

**U.S. HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION
COMMITTEE ON SCIENCE AND TECHNOLOGY**

HEARING CHARTER

*The National Institute of Standards and Technology's Role in Supporting Economic
Competitiveness in the 21st Century: the FY08 Budget Request*

**Thursday, February 15, 2007
10:00 a.m. – 12:00 a.m.
2318 Rayburn House Office Building**

1. Purpose

On Thursday, February 15, 2007, the Technology and Innovation Subcommittee of the House Committee on Science and Technology will hold a hearing to consider the President's fiscal year 2008 (FY08) budget request for the National Institute of Standards and Technology (NIST). An Administration witness will review the proposed budget in the context of the President's overall priorities for NIST. In addition, there will be four witnesses who will comment on the President's FY08 budget request and the future direction and requirements for NIST.

2. Witnesses

Dr. William Jeffrey, Director
National Institute of Standards and Technology

Dr. Stan Williams, Senior HP Fellow in Quantum Science Research
Hewlett-Packard Corp, Palo Alto, CA

Mr. Michael Borrus, General Partner
X/Seed Capital, Menlo Park, CA

Mr. Peter Murray, Vice President
Welch Allyn, Inc., Beaverton, OR

Mr. Michael Ryan, President and CEO
TUG Technologies Corporation, Marietta, GA

3. NIST Overview

Founded in 1901, the National Institute of Standards and Technology (NIST) has developed and promoted measurement, standards, and technology to enhance productivity, facilitate trade, and improve quality of life. NIST is a non-regulatory agency of the U.S. Commerce Department's Technology Administration.

NIST operates in two primary locations: Gaithersburg, MD and Boulder, CO. It also operates two institutes jointly with other organizations: the Center for Advanced Research in Biotechnology in Rockville, MD (with the University of Maryland) and JILA in Boulder, CO (with the University of Colorado).

NIST's staff includes approximately 2,700 scientist, engineers, technicians, and support personnel. In addition, 1,800 associates complement the staff, and NIST partners with about 1,500 manufacturing specialists and staff at affiliated centers around the country. Three NIST scientists have earned the Nobel Prize in the last 10 years.

NIST carries out its mission through four cooperative programs:

- **NIST laboratories** - conduct research supporting U.S. technology infrastructure by developing tools to measure, evaluate and standardize, enabling U.S. companies to innovate and remain competitive. NIST helps U.S. companies, workers, and consumers by ensuring that standards are used to create a level playing field—not a barrier to trade—in the global marketplace.
- **Baldrige National Quality Program** - promotes excellence among U.S. manufacturers, service companies, educational institutions, and health care providers; conducts outreach programs and manages the annual Malcolm Baldrige National Quality Award recognizing performance excellence and quality.
- **Manufacturing Extension Partnership** - offers technical and business assistance services to improve the productivity and competitiveness of small manufacturers through a nationwide network of local centers. The centers are funded by a one-third equal match from Federal, State and fees charged for services.
- **Advanced Technology Program** - accelerates the development of high-risk, innovative technologies that promise broad benefits for the nation by co-funding R&D partnerships with the private sector, including universities.

NIST laboratories are comprised of seven labs and a technical program, and are funded under the Scientific and Technical Research Services (STRS) account.

- **Building and Fire Research Laboratory** - works to improve quality and productivity in the U.S. construction. The lab also works to reduce human and economic loss due to fires, earthquakes, wind, and other hazards.
- **Chemical Science and Technology Laboratory** - conducts research in measurement science and develops the chemical, biochemical, and chemical engineering measurements, data, models, and reference standards that are required to enhance U.S. industrial competitiveness in the world market and to improve public health, safety and environmental quality.

- **Electronics and Electrical Engineering Laboratory** - provides the fundamental basis for all electrical measurements in the U.S. and advances standards for the electronics and electrical industries.
- **Information Technology Laboratory** - conducts research and develops test methods and standards for emerging and rapidly changing information technologies. ITL focuses on technologies to improve the usability, reliability and security of computers and computer networks for work and home.
- **Manufacturing Engineering Laboratory** - develops measurement methods, standards and technologies to improve U.S. manufacturing capabilities. MEL researchers work with industry to achieve greater efficiency and productivity with improved measurements and standards, both dimensional and mechanical. MEL also maintains the basic units for measuring mass and length in the United States.
- **Materials Science and Engineering Laboratory** - anticipates and responds to industry material-science needs in areas including microelectronics, automobiles, and health care. MSEL houses the nation's only fully equipped cold neutron research facility.
- **Physics Laboratory** - provides measurement services and research for electronic, optical and radiation technology. Research on atomic clocks at PL has led to the world's most accurate timing devices, critical for the Global Positioning System (GPS), financial markets, and electrical power grid testing. Over the last 10 years, three scientists from PL have won the Nobel Prize.
- **Technology Services** - provides technology products and services including support for NIST calibrations, Standard Reference Materials, Standard Reference Data, and Weights and Measures; coordination of documentary standards activities; training of foreign standards officials; laboratory accreditations; facilitating partnerships between NIST researchers and U.S. industry; and access to the NIST Research Library.

In addition, NIST has two national research facilities.

- **NIST Center for Neutron Research (NCNR)** - provides an intense source of neutrons used to probe the molecular and atomic structure and dynamics of a wide range of materials. This facility is used heavily by industry. In 2006, researchers from over 40 national labs, 140 U.S. universities, and 60 U.S. companies conducted research at the facility in collaboration with NIST scientists.
- **Center for Nanoscale Science and Technology (CNST)** - leverages the unique capabilities of the NIST Advanced Measurement Laboratory complex, providing state-of-the-art facilities for nanomanufacturing and nanometrology where industry, universities and other Federal laboratories can collaborate in solving critical measurement and fabrication issues necessary to convert nano-discoveries into products.

NIST also manages two programs that support small businesses.

- **Manufacturing Extension Program (MEP)** is a proven public/private partnership in all 50 states and Puerto Rico with the mission of improving the

competitiveness of small and medium-sized manufacturers. In FY05, MEP, a network of 59 centers, assisted more than 16,000 small manufacturers, providing a 10 to 1 return on Federal investment. In a survey of approximately 25% of MEP clients, they reported over \$1.3 billion in cost savings directly attributed to the program's assistance as well as creating \$6.25 billion in new or retained sales. The program also helped create/retain more than 53,000 jobs and increased investment by \$2.25 billion returned to the economy.

- The **Advanced Technology Program (ATP)** was created to foster economic growth through the development of innovative technologies. Through private/public partnerships, ATP's early stage investment is accelerating the development of high-risk, broadly enabling technologies and helping bridge the gap between the laboratory and the market place. Through May 2004, ATP co-funded 736 projects with 1,468 participants. Sixty-six percent of ATP projects are led by small businesses, while more than 160 different colleges and universities have participated in ATP projects. Benefit-cost studies from approximately 40 projects indicate an 8 to 1 return on investment.

NIST Budget Summary

NIST's FY08 budget request is summarized in the table below.

Table 1. National Institute of Standards and Technology FY05 - FY08 Request.

Program	FY05 Approp	FY06 Approp	FY07 Request	FY07 H.J.Res. 20	FY08 Request	Change FY08R vs FY07 H.J.Res. 20	% Chg FY08R vs FY07 H.J.Res. 20
STRS	373.3	387.5	459.4	416.7	492.4	75.7	18.2%
Baldrige	5.5	7.3	7.6	7.6	8.1	0.5	6.6%
ITS							
ATP	140.4	79.0	0.0	79.0	0.0	-79.0	-100.0%
MEP	107.5	104.6	46.3	104.6	46.3	-58.3	-55.7%
Construction	72.5	173.6	68.0	58.6	93.9	35.3	60.2%
Total	699.2	752.0	580.3	665.9	640.7	-25.2	-3.8%

Figures may not add up due to rounding

STRS: Scientific Technical Research Services (includes NIST laboratories, technical services and National Research facilities).

Baldrige: Baldrige National Quality Program.

ITS: Industrial Technology Services

ATP: Advanced Technology Program

MEP: Manufacturing Extension Program

4. NIST Budget Highlights

NIST's Laboratory Programs

The FY08 budget requests \$492 million for scientific research. The request is \$68 million (17%) above the FY07 level of \$417 million appropriated in the continuing resolution, H.J. Res. 20 (which passed the House on January 31, 2007) and is \$41 million above the FY06 request. The request also includes \$94 million for construction and renovation of NIST's scientific facilities, \$35 million (60%) above the FY07 appropriated level and \$80 million (46%) below the FY06 appropriation.

The increase in laboratory programs (STRS) for FY08 includes new research initiatives plus those requested in FY07 as summarized below.

- **Enabling Nanotechnology from Discovery to Manufacture** (requested increase of \$26 million) aims to improve the basic scientific understanding of artificial materials on the nanoscale as well as aid US industry in developing manufacturing technologies for these materials. (Includes \$6 million in FY08 request and \$20 million from FY07.)
- **Measurements and Standards for the Climate Change Science Program** (requested increase of \$5 million) will expand the NIST component of the multi-agency U.S. Climate Change Science Program (CCSP) to study the impact of aerosols on global warming, and to carry out precise calibration of satellite light sensors to monitor the amount of sunlight striking the Earth.
- **Enabling Innovation through Quantum Science** (requested increase of \$13 million) will pursue the development of devices governed by quantum physics to develop next-generation cryptography and computing technologies. (Includes \$4 million in FY08 request and \$9 million from FY07 "Quantum Information Science" initiative.)
- **Disaster Resilient Structures and Communities** (requested increase of \$6 million) will improve the scientific basis for building codes and best practices that make buildings more resistant to damage during natural disasters such as hurricanes, fires, and tsunamis. (Includes \$4 million in FY08 request and \$2 million from FY07 "Structural Safety in Hurricanes, Fires, and Earthquakes" initiative.)
- **National Earthquake Hazards Reduction Program Initiative** (requested increase of \$3.25 million) will fund research into technologies for retrofitting or otherwise protecting buildings against earthquake damage. NIST is the lead agency for this interagency initiative. (Combined \$3.25 M new initiative with \$2M increase for similar FY07 initiative.)
- **NIST Center for Neutron Research Expansion and Reliability Improvements: A National Need** (requested increase of \$10 million) will upgrade and expand the NCNR neutron source, which is used for research into superconductors, nanostructured materials, biomaterials, microelectronics, and hydrogen fuel cells. U.S. neutron research facilities are currently oversubscribed.

- **Enabling the Hydrogen Economy** (requested increase of \$10 million) will fund research into fuel-cell design and high-volume manufacturing through development of measurement tools, material characterization, theory, and models allowing real-time diagnostics of hydrogen fuel cell performance, as well as hydrogen transportation and point-of-sale technical requirements.
- **Manufacturing Innovation through Supply Chain Integration** (requested increase of \$2 million) to advance industry towards seamless global supply chains by developing manufacturing standards, measurements, and testing tools.
- **Synchrotron Measurement Science and Technology: Enabling Next Generation Materials Innovation** (requested increase of \$5 million) will fund the creation of a Center for Synchrotron Measurement Science and Technology to provide state-of-the-art measurement tools for characterizing the chemical and structural state of materials and devices through close collaborations with researchers from industry, academia, and other government agencies.
- **International Standards and Innovation: Opening Markets for American Workers and Exporters** (requested increase of \$2 million) will support NIST assuming a more proactive role as a convener, facilitator, and catalyst in ensuring that the necessary underpinnings for product and process standards are in place to support full U.S. participation in global markets.
- **Innovations in Measurement Science** (requested increase of \$4 million) will be used to advance NIST's capabilities in the core measurement science areas underpinning technology innovation.
- **Bioimaging: A 21st-Century Toolbox for Medical Technology** (requested increase of \$4 million) will fund NIST utilizing its expertise in the physical and information sciences to provide the necessary measurements and standards to pave the way for innovative diagnostics, in partnership with the National Institutes of Health (NIH) and the bioimaging industry.
- **Cyber Security: Innovative Technologies for National Security** (requested increase of \$2 million) will fund NIST collaboration with industry and academia to develop metrics and measurement techniques for characterizing known and unknown vulnerabilities of computer systems.
- **Biometrics: Identifying Friend or Foe** (requested increase of \$2 million) will fund NIST to develop measurements and standards to support testing and evaluation of enhanced biometric systems, in partnership with DHS, the FBI, and the State Department.

The FY08 construction and renovation (CRF) request includes two major new projects:

- **Boulder Building 1 Extension** (requesting \$28 million) will begin construction of a new laboratory building on the Boulder campus with high-performance facilities. Total construction is estimated at \$76.2 million with \$28.0 budgeted in FY08.
- **Center for Neutron Research Expansion and Reliability Improvements** (requesting \$31 million) will fund expansion and complete new construction at the neutron research facility on the Gaithersburg campus, which is used to probe the atomic and molecular structure of plastics, biological materials, and thin

magnetic films. As a national user facility, researchers from academia, industry, and government conduct research at the center. (Includes \$19 million in FY08 request and \$12 million from FY07 “NIST Center for Neutron Research Expansion and Reliability Improvements: A National Need”.)

Advanced Technology Program (ATP): The FY08 budget request proposes to eliminate ATP (funded at \$79 million in FY07).

Manufacturing Extension Partnership (MEP) Program: The FY08 request for MEP is \$46.3 million, which represents a 58% cut from the FY07 enacted level of \$104.6 million.

5. Issues

- Does the FY08 budget request set the appropriate priorities to achieve the stated goals of improving U.S. competitiveness?
- What are the criteria used by the Administration in determining the priorities for NIST funding and activities?
- As a part of the American Competitiveness Initiative (ACI), the Administration proposes doubling NIST’s Scientific & Technical Research Services and Construction budgets. What should NIST’s mandate and activities include under this proposed funding scenario?
- Can the Manufacturing Extension Partnership (MEP) program function effectively with the Administration’s proposed budget request of \$46.3 million (56% reduction from H. J. Res. 20). What would be the impact of this funding amount on the level of MEP services provided to small manufacturers and what would be the impact on the small- and medium-sized manufacturing community?
- Given the current focus on developing programs and policies to support an innovation-based economy, should the Advanced Technology Program (ATP) be eliminated as proposed in the Administration’s FY08 budget request?