web site. Documents greater than twenty pages, if available in electronic form, can be downloaded for a fee. Of course, all documents in the NTIS collection can be ordered in the traditional formats (i.e. paper and microfiche), if desired.

Data Validation and Verification

NIST

NIST's Program Office conducts an annual review of its quantitative performance data to ensure that it is complete and accurate. During this process, Program Office staff discuss the data with appropriate offices to assess results relative to forecasts and to understand long-term trends and drivers of performance. Program Office staff also evaluate the verification and validation procedures used by the offices that provide the source data and verify that the source data itself is identical to or consistent with the reported data. For its qualitative performance measure, the NIST Program Office provides summary findings from the annual NRC review of the NIST laboratories; the complete results of that evaluation are available for public review.

The table below summarizes the data validation and verification processes for each organization in the Technology Administration.

Performance Measure	Data Source	Frequency	Data Storage	Internal Control Procedures	Data Limitations	Actions to be Taken
NIST Measure 1a: Qualitative assessment and review of technical quality and merit using peer review	On-site interviews and discussions with NIST management and research staff by independent external scientific and technical experts, managed by the NRC.	Annual reviews; biennial reports	NRC	Oversight of laboratory-specific expert review panels provided by the NRC Board on Assessment of NIST Programs.	Data are qualitative in nature	None
NIST Measure 1b: Peer-reviewed technical publications	NIST Office of Information Services	Ongoing	Publications data are gathered and maintained by NIST Office of Information Services	Data represent direct and verifiable counts of NIST technical publications to be published in peer-reviewed journals and have been cleared for publication by the internal Washington and Boulder Editorial Review Boards. Internal controls include verification and review by the NIST Director's Office.	Output only	None

NIST Measure 2a: Standard Reference Materials (SRMs) sold NIST Measure 2b: NIST-maintained datasets downloaded NIST Measure 2c: Number of items calibrated	NIST Technology Services	Ongoing	NIST Technology Services	Data represent direct and verifiable counts of: 1) the number of SRMs sold to customers at the close of the fiscal year; 2) the number of times a NIST-maintained dataset has been downloaded; and 3) counts of items calibrated by the NIST Laboratories. Internal controls include verification and review by NIST Technology Services and the NIST Director's Office and Budget Division.	Data provide information on output levels only. NIST measure 2b reflects the number of users accessing these datasets; it does not reflect unique users or capture how the data was used.	None.
Measure 3a: Cumulative number of publications NIST Measure 3b: Cumulative number of patents filed NIST Measure 3c: Cumulative number of technologies under commercialization	Data are gathered from the portfolio of ATP project participants (funded since 1993) through company filings of patent information to the NIST Grants Office (a legal requirement) and an electronic survey instrument under ATP's Business Reporting System (BRS). Separate portfolio-based telephone surveys are conducted of project participants funded prior to 1993 and for post-project data collection.	Annual over the course of ATP funding for projects funded since 1993; intermittent for projects funded prior to 1993; every two years (up to six years) after ATP funding ends.	ATP's Office of Economic Assessment maintains BRS data in an integrated set of databases covering both descriptive information about the funded organizations and survey responses for all participants in ATP-funded research projects.	All ATP reports using BRS data and patent reports filed through the NIST Grants Office are monitored closely by ATP for research quality and are subject to extensive NIST-wide review and critique prior to being issued.	The BRS electronic survey and other telephone survey instruments represent a standardized reporting system. Standard sources of uncertainty include variation in interpretation of specific questions; variation in the estimation techniques used in response to specific questions; variation in the quality of industry data; and missing values.	None.

NIST Measure 4a: Number of clients served by HMEP Centers receiving Federal funding NIST Measure 4b: Increased sales attributed to HMEP Centers receiving Federal funding NIST Measure 4c: Capital investment attributed to HMEP Centers receiving Federal funding NIST Measure 4d: Cost savings attributed to HMEP Centers receiving Federal funding	The client impact survey is administered by a private firm, Synovate located in Arlington Heights, IL.	The survey is conducted four times per year, and clients are selected based on when they completed the first project with an HMEP Center in the previous year. For example, a client that completed a project with an HMEP Center in February 2003 was surveyed in January/February 2004. This process is used to reduce respondent burden, raise overall response rates, and improve data quality. Clients are asked to estimate how the group of HMEP-provided services over the previous two years has affected their business performance in the 12-month period prior to the survey date.	Survey data is sent directly to HMEP for analysis. HMEP reviews and stores survey data received from Synovate.	Internal controls include verification significant review of the Synovate data by HMEP staff. Criteria are in place for identifying and verifying significant outliers in the data.	As with similar survey instruments, sources of uncertainty include variation in interpretation of specific questions; variation in the estimation techniques used in response to specific questions; variation in the quality of industry data; missing values; and other common survey problems. Synovate uses standard survey techniques to clean the data, ensure accuracy and reliability, and improve the response rate. Reported data reflect the impact of HMEP services primarily on small manufacturing establishments; on some occasions, Centers may elect to serve establishments with over 500 employees.	None.
NTIS Measure 1a: Number of New Items Available (Annual)	NTIS operates and maintains internal systems for collecting acquisition statistics.	Data is available daily. Reports are produced monthly.	All data is stored within NTIS systems.	NTIS' accounting and budget offices analyze and report performance data to management. Data verification is provided through regular internal independent auditor reporting.	Output Only	None

NTIS Measure 1b: Number of Information Products Disseminated (Annual)	NTIS records every transaction using a commercial order processing system modified to meet its specific needs together with a standard Web analysis software package used by industry.	Internal management activity reports are produced daily, summaries are produced monthly.	All data is stored within NTIS systems.	NTIS' accounting and budget offices analyze and report performance data to management. Data verification is provided through regular internal independent auditor reporting.	Output Only	None
NTIS Measure 1c: Customer Satisfaction	NTIS operates and maintains internal systems for processing collected information. NTIS records every transaction using a commercial order processing system modified to meet its specific needs.	Internal management activity reports are produced daily, summaries are produced monthly.	All information is stored within NTIS systems.	NTIS accounting and budget offices analyze and report performance data to management. Data verification is provided through regular internal and independent auditor reporting.	None	None