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FISCAL YEAR 2005 NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY BUDGET: VIEWS FROM INDUSTRY

HEARING

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS

COMMITTEE ON SCIENCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

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CONTENTS

April 28, 2004

	Page
Witness List	2
Hearing Charter	3

Opening Statements

Statement by Representative Vernon J. Ehlers, Chairman, Subcommittee on Environment, Technology, and Standards, Committee on Science, U.S. House of Representatives	9
Written Statement	10
Statement by Representative Mark Udall, Ranking Minority Member, Subcommittee on Environment, Technology, and Standards, Committee on Science, U.S. House of Representatives	11
Written Statement	12
Prepared Statement by Representative Michael Honda, Member, Committee on Science, U.S. House of Representatives	13
Prepared Statement by Representative Lincoln Davis, Member, Subcommittee on Environment, Technology, and Standards, Committee on Science, U.S. House of Representatives	14

Witnesses:

Mr. Daryl G. Hatano, Vice President for Public Policy for the Semiconductor Industry Association	
Oral Statement	15
Written Statement	16
Biography	20
Ms. Deborah L. Grubbe, Corporate Dirrector for Safety and Health, DuPont, Wilmington, Delaware; Member of the NIST Visiting Committee on Advanced Technology	
Oral Statement	20
Written Statement	23
Biography	25
Dr. Thomas A. Cellucci, President, Chief Operating Officer, Zyvex Corporation, Richardson, Texas	
Oral Statement	26
Written Statement	28
Biography	30
Mr. James J. Jasinski, Vice President of Federal and State Systems for Cogent Systems, Pasadena, California	
Oral Statement	31
Written Statement	32
Biography	35
Mr. John Biechman, Vice President for Government Affairs for National Fire Protection Association	
Oral Statement	36
Written Statement	38
Biography	40

Page

Discussion
Impact of National Institutes of Standards and Technology (NIST) Funding on Current and Future Developments Within the Science and Technology Industry 40
Industry Suggestions on NIST Budget Increases 41
Advantage of the Science and Technology Industry Gaining Funding From NIST Versus From Other Federal Agencies 44
Integration of NIST Study Results into Fire and Building Codes 45
The Nature and Significance of the Advanced Technology Program (ATP) of the NIST 47
Will the Establishment of Institutions Similar to NIST in Other Countries Contribute to the Relocation of Industry Activities, Particularly Research and Development, to These Countries? 50

Appendix: Additional Material for the Record

FY 2004 Budget Cut Impacts Summary 52
Statement by the American Chemical Society 59
Statement by the American Society for Quality 60
Statement by the Computing Research Association and the Association for Computing Machinery 61
Statement by the Institute of Electrical and Electronics Engineers, Inc.–United States of America (IEEE–USA) 62
Statement by the Rohm and Haas Company 63
Letter to the House of Representatives by The Alliance for Science & Technology Research in America (ASTRA) 65

FISCAL YEAR 2005 NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY BUDGET: VIEWS FROM INDUSTRY

WEDNESDAY, APRIL 28, 2004

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS,
COMMITTEE ON SCIENCE,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:00 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Vernon J. Ehlers [Chairman of the Subcommittee] presiding.

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

Fiscal Year 2005 NIST Budget Hearing: Views from Industry

Wednesday April 28, 2004

10:00 AM – 12:00 PM
2318 Rayburn House Office Building (WEBCAST)

Witness List

Mr. Daryl Hatano is the Vice President for Public Policy for the Semiconductor Industry Association.

Dr. Thomas Cellucci is the President and Chief Operating Officer at the Zyvex Corporation, a nanotechnology company located in Richardson, Texas. Dr. Cellucci has worked for several technology companies.

Ms. Deborah Grubbe is the Corporate Director for Safety and Health at DuPont, headquartered in Wilmington, Delaware. Ms. Grubbe is also a member of the NIST Visiting Committee on Advanced Technology (VCAT), an advisory committee established by National Institute of Standards and Technology Act.

Mr. James Jasinski is the Vice President of Federal and State Systems for Cogent Systems, a biometrics company headquartered in Pasadena, California. Cogent Systems has worked with NIST on the development of biometrics for the United States Visitor and Immigrant Status Indicator Technology (U.S.-VISIT) program.

Mr. John Biechman is the Vice President for Government Affairs for National Fire Protection Association (NFPA). NFPA works with NIST on standards for equipment for firefighters and first responders.

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HEARING CHARTER

SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS

COMMITTEE ON SCIENCE

U.S. HOUSE OF REPRESENTATIVES

Fiscal Year 2005 National Institute of Standards and Technology Budget: Views From Industry

WEDNESDAY, APRIL 28, 2004
10:00 A.M.—12:00 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

Purpose

On Wednesday, April 28, 2004, the House Science Subcommittee on Environment, Technology, and Standards will hold a hearing to examine the role of the National Institute of Standards and Technology's (NIST) laboratories in serving industry and whether the funding for the NIST laboratories is adequate to support the measurement and standards needs of the U.S. economy. The hearing will also review how the NIST Fiscal Year (FY) 2005 budget request for its laboratory research programs will help support industry, homeland security, and its mission in measurement technology and standards development.

Witnesses:

Mr. Daryl Hatano is the Vice President for Public Policy for the Semiconductor Industry Association.

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The Subcommittee plans to explore the following questions:

1. What specific services do NIST's laboratories provide to U.S. industries? Are there other sources of these services?
2. Is NIST's FY05 budget request keeping pace with its basic mission, as well as its additional responsibilities in such areas as homeland security, voting standards, cyber security, and nanotechnology?
3. What are the impacts of the FY04 appropriation on NIST's ability to meet its mission requirements? What will be the long-term implications for NIST and for U.S. technological and economic competitiveness if future funding is not increased?
4. What technological opportunities are not being fully exploited because of NIST's current level of funding?

Background

The law creating the National Institute of Standards and Technology (NIST, then named the National Bureau of Standards) was signed March 3, 1901. NIST has two laboratory campuses, one in Gaithersburg, MD, and the other in Boulder, CO, and a joint institute with the University of Colorado at Boulder, the Joint Institute for Laboratory Astrophysics (JILA). NIST scientists have won two Nobel prizes since 1997.

The NIST laboratory programs are organized into eight laboratories that conduct research in a wide variety of physical and engineering sciences. The labs respond to industry needs for measurement methods, tools, data, and technology. NIST helps to produce and support voluntary standards for industrial applications. NIST researchers collaborate with colleagues in industry, academia, and other government agencies. The eight NIST laboratories are:

- Building and Fire Research Laboratory
- Chemical Sciences and Technology Laboratory
- Electronics and Electrical Engineering Laboratory
- Information Technology Laboratory
- Manufacturing Engineering Laboratory
- Materials Science and Engineering Laboratory
- Physics Laboratory
- Technology Services Laboratory.

In addition, NIST houses three major facilities that play a critical role in measurement and standards research, as well as supporting technology development for future industries. These are the Atomic Clock, the Neutron Spallation Source, and the Advanced Measurements Laboratory (AML), which is scheduled to open later this year. The construction of the AML was funded through the NIST Construction account. The total cost of the AML was $235 million.

NIST is also the home of the Advanced Technology Program (ATP) which funds joint R&D projects with industry; the Manufacturing Extension Partnership (MEP) program, which provides technical assistance to small and medium-sized manufacturers; and the Baldrige National Quality Program (BNPQ) which assists companies and other organizations with quality management.

The NIST laboratories are funded out of the Science, Technology, and Research Services (STRS) account in the NIST budget and received $338 million in FY04. The NIST labs also receive some funds (about $40 million) from the ATP to work on specific projects. Federal agencies provide NIST with roughly an additional $100 million in return for NIST technical assistance, spread among a range of projects on a reimbursable basis. The NIST labs also receive approximately $60 million a year from various companies in return for fee-for-service work and use of NIST's scientific resources.

Recent Events and Issues

The FY04 Appropriation Cut Funding for NIST's Laboratories.

The FY04 appropriation for NIST's lab account was $338.6 million, a cut of 5.2 percent ($20 million) from the FY03 appropriation. This appropriation was also $49 million below the President's request. Attached is a detailed account, provided by NIST, of how the impacts of the FY04 budget would be absorbed by its laboratories, and the resulting cuts to laboratory programs. A few examples are:

- The elimination of the Information Technology Laboratory's (ITL) Computer Security Expert Assistance Team (CSEAT) which would have provided federal agencies with hands-on guidance on remediating cyber security vulnerabilities.
- A substantial reduction in the availability of the NIST Center for Neutron Research to internal and external scientists who study the structure and function of advanced materials.
- The elimination of NIST's contribution to the UNICAT X-ray facility at Argonne National Laboratory, which may result in the breakup of the UNICAT consortium.
- Layoffs of up to 100 scientists at NIST.

The cuts in the FY04 appropriation are even greater than they appear. First, $21.5 million is earmarked for congressionally mandated projects. Second, NIST did not receive the $9 million it needed to cover federally mandated pay increases and inflationary increases in the costs of doing research. These increases are calculated

each year as "Adjustments to Base" or "ATBs" and usually included in the Administration's budget request. Since 1998, the cumulative shortfall in appropriated ATBs has amounted to nearly $42 million. These shortfalls must be absorbed by NIST programs, including the laboratories.

The FY05 President's Budget Request, If Funded, Would Help Restore This Cut.

The Administration's FY05 budget request includes $422 million for the core NIST laboratory functions—an increase of about $84 million, or almost 25 percent. This would restore the steep funding cuts that NIST's base programs sustained in FY04.

The proposed request must cover the cost-of-living increase for federal employees, the one-time costs associated with purchasing equipment for the new Advanced Measurement Laboratory (AML), the loss of internal NIST funding from the proposed elimination of the Advanced Technology Program (ATP), and the costs of laying off employees who worked on ATP. The entire remainder of the proposed increase would be needed to restore the cuts made to NIST's base programs in FY04.

Research of Particular Interest to Congress

NIST Supports Standards for Biometrics

Biometrics is a term used to describe the automated methods of recognizing a person based on physiological or behavioral characteristics. Among the features measured are: faces, fingerprints, hand geometry, handwriting, irises, retinas, veins, and voices. Achieving sufficient accuracy and reliability in biometric technology has been a challenge, but NIST has been working with industry to develop standards to meet these challenges. NIST has more than 10 years of experience in biometrics, including work on the rapid and accurate transmission of biometric data to facilitate cooperation between local, State, and federal law enforcement agencies. NIST is also carrying out mandatory work under the USA–PATRIOT Act (P.L. 107–56) to develop and certify technology standards to verify the identities of visa applicants and other persons seeking to enter the U.S., and is currently running tests using face and fingerprint data, with future tests planned for iris scanning devices.

NIST currently has no funding of its own for biometrics, but gets about $5 million in other agency funding. The FY05 request for NIST includes $1 million to enhance NIST's biometrics work including investigations of how to use "multi-modal" biometrics (techniques that combine two or more measurements simultaneously, e.g., fingerprint and iris scan).

NIST Helps Develop Standards for Equipment for First Responders

For the Department of Homeland Security (DHS), NIST is facilitating the development of a suite of national standards that establish minimum performance requirements for respirators and other essential equipment designed to protect first responders against chemical, biological, radiological, nuclear and explosive (CBRNE) hazards. Announced on February 26, 2004, the first of these DHS standards—three for respiratory equipment and five for protective clothing—incorporate expertise and technical contributions from private-sector standards organizations and federal agencies. This kind of work helps reduce complexity for pubic safety organizations and procurement officials, ensuring consistency by linking and cross-referencing corresponding performance specifications. These standards incorporate work by the National Fire Protection Association (NFPA) and the National Institute of Occupational Health and Safety (NIOSH).

The FY05 request includes $7.5 million to develop improved CBRNE measurements and guidance to detect and disable these threats. This work will help instrument manufacturers, analysis laboratories, and government agencies determine instrument accuracy and sensitivity.

NIST Reviews the Performance of Fire, Smoke, and Other Detection Systems

NIST is involved in many aspects of technology and testing to support the mission of firefighters and other first responders. Much of this is done through the Building and Fire Research Laboratory, although other NIST labs also contribute. For example, NIST recently completed a two-year, comprehensive survey of smoke detector performance, the first such review in 25 years. NIST found that ionization smoke detectors work more quickly for flaming fires than do photoelectric alarms. Photoelectric alarms, on the other hand, often provide faster response time to smoldering fires. The tests also showed that the typical contents of a home burned hotter and faster than 25 years ago, giving occupants less time to escape a burning building safely. This study was partly sponsored by the NFPA, the U.S. Fire Administration, and the Consumer Product Safety Commission. Because of budget cuts, however,

NIST will have to delay a similar evaluation of explosive and flammable vapor detectors, and will have to cut the national fire grants programs again.

Nanotechnology Development Needs NIST Expertise and Facilities

Cutting-edge nanoscale manufacturing, particularly in electronics, is rapidly approaching the boundaries of what is measurable and thus what can be built. NIST is pushing those boundaries by developing new ways to measure increasingly small things. NIST is also working on new ways to fabricate materials at the nanoscale with increasing precision and consistency. The FY04 appropriation cut funding for the Electronics and Electrical Engineering Laboratory, the Materials Science and Engineering Laboratory, and delayed work at the Manufacturing Engineering Laboratory in this field. All three of these labs have critical contributions to make to the development and support of a nanotechnology industry.

The FY05 request, however, includes a $12 million increase for nanotechnology work by these three labs, plus a one-time, $25 million sum for the purchase of the equipment that will establish the new Advanced Measurements Laboratory (AML) as a world-class facility.

NIST Supports Standards for the Chemical Industry

NIST's Chemical Science and Technology Laboratory (CSTL) is the primary reference laboratory for chemical measurements in the U.S. Its calibration services and library of standard reference materials are a resource to which all chemistry-related measurements can be traced and verified. This provides the fundamental basis for scientific certainty, consistency, and accuracy in the chemical industry, academia, and government research. Reference materials and calibrations provide traceability to the International System of Units (SI), which is essential to fair trade. CSTL maintains and develops standards for chemical processes, maintaining the U.S. standard for temperature, humidity, pressure and vacuum, fluid flow, air speed, liquid density and volume, all things that govern industrial production technologies. CSTL's scientists support existing and develop new reference methods and standards for clinical diagnosis and other medical applications, ensuring the quality of health care and pharmaceuticals in the U.S.

As a result of the FY04 appropriation and staff reductions, CSTL has had to delay work related to the natural gas and refrigerant industries, and severely reduce its programs in computational biology and bioinformatics, both areas identified as having strong potential for economic growth and the production of new and more precise methods of drug development. The FY05 request includes $1.6 million for standards for such diagnostics technologies as portable test kits for infectious diseases, glucose, and cholesterol monitoring. NIST will also conduct tissue engineering-related materials chemistry research for implants that do not provoke rejection.

Cyber Security

NIST runs a variety of cyber security-related projects, but the FY04 appropriation cut the Information Technology Laboratory by more than $3 million, causing a reduction in these efforts. NIST's Computer Security Expert Assistance Team (CSEAT) program, which was supposed to provide federal agencies with hands-on expert guidance to remediate security vulnerabilities, is being eliminated. The recently enacted Federal Information Security Management Act (FISMA) mandated the development of checklists and guidelines for the procurement of commercial off-the-shelf (COTS) security technologies. This work will also be delayed.

The FY05 request includes a $6 million increase for Computer Science and Applied Mathematics for the delayed cyber security activities, as well as the development of wireless security and cryptographic standards for small, mobile devices such as BlackBerries and cellular phones.

Other Federal Agencies Rely on NIST

NIST does work for other federal agencies, but the money for these projects varies from year to year. Funding from federal sources increased from $70 million in FY 1998 to about $115 million in FY 2003, as agencies came increasingly to rely upon NIST scientists. Funding in FY04 decreased slightly to about $110 million.

The reduction in NIST's base funding may impair its future ability to provide expert assistance to federal agencies. This is already the case with cyber security (see above). NIST has also had to delay its involvement in the development of armor, structural, and projectile applications for the Department of Defense by the Materials Science and Engineering Lab. NIST is trying to manage the RIF process by allowing some of its most senior scientists to take early retirement. Although this will reduce the number of involuntary lay-offs, it means these individuals will not be there when agencies come to NIST seeking their advice.

Other NIST Budget Issues

The Manufacturing Extension Partnership (MEP) Program Has Been Cut

The MEP program is a network of 400 centers and satellite offices, often partnered with universities and community colleges, offering technical assistance to small and medium-sized manufacturers. MEP helps businesses become more efficient and develop new capabilities, making them competitive in the increasingly global economy. The MEP centers are funded on a cost-shared basis with NIST providing one-third of the funds. States and fees charged to the manufacturers, make up the remainder, so every federal dollar leverages approximately two dollars from other sources. The FY04 appropriation for MEP cut the program by more than 60 percent, from $106 million to $39 million. As a result, more than half of the MEP centers and offices may have to close. The Administration is seeking additional funds within existing budgets that could be used to support MEP centers, and recently announced that the Economic Development Agency (EDA) would open its grants to MEP centers. Only about $5 million remains this fiscal year, but $45 million is expected to be available in FY05, although MEP centers would have to go through a competitive application process to secure these funds.

The FY05 request maintains funding at the reduced level of $39 million, maintaining the impact of the cut. MEP offices have already had to lay off staff and reduce services because of the FY04 cut.

Advanced Technology Program (ATP)

Congress established ATP in 1988 to restore and enhance the competitiveness of the U.S. economy. It is a competitive grant program that funds cost-shared technology development projects with companies to advance promising technologies to bridge the gap between the research laboratory and the marketplace. ATP seeks to develop pre-competitive, emerging, and high-risk technologies that promise significant commercial payoffs and widespread benefits. ATP is designed to support technical research, not product development. The FY04 appropriation funded ATP at $179 million, but the Administration request for FY05 eliminates the program entirely.

Voting Technology Standards Have Not Been Funded

The FY04 appropriation and FY05 request did not include money for voting standards, a critical part of the Help America Vote Act (HAVA). The development of new voluntary standards was intended to increase the reliability of new voting equipment that States are required to buy under HAVA. NIST's Information Technology Lab was cut by $3 million in FY04, which meant that NIST could not even continue the work it had already started in voting standards development in FY03. The Science Committee has worked with NIST to shift $350,000 in internal money for FY04 to allow some continuity in this project, and provide some technical assistance to the newly-created Election Assistance Commission. However, $1.8 million is needed if a comprehensive standards development process for voting technology is to begin in FY05.

World Trade Center Investigation

NIST is in the process of completing its technical investigation of the collapse of the World Trade Center, and the Station Nightclub fire in West Warwick, Rhode Island. Under the National Construction Safety Team (NCST) Act, NIST is responsible for conducting investigations of events causing building failures that result in substantial loss of life or pose the potential for substantial loss of life. The NIST investigations will establish the likely technical causes of the building failure and evaluate the technical aspects of emergency response and evacuation procedures in the wake of such failures. The goal is to recommend improvements to the way in which buildings are designed, constructed, maintained and used. NIST received $4 million in the FY04 appropriation, which is expected to be sufficient to complete the investigation this year.

Witness Questions

In their letters of invitation, all the witnesses were asked to respond to the following questions:

1) Describe how your company or organization has worked with NIST and how NIST's work has assisted your company or organization.
2) Are NIST research and services available elsewhere and to what extent would you use these if NIST were unable to provide them? Are there limitations or drawbacks to using these alternatives?

3) How have or how will the reductions in NIST's funding affected its ability to support your company or organization? How would the proposed Fiscal Year 2005 increases help?
4) If NIST had more resources and staff available on a consistent basis, what kinds of new work would you want NIST to do in the future?

Chairman EHLERS. I am pleased to call to order the hearing entitled "The Fiscal Year 2005 National Institute of Standards and Technology Budget: Views From Industry."

We are here today to talk about one of the Nation's least known, but most critical, science programs, the National Institute of Standards and Technology, known as NIST but previously known as the Bureau, back in the good old days, which is within the Department of Commerce. NIST ensures that the technology and standards we use every day are of high quality and are reliable. The work of NIST scientists impacts almost every citizen of this country, as experts at NIST have studied, measured, or improved services and products including cars, mobile phones, roads, furniture, CD players, shoes, houses, fire prevention, drinking water, and air quality.

The vital standards and measurements provided by NIST are usually behind-the-scenes support that goes unnoticed by everyday consumers. For example, when you make a call on your cell phone, it works only because NIST developed and maintains the standards and measurements for the chips and circuits inside the phone and because NIST helped developed the standards that allow different service providers the different types of phones to communicate with one another.

However, NIST is becoming even more important to the future of our industries, their competitiveness, and our national security. NIST's scientists are on the forefront of nanotechnology and cybersecurity research, standards and measurements for homeland security devices, and equipment for first responders, and are developing standards for new electronic voting machines, just to name a few.

Most unfortunately, at a time when we are relying more and more on NIST, Congress cut last year's appropriation for the NIST laboratory account by 14 percent, or $49 million below the Administration's request and five percent below the funding level that NIST received in 2003. This reduction, coupled with costs of mandatory pay raises for its employees and regular inflation over the past several years, has gone beyond cutting the fat and muscle and has really carved into the bone.

The problem is that NIST consists primarily of its people and its scientists. With as many as 100 scientists being forced to take early retirement, buyouts, or lay-offs because of the funding cuts, we lose valuable experience and expertise that can not be replaced. I might add that NIST currently has two Nobel Prize-winning scientists and another who has won the MacArthur Fellowship, also known as the "genius grant." I bet her mother is proud of that one. The point is, we can not afford to lose this world-class talent and service to our nation.

The Administration has requested an increase of 25 percent, or $84 million, for NIST's budget. This request, if funded, will go a long way toward restoring the cuts of fiscal year 2004, and I support this effort 100 percent.

Our distinguished panel of witnesses is here today to provide specific examples of the role of NIST in their respective industries and work. The goal of the hearing is to further inform Members of Congress, especially the Appropriators and their staffs, about NIST

and the critical need to fund its fiscal year 2005 budget request, as submitted by the President.

Toward this end, I am pleased to note that a letter supporting NIST's budget request was signed by a group of more than 100 businesses, organizations, and academics. That represents a tremendous effort, and I ask unanimous consent that this letter be included in the record. Without objection, so ordered. *(See Appendix: Additional Material for the Record.)*

Chairman EHLERS. I look forward to hearing the testimony of our witnesses today as they discuss the vital services that NIST provides to the Nation.

[The prepared statement of Mr. Ehlers follows:]

PREPARED STATEMENT OF CHAIRMAN VERNON J. EHLERS

Good morning. Welcome to today's hearing on the *Fiscal Year 2005 National Institute of Standards and Technology Budget: Views from Industry.*

We are here today to talk about one of the Nation's least known but most critical science programs, the National Institute of Standards and Technology (NIST), which is within the Department of Commerce. NIST ensures that the technology and standards we use every day are of high quality and are reliable. The work of NIST scientists impacts almost every citizen of this country, as experts at NIST have studied, measured, or improved services and products including cars, mobile phones, roads, furniture, CD players, shoes, houses, fire prevention, drinking water, and air quality.

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Our distinguished panel of witnesses is here today to provide specific examples of the role of NIST in their respective industries and work. The goal of the hearing is to further inform Members of Congress, especially the Appropriators and their staffs, about NIST and the critical need to fund its Fiscal Year 2005 budget request as submitted by the President.

Toward this end, I am pleased to note that a letter supporting NIST's budget request was signed by a group of more than 100 businesses, organizations and academics. That represents a tremendous effort, and I ask unanimous consent that this letter be included in the record.

I look forward to hearing the testimony of our witnesses today as they discuss the vital services that NIST provides to the Nation.

Chairman EHLERS. I am pleased now to recognize the late Mark Udall, the gentleman from Colorado, Ranking Member of this committee. And the Chair now recognizes him for purposes of making a statement.

Mr. UDALL. I thank the Chairman, as long as the record reflects that late means I am late in a temporal sense, not late in my presence here on the planet.

I do want to take the opportunity to thank the panel and welcoming them here for this morning's hearing. Chairman Ehlers has already outlined NIST's importance to the Nation's economy and industrial base. I would also like to remind everyone that NIST's standards and measurement activities are at the cutting edge of research. On a modest research budget during the past 10 years, NIST's researchers have been awarded two Nobel Prizes and a MacArthur Foundation grant. I don't know of any federal agency that can match this impressive track record.

I would like to move on to the issue of NIST lab funding. This committee is well aware of the importance of NIST to commerce and competitiveness. This panel of witnesses highlights the support NIST has among industry, but NIST is not well known in Congress, nor is its importance to our economy well understood. As a result, NIST has been an easy target for cuts in tight budget times. Cuts made in the fiscal year 2004 omnibus appropriations bill were especially devastating.

The Committee has worked to get outside groups to express their support for NIST, and it has been successful. Two recent letters not only express support for NIST's programs, but also advocate substantive increases for its budget as well. I continue to be concerned that the Committee has taken no official position on NIST funding. The Committee has not moved a comprehensive authorization bill. We have fallen into the habit of authorizing NIST activities by subject with little follow up on whether NIST has the money to fulfill its new obligations.

In the 107th and 108th Congresses, we have passed nine laws that significantly add to NIST's mission. They are the Help America Vote Act, the National Construction Safety Team Act, the Enterprise Integration Act, the Patriot Act, the Enhanced Border Security and Visa Entry Reform Act, the Federal Information Security Management Act, the Pipeline Safety Improvement Act, the Cybersecurity Research and Development Act, and the Nanotechnology Research and Development Act. Generally, these bills authorize no additional funds for these new activities, or when there is authorization, no funds have been appropriated. In fiscal year 2005, four of these bills authorize more than $100 million in funding: it was not reflected in the fiscal year 2005 budget request.

The main reason for today's hearing is to raise the visibility importance of NIST in Congress. NIST's problems have frequently been attributed to the appropriations process, but I have to tell you I don't believe this is entirely true. Our committee, and I share the responsibility with all of the Members of the Committee, has not done all that it could do to ensure that NIST has the funds to meet the obligations that this committee has set forth. We need to take our responsibility as an authorizing committee seriously and move authorizing legislation that sets out spending limits and priorities

for NIST. Unless this committee takes a more active legislative role, I fear that NIST is likely to suffer from the same processes that resulted in severe budget cuts and termination of NIST employees in fiscal year 2004.

Reading through the testimony of today's witnesses only reinforces my belief that NIST is underfunded, so what I hope to learn today is what is the appropriate level of funding for NIST and what should NIST be doing to support industry but can't because of budget limitations.

So again, let me thank the witnesses for taking the time to appear before the Subcommittee today. Your appearance speaks to the importance that you and the organizations you represent place on NIST. I hope that the Science Committee will follow your example. Welcome, and I look forward to your testimony.

[The prepared statement of Mr. Udall follows:]

PREPARED STATEMENT OF REPRESENTATIVE MARK UDALL

I want to welcome everyone to this morning's hearing.

Chairman Ehlers has already outlined NIST's importance to the Nation's economy and industrial base. I would also like to remind everyone that NIST's standards and measurement activities are at the cutting edge of research. On a modest research budget, during the past ten years NIST researchers have been awarded two Nobel Prizes and a MacArthur Foundation Grant. I don't know of any federal agency that can match this impressive track record.

I'd like to move on to the issue of NIST lab funding. This committee is well aware of the importance of NIST to commerce and competitiveness. This panel of witnesses highlights the support NIST has among industry.

But NIST is not well-known in Congress, nor is its importance to our economy well understood. As a result, NIST has been an easy target for cuts in tight budget times. Cuts made in the FY04 Omnibus appropriations bill were especially devastating.

The Committee has worked to get outside groups to express their support for NIST, and it has been successful. Two recent letters not only express support for NIST programs, but also advocate substantive increases for its budget as well.

I continue to be concerned that the Committee has taken no official position on NIST funding. The Committee has not moved a comprehensive authorization bill. We have fallen into the habit of authorizing NIST activities by subject—with little follow-up on whether NIST has the money to fulfill its new obligations. In the 107th and 108th Congresses, we have passed nine laws that significantly add to NIST's mission.

They are:

the Help America Vote Act;
the National Safety Team Construction Act;
the Enterprise Integration Act;
the Patriot Act;
the Enhanced Border Security and Visa Entry Reform Act;
the Federal Information Security Management Act;
the Pipeline Safety Improvement Act;
the Cyber Security Research and Development Act; and
the Nanotechnology Research and Development Act.

Generally, these bills authorize no additional funds for these new activities, or when there is authorization, no funds have been appropriated. In FY05, four of these bills authorize more than $100 million in funding that was not reflected in the FY05 budget request.

The main reason for today's hearing is to raise the visibility and importance of NIST in Congress. NIST's problems have frequently been attributed to the appropriations process—but I don't believe this is entirely true.

The Science Committee has not done all that it could do to ensure that NIST has the funds to meet the obligations that this committee has set for it. We need to take our responsibility as an authorizing committee seriously and move authorization

legislation that sets out spending limits and priorities for NIST. Unless this committee takes a more active legislative role, NIST is likely to suffer from the same process that resulted in severe budget cuts and termination of NIST employees in FY04.

Reading through the testimony of today's witnesses only reinforces my belief that NIST is woefully under-funded. So what I hope to learn today is—

What is an appropriate level of funding for NIST?; and

What should NIST be doing to support industry, but can't because of budget limitations?

I want to thank our witnesses for taking the time to appear before the Subcommittee today. Your appearance here speaks to the importance that you and the organizations you represent place on NIST. I hope the Science Committee will follow your example.

Chairman EHLERS. Thank you, Mr. Udall. And I should also mention that Mr. Udall has the pleasure of representing Boulder, among other places. Boulder is, of course, home to a very important part of NIST's laboratory research activities. It is also a wonderful place to live.

If there is no objection, all additional opening statements submitted by the Subcommittee Members will be added to the record. Without objection, so ordered.

[The prepared statement of Mr. Honda follows:]

PREPARED STATEMENT OF REPRESENTATIVE MICHAEL HONDA

I thank Chairman Ehlers and Ranking Member Udall for holding this important hearing, and I thank the witnesses for taking the time to come here today to express the importance of the National Institute of Standards and Technology's (NIST) laboratories to our nation and need for adequate funding to support the measurement and standards needs of the U.S. economy.

NIST's laboratories conduct research in a wide range of physical and engineering sciences, including building and fire research, chemical sciences and technology, electronics and electrical engineering, information technology, manufacturing engineering, and materials science and engineering. The labs are among the only federally supported resources able to respond to pressing industry needs for measurement methods, tools, data, and technology.

NIST is also the home to several extramural programs involving the private sector. The Advanced Technology Program (ATP) funds research and development projects with industry, and the Manufacturing Extension Partnership (MEP) program provides technical assistance necessary to keep small and medium-sized manufacturers on the cutting edge.

Unfortunately, funding levels have been insufficient to support NIST's missions. Fiscal Year (FY) 2004 budget cuts of 5.2 percent from FY03 mean missed cost savings to industry and reduced industrial competitiveness, staff reductions, missed improvements in homeland security and public safety, missed benefits to public health, and missed developments and improvements in basic science. NIST has had to eliminate the Information Technology Laboratory's Computer Security Expert Assistance Team, which deals with cyber security, and the funding levels were reduced for three NIST laboratories that have critical contributions to make to the development and support of a nanotechnology industry in the United States. Increased funding for NIST could enable the completion of delayed cyber security activities as well as the development of wireless security and cryptographic standards for mobile devices. Support for nanotechnology work by NIST labs could be increased, and equipment purchased that will establish the Advanced Measurements Laboratory as a world-class facility.

Funding cuts and policy changes have also greatly impacted extramural programs. The FY04 appropriation for MEP cut the program by more than 60 percent, which means that more than half of the MEP centers may have to close, and the FY05 budget request maintains funding at the reduced level. And the FY05 budget request eliminates entirely the Advanced Technology Program, which seeks to help companies advance promising technologies by bridging the gap between the research laboratory and the marketplace.

As U.S. manufacturing jobs move overseas, it is more important than ever for us to invest in the infrastructure here at home to support these activities. NIST, which

supports companies in so many different ways, is the perfect place to make that investment, and I believe that Congress and the President should do all we can to ensure a healthy NIST budget now and in the future.

[The prepared statement of Mr. Davis follows:]

PREPARED STATEMENT OF REPRESENTATIVE LINCOLN DAVIS

Good morning, all. Thank you, Mr. Chairman and Ranking Member, for the opportunity for us to discuss the National Institute of Technology and Standards this morning.

Industry works with NIST in several ways. Of particular importance to my district is the Manufacturing Extension Program. Small manufacturers wishing to modernize improve productivity, and increase efficiency can seek assistance through NIST's nationwide Manufacturing Extension Partnership program.

In Tennessee, NIST has an MEP Partnership serving firms throughout Tennessee through five regional offices. Rural manufacturers depend on assistance through these and other programs for support. MEP centers are located in every state to offer local manufacturers assistance with a variety of technical and business problems.

We should do all that we can to support the MEP and other programs like it. Mr. Chairman and Ranking Member, and distinguished witnesses and guests, I thank you for this opportunity today.

Chairman EHLERS. At this time, I would like to introduce our witnesses, but before I do so, I would also like to introduce a distinguished member of the audience, Mr. Arden Bement, who currently is wearing two hats, one on each head, as he guides both NIST and the National Science Foundation, either one is a very daunting job, and he is handling both well. We are pleased to have you step away from your NSF duties and come here for this hearing, Mr. Bement.

The witnesses—I will go in order here. First is Mr. Daryl Hatano. He is the Vice President for Public Policy for the Semiconductor Industry Association, which in my lifetime, semiconductors have gone from curiosities to a very, very important industry. Next, we have Ms. Deborah Grubbe. She is the Corporate Director for Safety and Health at DuPont, headquartered in Wilmington, Delaware. Ms. Grubbe is also a member of the NIST Visiting Committee on Advanced Technology, better known by its acronym VCAT, an advisory committee established by National Institute of Standards and Technology Act. Next, we have Dr. Thomas Cellucci, who is the President and Chief Operating Officer at the Zyvex Corporation, a nanotechnology company located in Richardson, Texas. Dr. Cellucci has worked for several technology companies. Next, we are pleased to have Mr. James Jasinski, who is Vice President of Federal and State Systems for Cogent Systems, a biometrics company headquartered in South Pasadena, California. Cogent Systems has worked with NIST on the development of biometrics for the United States Visitor and Immigrant Status Indicator Technology, also known by its acronym, U.S.–VISIT, program. And finally, Mr. John Biechman, who is the Vice President for Government Affairs for National Fire Protection Association, better known by its acronym, NFPA. NFPA works with NIST on standards for equipment for firefighters and first responders, and many people are surprised to find out that NIST plays such an important role in fire prevention and the study of fires, but actually, they owe part of their existence to the problem when Baltimore nearly burned down because fire departments coming from all over the country to help with the major fire couldn't fit their hoses onto the hydrants

in Baltimore, because we didn't have a standard for fire hydrants in this country. And that was a dramatic illustration of the importance of standards and of NIST. Perhaps we need another barn-burning fire to awaken the public as to the importance of NIST today.

As our witnesses should know, I believe you have been informed, spoken testimony is limited to five minutes each, after which the Members of the Committee will have five minutes each to pose questions. I would appreciate it if you could summarize your statements in five minutes, and I am certain during the rest of the session, you will have opportunity to amplify your statements, if you wish.

We will start with Mr. Hatano and hear his testimony first.

STATEMENT OF MR. DARYL G. HATANO, VICE PRESIDENT FOR PUBLIC POLICY FOR THE SEMICONDUCTOR INDUSTRY ASSOCIATION

Mr. HATANO. Thank you, Mr. Chairman.

Good morning. My name is Daryl Hatano, and I am Vice President for Public Policy for the Semiconductor Industry Association. I would like to begin by thanking the Science Committee and this subcommittee for your work to promote research in this country. In particular, I would like to thank Chairman Boehlert and Representative Eddie Bernice Johnson for their leadership in circulating a letter supporting the Semiconductor Focus Center Research program, as well as the Members of this committee who have agreed to sign this letter this Friday as it circulates. Under the focus center program, the industry matches Defense Department funds for semiconductor research at 30 universities across this country. This program complements the NIST work that I will be discussing today.

As you know, semiconductors are the enabling technology behind the Information Age. The industry's ability to continually manufacture chips that are better, faster, and cheaper is driving productivity and creating jobs throughout our economy. Propelling the ever-expanding role of semiconductors in our economy is the ever-shrinking transistor. The transistor is the basic building block within the semiconductor chip. For over three decades, the industry has followed Moore's Law, which states that we can double the number of transistors on each chip every 18 months. A decade ago, we were able to integrate thousands of transistors on each chip, and today, we can integrate millions, if not billions, of transistors on a single silicon chip.

Semiconductors are the most complex structures manufactured on this planet. If we were to get a semiconductor chip and magnify it to be the size of this hearing room, each circuit on that chip would be about the size of a period on the written statement in front of you. We are integrating millions of these transistors in each chip, and we are producing millions of chips, resulting in a phenomenal number of transistors that we are producing worldwide.

One way to demonstrate the number of transistors that we are producing worldwide is to tell you that in the time that this coin

is in the air, we just produced 60 billion transistors around the world. That is a lot of computing power.

To continue to pack more transistors on each chip, industry experts around the world have published the International Technology Roadmap for Semiconductors. This roadmap identifies the technical barriers that are confronting us for the next 10 to 15 years, at which time we will have reached the physical limits of our current semiconductor chip making technology. I might add that the first meeting of this roadmap process was at the Boulder NIST facility. This roadmap also explores emerging devices that will replace our current chips when we reach those physical limits.

One important set of technical challenges is in the area of metrology. There are dozens of types of measurements required to manufacture a semiconductor chip. These measurements are not only the obvious one of length, or nanometers, but also include measurements such as a material's electrical characteristics, the ratio of the height to the width in a trench, the nanotrenches that we etch onto semiconductor circuits, and the size of defective pores that are hidden within thin layers of materials.

NIST is the leader in chip metrology research, having made a number of contributions in recent years. Two examples of excellent NIST research relate to the measurement of the roughness of the edge of the lines that we etch on semiconductor circuits and the distortion of images that are created when light passes through Calcium Fluoride. Both of these are key issues in our industry, and are described further in my written testimony.

The problem is that NIST's budget has not kept pace with today's needs. Three indications of the shortfall are: first, NIST's spending on semiconductor research has only increased 15 percent in the last decade, while the semiconductor industry's total investment in R&D has increased 145 percent; second, a detailed analysis of our roadmap estimated that over $100 million was needed to meet the roadmap challenges, while the total worldwide research fell well short of what was required; three, NIST's lithography equipment can etch patterns with feature sizes of only one micron, while the current industry standard is about 1/8 of that length, and it continues to shrink.

The SIA supports the Administration proposal for increased spending at the NIST laboratories, and specifically $25 million to equip the AML and $16 million for advances in manufacturing, including $4 million for semiconductor nanometrology. We would also encourage that these budget increases should complement increased NSF and Defense spending for university research. Finally, this committee might consider adding language related to NIST similar to the language in last year's House Appropriations Report for NSF, which encouraged the NSF to increase research aimed at the challenges outlined in the semiconductor roadmap.

Thank you.

[The prepared statement of Mr. Hatano follows:]

PREPARED STATEMENT OF DARYL G. HATANO

Good afternoon, my name is Daryl Hatano and I am Vice President for Public Policy for the Semiconductor Industry Association. This morning I would like to

- describe the U.S. semiconductor industry and the technical challenges it faces; and
- highlight the importance of NIST metrology research to insure that the industry can continue to drive American economic growth.

The Exponential Increase in Transistors Drives Economic Growth

The semiconductor industry employs 226,000 people across the U.S. and contributes $41 billion to U.S. GDP. However the industry's real impact is due to its role in creating the enabling technology behind computers, telecommunications, consumer electronics, and the Internet. The industry's ability to continually manufacture chips that are better, faster, and cheaper is driving increased productivity and creating more jobs throughout the economy.

Propelling the ever expanding role of semiconductor's in our economy is the ever shrinking transistor. The transistor is the basic building block within the semiconductor chip. For over three decades the industry has followed Moore's Law, which states that the number of transistors on a chip will double every eighteen months. A decade ago, we were able to integrate thousands of transistors on each silicon chip. Today we can integrate millions of transistors on each chip.

Cramming millions of transistors on each chip makes semiconductors the most complex structures manufactured today. To get an idea of how precisely the features on each chip are placed, image drawing a map of New York City that is so accurate that you can identify features on each street that are only 1.5 inches long—and this map is only the size of a postage stamp.

By integrating millions of transistors on each chip, and by producing those chips by the millions, we estimate that today about 30 billion transistors are produced worldwide every second.

The International Roadmap for Semiconductors sets a Timetable for Technology Advances

To continue to pack more transistors on each chip, over 800 hundred of chip experts around the world contribute to "The International Technology Roadmap for Semiconductors" (ITRS). The North American participation of the ITRS is under the auspices of the SIA, and NIST participates in the ITRS metrology workshops—in fact one of the first meetings of what is now the ITRS was held at NIST's Boulder, Colorado facility.

The ITRS identifies the milestones that will need to be reached in all aspects of semiconductor manufacturing for technology trends such as Moore's law to continue. For example, microprocessor transistor gate lengths—a critical dimension that affects the processor's speed—must decrease from 37 nanometers in 2004 to 18 nanometers in 2010 and 7 nanometers in 2018 if microprocessors are to continue to increase in speed. (Note: a nanometer is one-billionth of a meter. A human hair is 100,000 nanometers in width, and a red blood cell is 5,000 nanometers in width.) If these and other milestones identified in the ITRS are reached, microprocessors would be three times faster.

The ITRS also finds that we are beginning to reach the fundamental limits of the materials used in the planar CMOS process, the process that has been the basis for the semiconductor industry for the past 30 years. By introducing new materials into the basic CMOS structure and devising new CMOS structures, further improvements in the CMOS process can continue for the next ten to fifteen years, at which time it becomes evident that most of the known technological capabilities of the CMOS device structure will approach or have reached their limits. In order to continue to drive information technology advances, it becomes necessary to investigate new devices that may provide a more cost-effective alternative to planar CMOS in this timeframe.

The ITRS lists the technical barriers at each stage of production that must be overcome if we are to continue to enjoy the benefits of chip technology advances. One important set of challenges is in the area of metrology. New metrology tools and techniques are needed to accurately perform critical measurements as new materials, processes, and device structures are introduced. These measurements are not only the obvious measurement of linear dimensions (nanometers) but also includes measurements such as a material's electrical characteristics, the aspect ratio of nanoscale trenches etched into chips, the thickness of oxide layers that are only a few atoms thick, and the size of pores inside of thin layers of materials.

The ITRS metrology chapter lists 112 measurements and controls and the required accuracy levels that must be met at specific points in time if semiconductor technology is continue to advance at current rates from now until 2018. The ITRS also identifies areas where further research is needed. For example, for 59 of these 112 measurements there are currently no known manufacturing solutions for the

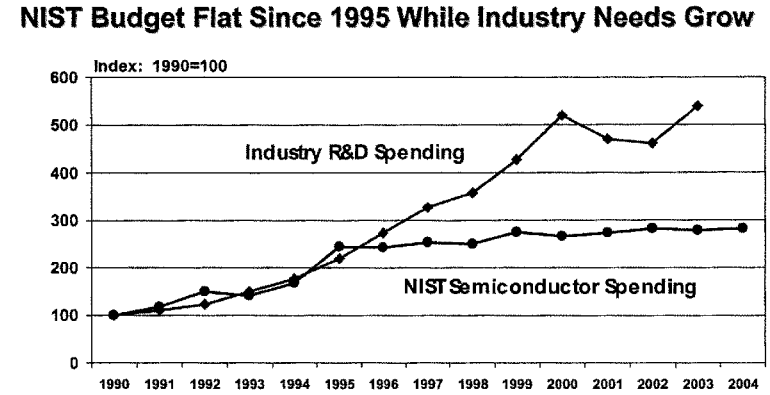
levels of accuracy that will be required on the factory floor in 2009—a mere five years away.

NIST's Ability To Meet The Challenges Has Not Kept Pace With Advance Of Technology

NIST is the leader in semiconductor metrology research, and has made a number of contributions in recent years. Recently a NIST paper on the measurement of the roughness of the edges of the lines etched on semiconductor chips, a major topic of concern identified in the ITRS, won a best paper award from the International Society for Optical Engineering. NIST was also the first to note that light traveling through Calcium Fluoride (CaF) lenses at different speeds created distorted images, a problem for semiconductor makers as shorter wavelengths of light were used to expose patterns on semiconductor chips.

While these contributions are notable and underscore NIST's potential, NIST's level of effort has not kept pace with needs brought on by technology advances. Three indications of the shortfall are provided by comparisons with industry R&D spending, detailed analysis of ITRS needs, and an evaluation of NIST tools.

NIST spending on semiconductor research has only increased 15 percent since 1995. As an indication of the growing technical challenge as circuits continue to shrink, the semiconductor industry's total investment in R&D increased 145 percent during that period. See Figure 1.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
NIST S/C Spending ($M)	$6.4	$7.5	$9.5	$9.0	$10.6	$15.5	$15.5	$16.2	$15.9	$17.5	$16.9	$17.5	$18.1	$17.8	$18.0
R&D Spending ($B)	$2.6	$2.9	$3.2	$3.9	$4.6	$5.7	$7.1	$8.5	$9.3	$11.1	$13.5	$12.2	$12.0	$14.0	

Note: Industry data for calendar year, NIST Fiscal year starting in October of prior year. NIST semiconductor spending refers to the Office of Microelectronics Programs and the Semiconductor Electronics Division. In addition, NIST estimated in 2000 that there was an estimated $7M on broader research of value to semiconductors in other NIST divisions.

Source: SIA Databook, NIST

Figure 1

Another indication that NIST spending is well below what is required comes from a detailed analysis of the ITRS by the Semiconductor Research Corporation that estimated that 480 person-years should be devoted each year to meet the metrology challenges; at a cost of over $100 million dollars. The total worldwide research currently aimed at these challenges is only a fraction of this amount. A third indication that NIST spending has fallen short of what is required is to compare the current lithography equipment at the NIST lab with current market requirements. Lithography, the ability to use exposures of light through masks to etch microscopic patterns on silicon, is a key step in semiconductor manufacturing. NIST's lithography equipment can etch patterns with a feature size of one micron, while the current industry standard is approaching 0.13 microns (or 130 nanometers), and sub-100-nanometers devices are coming soon.

SIA Recommendations to Congress for NIST and Other Research Agencies

The SIA supports the Administration proposal for increased spending at the NIST laboratories, and specifically *$25.5 million to equip the Advanced Measurement Lab-*

oratory, $15.6 million for advances in manufacturing (including $4 million for electronics and semiconductor nano-metrology). These increases represent a good first step toward achieving the funding level at NIST that was envisioned when the NIST Office of Microelectronics was established in 1994. SIA would encourage NIST to insure that a portion of this increase is devoted to funding for university research in metrology.

The budget increases at NIST aimed at metrology issues should be done in concert with increased appropriations for other programs in semiconductor research at universities. SIA supports significant increases in the NSF budget, and in particular funds focused on nanoelectronics research as authorized in the Boehlert-Honda Act.[1] The House Appropriations report for NSF noted the importance of semiconductor advances to continued productivity growth in our economy and encouraged the NSF to increase research aimed at the challenges outlined in the ITRS.[2] The House Science Committee might consider similar language in its report to support increased alignment of NIST research and the priorities identified by the ITRS. SIA also urges Congress to appropriate $20 million for the Defense Department's Government-Industry Cosponsorship of University Research program.[3] This program funds the Semiconductor Focus Center Research Program at 30 universities across the country.[4]

Increased Spending on Chip Research Benefits the Federal Budget

While the SIA recognizes that this is a difficult budget year for the Congress, it is instructive to view the research costs required to meet the ITRS timetables from the perspective of the costs to future federal budgets if the timetables are not met. On both the revenue and spending side, the government receives a multifold return on its investment.

The CBO budget deficit models assume that even a 0.1 percent/year increase in GDP growth results in a $236B smaller federal deficit over 2005–2014, largely due to increased tax revenues collected. In its projection of a $1.8 trillion deficit for FY 2005–2014, the Congressional Budget Office assumes the 0.7 percentage point surge in productivity that was experienced from 2001 to 2003 does not continue. The CBO does recognize, however, that

> ". . .Computers and other information-related technologies are fundamentally transforming the way the economy works, much as the electric dynamo and the internal combustion engine did in previous eras. If that hypothesis is valid, productivity growth might remain faster than its historic average during a transition period that could last several decades."[5]

Economists have noted the acceleration of semiconductor product cycles from three years to two years as a key driver of the surge in productivity. Because of the ubiquity of semiconductors in our economy, the acceleration or deceleration of semiconductor technology advances has a pronounced impact on productivity growth and GDP. The federal dollars needed at NIST, NSF, DOE, and DOD to support the basic research at universities and national labs related to semiconductors and nanoelectronics are small relative to the economic growth and added tax revenues that would ultimately accrue to the government.

It addition to the benefits from economic growth, and added taxes, that the government receives from semiconductor technology advances, it is also possible to quantify the benefits that government (Federal, State, and local) receives as a consumer of semiconductors. The Bureau of Economic Analysis at the Department of Commerce has data indicating that the government sector of the economy purchased $8.9 billion of computers in 2003, but that they would have had to spend $106 billion for that same amount of computing power if they had to pay 1994 prices. The

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[1] 21st Century Nanotechnology Research and Development Act; Public Law No: 108–153.

[2] "From within the Engineering Directorate, the Committee is concerned that researchers are reaching the physical limits of current complementary metal oxide semiconductor (CMOS) process technology and that this will have significant implications for continued productivity growth in the information economy. The Committee encourages NSF to examine the challenges and time lines outlined in the most recent International Technology Roadmap for Semiconductors and, where feasible, increase research support in this area accordingly." House Rpt. 107–740—Departments Of Veterans Affairs And Housing And Urban Development, And Independent Agencies Appropriations Bill, 2003.

[3] The Government-Industry Cosponsorship of University Research (GICUR), program element number 0601111D8Z, is funded through the Office of the Secretary of Defense.

[4] For further information on the Focus Center Research Program, see http://fcrp.src.org

[5] Source: "The Budget and Economic Outlook: Fiscal Years 2005–2014" Congressional Budget Office, January 2005.

cumulative benefit from technology improvements and resulting price declines from 1994 to 2003 is $363 billion of "free" computing.

Summary

For the past five decades, semiconductors have become ever faster, better, and cheaper, and today are a major driver of growth in economic productivity. As we approach the physical limits of the chip making technology that we have used for the past 30 years, technology advances are becoming ever more difficult. Metrology challenges are among the most important as they cut across all of the manufacturing stages in chip production. Basic research funded by the Federal Government is needed if we are to continue to advance our current technology as well as find a replacement technology before the aforementioned physical limits are reached. Congress must increase the NIST laboratory budget if the country is to continue to enjoy the benefits of every increasing semiconductor capabilities at ever decreasing costs.

BIOGRAPHY FOR DARYL G. HATANO

Daryl Hatano is the Vice President of Public Policy for the Semiconductor Industry Association. In that capacity, he has responsibilities for the Association's international trade, legislative and workforce strategy programs.

SIA's international trade program has included the implementation of the U.S.-Japan Semiconductor Agreements of 1986, 1991, and 1996—which contributed to an increase in foreign share in Japan from 8.5 percent in 1986 to over 30 percent today; and the 1998 elimination of European semiconductor tariffs—which has saved U.S. producers and their customers $1.5 billion. SIA's legislative successes include the passage of the Semiconductor Chip Protection Act, the National Cooperative Research Act, and the American Competitiveness and Workforce Improvement Act. SIA's workforce strategy program seeks to insure a qualified workforce to support industry growth with activities at the K–12, technician, and engineering levels. Mr. Hatano has been with SIA since 1983.

SIA is currently urging China's WTO compliance, increased federal support for university R&D, improved intellectual property protection, and export control reform. SIA is also an active participant in the World Semiconductor Council. SIA's full public policy program can be found at sia-online.org.

Mr. Hatano has an undergraduate degree in political science and economics from the University of California at Davis, a Juris Doctorate from the U.C. Davis Law School and a Master's in Business Administration from U.C.–Berkeley's Haas School of Business Administration; and is a member of the California Bar. Mr. Hatano has published articles in the area of business and public policy in the *California Management Review,* the *American Journal of Business Law,* and *Managerial Planning.* Mr. Hatano currently serves on the board of directors for the U.S. Information Technology Office in Beijing, the Advisory Board to the Maricopa Advanced Technology Education Center (a National Science Foundation funded program that is working with community colleges across the country to train high tech technicians), the Japan Society of Northern California, the Cost Recovery Action Group (a coalition to encourage capital investment in the U.S. through accelerated tax depreciation). Mr. Hatano is also a member of the Foundation Board of Trustees for the University of California at Merced, the first new research university built in the U.S. this century.

Chairman EHLERS. Thank you.

Ms. Grubbe.

STATEMENT OF MS. DEBORAH L. GRUBBE, CORPORATE DIRECTOR FOR SAFETY AND HEALTH, DuPONT, WILMINGTON, DELAWARE; MEMBER OF THE NIST VISITING COMMITTEE ON ADVANCED TECHNOLOGY

Ms. GRUBBE. Good morning, Mr. Chairman, Congressman Udall, and Members of the Subcommittee. Thank you for the opportunity to testify today on the importance of the work that the National Institute of Standards and Technology undertakes to support our nation's commerce and our national security. My firm, the DuPont Company, appreciates the Subcommittee's leadership on helping to assure the competitiveness of our country's business community.

My name is Deborah Grubbe, and I am a chemical engineer, currently the Corporate Director of Safety and Health. I have 26 years of experience with DuPont in managing engineering technology and manufacturing projects.

Today, I would like to focus my remarks on how NIST helps to ensure the U.S. business competitiveness by focusing on four DuPont examples, one each from MEP and ATP and two from the NIST labs. I personally believe that our nation—the Nation that leads in measurements and in standards reputation will, over time, be the leader in international commerce.

My first example of how NIST is helping DuPont grow is with our Surfaces business, the Corian product, and the NIST Manufacturing Extension Partnership that this Congress has supported.

DuPont manufactures Corian in sheet form at a 1,000-person site in Buffalo, New York. However, that raw sheet is a long way from the finished countertop in your kitchen or bathroom. The finished countertop is produced for DuPont by a network of independent fabricators across the country. The manufacturing capability among these fabricators varies greatly. As you can imagine, quality and training become very important as one tries to grow the business. DuPont is trying to broaden its market for the Corian product and is relying on these fabricators to deliver new products. How can DuPont improve the efficiency and delivery predictability of the finished Corian product when these key people in our supply chain work for a smaller company that may not have the resources to train their employees?

DuPont approached this problem in two ways. First, we invited MEP representatives to present business cases for change at several national fabricator conferences. MEP personnel developed a consistent scope of work, methodology, and project tracking capability for hundreds of the Corian fabricators. Currently, MEP has seven active projects with fabricators around the country. DuPont has agreed to contact 300 more to support MEP. In a growing business like Corian, this supports job growth and creation in many communities.

My second example is how NIST laboratories support DuPont and other businesses. As you may know, DuPont is a leading provider of automotive paints and finishes for many of the world's major car and truck manufacturers. Pigment and paint technologies change over time, and over recent years, NIST has led a highly successful collaboration with DuPont and other industry leaders to develop new measurement standards and procedures for color and appearance. The NIST standards support new industry-wide ASTM standards, which become the standards required for manufacture. The one question that we need to ask is rhetorical, yet important: "What would be the effect on DuPont earnings in this important market if this standards process was being run by another government?"

The third example focuses on the expertise of the NIST physics laboratory. DuPont is a leading provider of membrane materials for PEM, that is polymer electrolyte membrane, fuel cells. NIST works closely with DuPont and the fuel cell industry because of NIST's unique capability to internally image operating fuel cells using neutron radiography. The data provided by NIST is of such funda-

mental importance to DuPont and to our customers in our ongoing research and development.

In my fourth example, I would like to talk about the Advanced Technology Program, or ATP. ATP is an extremely valuable program to industry, and I would like to express a strong concern for the proposed elimination of this program in fiscal year 2005. A number of times in the past years, the Administrative Branch has sought to significantly reduce or eliminate ATP funding, and each time, Congress has had the wisdom to reinstate this valuable program. Through partnerships with the private sector, ATP's early investment is accelerating the development of innovative technologies that promise significant commercial payoffs and widespread benefits to the Nation. In addition to the ATP financial benefit of 50 percent funding of early stage, high-risk technology development, ATP processes foster rigorous peer reviews that validate the technological value.

Since 1993, there have been over 10 ATP collaborations with DuPont in the areas of superconductivity, electronic displays, and other areas of electronic technologies. ATP has been very helpful where the development costs and risks are very high for one company to bear alone. I urge you not to eliminate this program.

NIST currently suffers from the disease of the "non-funded mandate." Work to support Homeland Security is more ineffective today because the Department of Homeland Security has the money yet needs the time to build the scientific expertise. DHS is indeed making important contributions to homeland security, but it has insufficient funding to support the full range of its needs and other homeland security areas. However, NIST has the expertise, yet has no funding to do the work that it could do to support DHS. DHS and NIST need to work more closely together, and the appropriators need to make sure that the funds are allocated to the agency that can effectively accomplish the work.

I understand that the last NIST comprehensive authorization was in the late 1990's. Our world changed on September 11, 2001, and I suggest the Subcommittee lead an effort to reexamine that authorization in light of the support that NIST can bring to making our homeland more secure and to strengthen our nation's commerce.

Additionally, DuPont has identified profitable business growth areas that require measurements and standards capabilities and infrastructure support in the areas of: one, materials science, bio-based materials; two, robotics; three, characterization of multi-component films; and four, standardizing protocols for thermoelectric measurements.

NIST has the technical expertise and has some programs in this area, but funding constraints limit NIST's ability to meet industry's level of demand. These are areas where NIST can, with the right support, hasten the technical development now underway within various companies.

NIST is a strategic weapon in the DuPont innovation engine of the future. We need NIST to position our country competitively for the 21st century. No where else in the world can we find the specific measurement and special infrastructure needed to measure what we need to measure.

The NIST role is obviously broader than DuPont. It is essential that we, as leaders in the U.S. scientific and technical community, recognize NIST as a key leader in our nation's innovation engine. Mr. Chairman, Congressman Udall, Members of the Subcommittee, leading edge research fosters innovation, and innovation creates jobs.

Thank you.

[The prepared statement of Ms. Grubbe follows:]

PREPARED STATEMENT OF DEBORAH L. GRUBBE

Good morning, Mr. Chairman, and Members of the Subcommittee. Thank you for the opportunity to testify today on the importance of the work that the National Institute of Standards and Technology undertakes to support our nation's commerce and our national security. My firm, the DuPont Company, appreciates the Science Committee's leadership on helping to assure the competitiveness of our country's business community. My name is Deborah Grubbe, and I am currently the Corporate Director of Safety and Health for DuPont. I am a chemical engineer by training and have 26 years of experience with DuPont in managing engineering technology and manufacturing projects. I currently sit as a member of the NIST Visiting Committee on Advanced Technology, or VCAT. The VCAT gives guidance to NIST on strategies and direction.

NIST is the only U.S. Government agency chartered to *help* U.S. business. Today I would like to focus my remarks on how NIST helps to ensure U.S. business competitiveness by using five (5) DuPont examples. I personally believe that the Nation that leads in measurements and in standards reputation will, over time, be the leader in international commerce.

DuPont has been in business for 202 years, and safety and technical innovation have been, and remain, essential to our growth. We started as a manufacturer of black powder for the U.S. Government in 1802, operations that by their very nature require a focus on safety and technology. During the middle part of the 20th century, we built on that history of good safety and innovative technology to support the United States and its allies during World War II. Our discovery of nylon made safer parachutes for D–Day, and our development of Neoprene®, a synthetic rubber, was used in allied war machines. In today's war on terrorism, our Kevlar® fiber is found in bulletproof vests, and our Sentry-glas® technology is protecting the occupants of the Pentagon and civilians around the world.

DuPont is a $25 billion global corporation that is working hard to remain competitive. Fifty percent of our sales are in the United States.

I would now like to cover the five examples. My first example is from the Manufacturing Extension Partnership, or MEP. My fifth example is about the Advanced Technology Program, or ATP. Examples two, three and four are from the NIST laboratories, which are often overlooked, yet are essential to NIST and its value proposition.

My first example of how NIST is helping DuPont grow is with our Surfaces business, Corian®, and the NIST Manufacturing Extension Partnership (MEP) that this Congress has supported.

DuPont manufactures Corian® in sheet form at a 1000 person site in Buffalo, New York. However, that "raw" sheet is a long way from the finished counter top in your kitchen or bathroom. The finished counter top is produced for DuPont by a network of independent fabricators around the country. The manufacturing capability among these fabricators varies greatly. As you can imagine, quality and training become very important as one tries to grow the business. DuPont is trying to broaden its market for the Corian® product and is relying on these fabricators to deliver our new products. How can DuPont improve the efficiency and delivery predictability of the finished Corian® product when these key people work for a smaller company that may not have the resources to train their employees?

DuPont approached this problem in two ways: First, DuPont invited MEP representatives to present business cases for change at several national fabricator conferences. MEP personnel developed a consistent scope of work, methodology and project tracking capability for hundreds of the Corian® fabricators. Currently MEP has seven active projects with fabricators around the country. DuPont has agreed to contact 300 more to support MEP. In a growing business like Corian® this supports job growth and creation in many communities.

My second example is of how NIST laboratories support DuPont and other businesses. As you may know, DuPont is a leading provider of automotive paints and

finishes for many of the world's major car and truck manufacturers. Pigment and paint technologies change over time, and over recent years NIST has led a highly successful collaboration with DuPont and other industry leaders to develop new measurement standards and procedures for color and appearance. The NIST standards support new industry-wide ASTM standards, which become the standards required for manufacture. The one question to ask is rhetorical, yet important, "What would be the effect on DuPont earnings in this important market if this standards process was being run by another government?"

The third example refers back to my earlier mention of Kevlar®, the fiber used in bulletproof vests, and a collaboration with the NIST Building and Fire Research laboratory (BFRL). The National Institute of Justice has identified BFRL's Polymeric Materials Group as the prime research laboratory for studying the degradation of ballistic fibers. This degradation is important in the ability of the vest to protect its wearer. DuPont Kevlar® is a ballistic fiber, and research collaborations between the NIST and DuPont scientists are in progress at our Richmond, Virginia, plant site.

The fourth example focuses on the expertise of the NIST Physics Laboratory. DuPont is a leading provider of membrane materials for PEM (polymer electrolyte membrane) fuel cells. NIST works closely with DuPont and the fuel-cell industry because of NIST's unique capability to internally image operating fuel cells using neutron radiography. The data provided by NIST is of fundamental importance to DuPont and to our customers in our ongoing research and development to make fuel cells more reliable and more efficient.

For my fifth example, I would like to talk about the Advanced Technology Program. ATP is an extremely valuable program to industry, and I would like to express a strong concern for the proposed elimination of this program in FY 2005. A number of times in the past years, the Administrative Branch has sought to significantly reduce or eliminate ATP funding, and each time Congress has had the wisdom to reinstate this valuable program. ATP is a unique program in the Government R&D portfolio. Through partnerships with the private sector, ATP's early investment is accelerating the development of innovative technologies that promise significant commercial payoffs and widespread benefits to the Nation. ATP focuses on industry and industry sets the priorities. In addition to the ATP financial benefit of 50 percent funding of early stage, high-risk technology development, the ATP process fosters partnerships among industry and with academic institutions. Additionally the rigorous peer review adds significant validation of the technology value. Accelerating development of advanced technologies is a key way to maintain U.S. competitiveness and U.S. jobs.

ATP is an important part of the DuPont technology partnership with the Federal Government, and since 1993 there have been over 10 collaborations in the areas of superconductivity, electronic displays, and other areas of electronic technologies. ATP has been very helpful where the development costs and risks are very high for one company to bear alone. I urge you not to eliminate this program.

These are five of many examples of value that NIST brings to DuPont. The world-class NIST special facilities and technical capability is not available elsewhere. Even our university research partners rely on NIST measurements and facilities. There are other governments attempting to emulate the NIST model, and we need to be certain to assure that the United States of America remains the leader in scientific measurements and standards. This leadership comes with a price, and that price is our commitment and increased funding.

NIST currently suffers from the disease of the "non-funded mandate." Work to support Homeland Security is more *ineffective* today because the Department of Homeland Security (DHS) has the money, yet needs the time to build the scientific expertise. DHS is indeed making important contributions to homeland security, but it has insufficient funding to support the full range of DHS needs and other homeland security areas. However, NIST has the expertise, yet has no funding to do the work that it could do to support DHS. DHS and NIST need to work more closely together, and the appropriators need to be sure the funds are allocated to the agency that can effectively accomplish the work.

I understand that the last NIST comprehensive authorization was in the late 1990's. Our world changed in September, 2001, and I suggest the Subcommittee lead an effort to reexamine that authorization in light of the support that NIST can bring to making our homeland more secure and to strengthen our nation's commerce.

Additionally, DuPont has identified profitable, business growth areas that require measurements and standards capabilities and infrastructure support:

1) Materials science—bio-based materials (e.g., clothes from corn)

2) Robotics
3) Characterization of multi-component films (packaging)
4) Standardizing protocols for thermoelectric measurements.

NIST has the technical expertise and has some programs in these areas, but funding constraints limit NIST's ability to meet industry's level of demand. These are areas where NIST can, with the right support, hasten the technical development now underway within various companies.

NIST is a strategic weapon in the DuPont innovation engine of the future. We need NIST to position our company competitively in the 21st century. No where else in the world can we find the special infrastructure needed to measure what we need to measure.

The NIST role is obviously broader than DuPont. It is essential that we, as leaders in the U.S. scientific and technical community, recognize NIST as a key to our nation's innovation engine. Mr. Chairman, Members of the Subcommittee, leading edge research fosters innovation, and innovation creates jobs. History has shown that the jobs are usually created close to the point of innovation, reference Silicon Valley and other High Tech Corridors around our nation. NIST has been and remains essential to DuPont and to other businesses, both large and small. Thank you for this opportunity to address you today, and thank you for your support of NIST. We are all working to ensure that the generations that follow us will enjoy the high standard of living that is a benefit of an innovative society.

BIOGRAPHY FOR DEBORAH L. GRUBBE

Deborah Grubbe is Corporate Director—Safety and Health for DuPont. She is accountable for leading new initiatives in global safety and health for the corporation. Deb was formerly the Operations and Engineering Director for DuPont Nonwovens, where she was accountable for manufacturing, engineering, safety, environmental and information systems for a $1 billion business with eight manufacturing facilities around the world. Deborah is also a past director of DuPont Engineering's 700-person engineering technology organization. Her 15 different assignments in 26 years range from capital project implementation through manufacturing management and human resources.

Deborah currently sits on the National Institute of Standards and Technology Visiting Committee for Advanced Technology. She has recently served as a consultant to the *Columbia* Shuttle Accident Investigation Board, and has been appointed to the new NASA Aerospace Safety Advisory Panel. She has worked with the National Academy of Sciences as a member of the oversight committee for the Demilitarization of U.S. Chemical Weapons Stockpile. Deborah is on the Board of Directors of the Engineering and Construction Committee of the American Institute of Chemical Engineers, and is on the Business Management Advisory Committee of Wilmington College. Deborah currently serves as a member of the Purdue University School of Chemical Engineering New Directions Executive Committee. She was the first woman and youngest elected member on the State of Delaware Registration Board for Professional Engineers (1985–1989). During her tenure on the State Board, she was the Chair of the Law Enforcement and Ethics Committee. She is active with the Society of Women Engineers, and is a former board member of the Women in Engineering Program Advocates Network (WEPAN). Deborah has been featured in the books "Engineering Your Way to Success" and "Journeys of Women in Science and Engineering—No Universal Constants."

She has been active in the Delaware community; as former president and board member of the Chesapeake Bay Girl Scout Council, and currently sits on their Northern President's Advisory Council. Deborah is also a board member of the Delaware Zoological Society. Deborah is a past board member of the YWCA of New Castle County and the Delaware State Board of Pharmacy. In 1994, Deborah was named an outstanding Chemical Engineering Alumna by the Purdue University School of Chemical Engineering, and is a recipient of the 1986 Trailblazer Award from the Delaware Alliance of Professional Women. In 2002, she received the Purdue Distinguished Engineering Alumni Award, and was named Engineer of the Year in Delaware.

Deborah was born in suburban Chicago and graduated with a Bachelor of Science in Chemical Engineering with Highest Distinction from Purdue University. She received a Winston Churchill Fellowship to attend Cambridge University in England, where she received a Certificate of Post-Graduate Study in Chemical Engineering. She is a registered professional engineer in Delaware, and is the engineer of record for DuPont. She is married to James B. Porter, Jr., and resides in Chadds Ford, Pennsylvania.

Chairman EHLERS. Thank you.
Dr. Cellucci.

STATEMENT OF DR. THOMAS A. CELLUCCI, PRESIDENT, CHIEF OPERATING OFFICER, ZYVEX CORPORATION, RICHARDSON, TEXAS

Dr. CELLUCCI. Mr. Chairman, I would like to thank you and the Members of this distinguished Committee for inviting me here today. I applaud you and all of the Members of the Science Committee who have taken the time to confront the challenges that will ensure our nation's future. We wouldn't be gathered here today if not for your efforts.

I am Tom Cellucci, President of Zyvex Corporation. Thank you for giving me the honor of sharing my views on the impact of NIST on our nation.

As President of one of the world's leading nanotechnology companies, I have the rare opportunity and privilege to play a role in shaping this emerging field. I have had the honor and distinct privilege of meeting with several respected Members of Congress about how NIST has enabled this new nanotechnology revolution. I am especially grateful for the vision of President Bush, Senator George Allen, Senator Ron Wyden, and Representatives Boehlert, Ehlers, and Gordon in passing the 21st Century Nanotechnology Research and Development bill into law this past December 2003.

As Members of the Science Committee know, we have made great strides by passing this bill. However, much work still needs to be done to ensure that it will be the United States who continues as the world leader in science, technology, and business.

It is no surprise that America leads the world in technological innovation. Much of our leadership position and the jobs generated for Americans can be directly attributable to NIST. NIST fulfills a vital role in bringing the promise of nanotechnology to the American people. NIST is responsible for developing the measurements, standards, and data critical to private industry's development of products for potential market that is estimated to exceed a trillion dollars in the next decade.

Through NIST's measurements and standards laboratories, they are helping the private sector to create more high-quality, high-paying jobs. Their commitment allows us to live in the best country in the world.

NIST works with organizations in the private sector to develop consensus standards, which are needed by United States' industry for delivering and improving products and services sold throughout the world. NIST's weights and measurements services are the basis for ensuring the efficiency and fairness of more than $5 trillion in sales, roughly half of the United States economy. Industry standards are critical in emerging fields, such as nanotechnology. Right now, one of the key issues facing the nanotechnology arena is the need for standards for nanoscale materials and tools.

As someone who possesses approximately 20 years experience as a senior director and executive of high technology firms, I can relay many instances where the assistance of NIST laboratories was invoked. To put it simply, there is no test and measurement body on

earth that has the credibility, experience, technical depth, and the thoroughness of the NIST laboratories.

Many of the divisions I was responsible for relied on NIST traceable standards and information on emerging trends for tighter tolerances and higher resolution requirements for industry. If you mentioned to your potential customers that NIST was either consulted, used, or the originator of certain data you presented, you could rest assured that it was never questioned and provided your firm with instant credibility of one's products, services, and/or processes.

I am often invited to give keynote speeches and advice to universities, such as MIT and Harvard, and trade organizations, such as the NanoBusiness Alliance and SEMATECH. Many times, I find myself directing them towards the NIST labs to retrieve materials and information in order to assist them in identifying technical trends and needs.

As I previously mentioned, there is no entity, that I know of, that has the technical depth, practical industrial experience, and vision in helping United States industry look at new trends in test and measurement.

I was never a big supporter of government spending on R&D funding for any industry. I subscribed to the philosophy, and still do today, that private industry's role is to bring about innovation based on market drivers. Yet September 11 had a powerful effect on the way I think about the urgency of innovation. It is all too apparent to me that leading technology holds the key to our fight on terrorism at home and abroad. As you are acutely aware, American lives are at stake, and we need to do everything humanly possible to protect the lives of our American soldiers, first responders, and citizens.

There are over 2,700 law enforcement officers who have been spared either death or disabling injury as a result of NIST-developed standards for bullet-resistant vests. Zyvex's NIST–ATP has allowed us to develop instrumentation that DARPA has identify as being critical to our armed forces and laboratories. I am very proud of this and all of the Zyvex employees who are so diligently working on this project.

While some mistakenly characterize the NIST–ATP as "corporate welfare," I am here to tell you that Zyvex is a real-world example of a small business that is leveraging this program to commercialize nanotechnology today. We are today creating new markets and new jobs. As anyone who knows me will attest, I am known for profitably growing companies, not wasting money. NIST is our business partner, not simply an organization that gives us money. We jointly share the cost and the responsibility of bringing this new technology to the marketplace.

Thanks to our ATP, we have hired 15 new employees in 2003 and plan to hire at least another 25 new employees in 2004. We support researchers at universities in Texas, Colorado, Michigan, Massachusetts, California, Virginia, and New York. I have grown increasingly wary as I travel all over the world and see how aggressive countries such as China, Taiwan, Japan, and the European community are funding initiatives very similar to our NIST. I ask myself: "What type of legacy will we be leaving to our future

scientists and engineers if we decrease NIST's budget?" I also ask: "What kind of economic opportunities will our children have if the United States loses its industrial competitiveness to other countries?"

Many people will argue that with the war, these cuts are necessary. I ask: "How can we continue to fight a war on terrorism without developing the critical technology that is needed in the next decade?" We are not only at war with terrorism, we are in the midst of a significant worldwide battle for technical prowess to sustain and increase our technological leadership in the world, the greatest economic battle of our lifetime.

Anything but increasing this funding is surrendering our economic prosperity and giving up on our promise to our children, a promise to higher life. Mr. Chairman and Members of this committee, I want to personally thank you for your time and for this honor.

[The prepared statement of Dr. Cellucci follows:]

PREPARED STATEMENT OF THOMAS A. CELLUCCI

Mr. Chairman, I would like to thank you and Members of this distinguished Committee for inviting me here today. I applaud *you,* Chairman Boehlert, Representative Ehlers, Representative Udall, and all the members of the Science Committee who have taken the time to confront the challenges that will ensure our nation's future. We wouldn't be gathered here today, if not for your efforts.

I'm Tom Cellucci, President of Zyvex Corporation. Thank you for giving me the honor of sharing my views on the impact of NIST on our nation.

As President of one of the world's leading nanotechnology companies, I have the rare opportunity and privilege to play a role in shaping this emerging field.

Zyvex's vision is to become the leading worldwide supplier of tools, products, and services that enable adaptable, affordable, and atomically precise manufacturing. Jim Von Ehr founded Zyvex in 1997 and we now employ over 50 people. We introduced 10 new products in 2003, and are on target to introduce an estimated 12 additional products and double our revenues in 2004.

I've had the honor and distinct privilege of meeting with several respected members of Congress about how NIST has enabled this new nanotechnology revolution. I'm especially grateful for the vision of President Bush, Senator George Allen, Senator Ron Wyden and Representatives Boehlert, Ehlers and Gordon in passing the 21st Century Nanotechnology Research & Development Bill into law this past December 2003. Jim Von Ehr was present when he signed it.

As Members of the Science Committee know, we've made great strides by passing this bill. However, much work still needs to be done to ensure that it will be the United States who continues as the world leader in science, technology, and business.

NIST

It's no surprise that America leads the world in technological innovation. Much of our leadership position and the jobs generated for Americans can be directly attributable to NIST. NIST fulfills a vital role in bringing the promise of nanotechnology to the American people. NIST is responsible for developing the measurements, standards, and data critical to private industry's development of products for a potential market that is estimated to exceed a trillion dollars in the next decade.

NIST brings about this innovation because NIST is committed to maximizing innovative technologies to our national economy through its labs, its Advanced Technology Program, and by working with the private sector to spur innovation and entrepreneurship.

Through NIST's measurements and standards laboratories, they are helping the private sector to create more high-quality, high-paying jobs.

Their commitment allows us to live in the best country in the world.

NIST and Industry Standards

NIST works with organizations in the private sector to develop consensus standards, which are needed by United States' industry for delivering, and improving products and services sold throughout the world.

NIST's weights and measurements services are the basis for ensuring the efficiency and fairness of more than five trillion dollars in sales—roughly half of the U.S. economy. Industry standards are critical in emerging fields such as nanotechnology. Right now, one of the key issues facing the nanotechnology arena is the need for standards for nanoscale materials and tools. The NIST labs provide the accuracy, reliability and international recognition for the measurements and measurement-related operations that make up approximately three percent of the U.S. gross domestic product. In a marketplace that is increasingly global in nature, we know that 80 percent of all global merchandise trade is being influenced by testing and other measurement-related requirements of regulations and standards. More and more, U.S. companies cannot deal in this marketplace without NIST. For example, if NIST had not been involved, U.S. manufacturers of in vitro devices (IVD) wouldn't been able to meet new European Union regulations We now have more than 60 percent of a $7 billion market.

NIST's commitment to developing the best standards through its scientists and engineers, in tandem with industry leaders, is paramount for U.S. businesses to rapidly deploy these new novel nanotechnology products and services in this global economy.

NIST Labs

As someone who possesses approximately 20 years experience as a senior executive and Director of high technology firms, I can relay many instances where the assistance of NIST laboratories was invoked.

To put it simply, there is no test and measurement body on earth that has the credibility, experience, technical depth, and the thoroughness of NIST laboratories.

Many of the divisions I was responsible for relied on NIST traceable standards and information on emerging trends for tighter tolerances and higher resolution requirements for industry.

Companies like Newport Corporation, a leading manufacturer of laser/electro-optic equipment; Coherent, Inc., the leader in industrial and scientific lasers; Etec, Inc., a worldwide leader in MEMS test and measurement equipment; and Edmund Industrial Optics, a global leader in the optics industry relied on NIST traceable standards and insights on new trends for tighter tolerances and resolution requirements for industry. All relied on NIST expertise.

If you mentioned to your potential customers that NIST was either consulted, used, or the originator of certain data you presented, you could rest assured that it was never questioned and provided your firm with instant credibility of one's products, services, and/or processes.

I'm often invited to give keynote speeches and advice to universities such as MIT and Harvard, and trade organizations such as the NanoBusiness Alliance and SEMATECH. Many times, I find myself directing them towards the NIST labs to retrieve materials and information in order to assist them in identifying technical trends and needs.

As I previously mentioned, there is no entity that I know of, that has technical depth, practical industrial experience, and vision in helping United States industry look at new trends in test and measurement.

Zyvex's NIST–ATP

I was never a big supporter of government spending on R&D funding—for any industry. I subscribed to the philosophy (and still do today) that private industry's role is to bring about innovation based on market drivers. Yet September 11th had a powerful effect on the way I think about the urgency of innovation. It's all too apparent to me, that leading technology holds the key to our fight on terrorism at home and abroad. As you're acutely aware, American lives are at stake and we need to do everything humanly possible to protect the lives of our American soldiers, first-responders, and citizens.

There are over 2,700 law enforcement officers who have been spared either death or disabling injury as a result of NIST-developed standards for bullet resistant vests. Intelligent machines influenced by NIST's real-time control system, a concept for controlling automation, have helped to keep U.S. troops out of harm's way by clearing land mines. The military and other users have saved millions of dollars thanks to NIST's contributions to the testing of antennas used for communications to and from satellites.

Zyvex's NIST–ATP has allowed us to develop instrumentation that DARPA has identified as being critical to our armed forces and laboratories. I'm very proud of this and all the Zyvex employees who are so diligently working on this project.

Through our assembly and manufacturing technology we have been able to develop a very inexpensive Mini-SEM prototype that will, for the first time, allow soldiers and scientists to use this kind of microscope on samples in the field—instead of having to take the sample to the microscope in a lab. Detecting biohazards in minutes—rather than hours—will not only save time—it will save lives.

While some mistakenly characterize the NIST–ATP as corporate welfare, I'm here to tell you that Zyvex is a real-world example of a small business that is leveraging this program to commercialize nanotechnology—today. We are today creating new markets *and* new jobs.

As anyone who knows me will attest, I'm known for profitably growing companies, not wasting money. NIST is our business partner, not simply an organization that gives us money. We jointly share the cost and responsibility of bringing this new technology to the marketplace.

Thanks to our ATP, we've hired fifteen new employees in 2003; and plan to hire, at least, another twenty-five new employees in 2004. We support researchers at universities in Texas, Colorado, Michigan, Massachusetts, California, Virginia, and New York. We're developing a new manufacturing technology that will drive innovation in the silicon micro-machine domain. The impact of parallel micro-assembly on the broader economy will be in the billions of dollars and will ultimately create thousands of high value manufacturing jobs—here in America.

I've grown increasingly wary as I travel all over the world and see how aggressive countries such as China, Taiwan, Japan, and the European Community are funding initiatives very similar to NIST. I ask myself—what type of legacy will we be leaving to our future scientists and engineers if we decrease NIST's budget? I also ask myself—what kind of economic opportunities will our children have if the United States loses its industrial competitiveness to other countries?

Many people will argue that with the War, these cuts are necessary. I ask how can we continue to fight a war on terrorism without developing the critical technology that is needed in the next decade? We're not only at war with terrorism, we are in the midst of a *significant world-wide battle* for technical prowess to sustain and increase our technological leadership in the world—*the greatest economic battle of our lifetime.*

Anything but increasing NIST funding is surrendering our economic prosperity and giving up on our promise to our children—a promise for a higher quality of life.

Once again, I'd like to commend you and your colleagues—for your courage, your patriotism, and your vision.

Mr. Chairman and Members of this committee—I want to personally thank you for your time and for this honor.

BIOGRAPHY FOR THOMAS A. CELLUCCI

Tom Cellucci is the President and Chief Operating Officer at Zyvex Corporation. He is also a member of Zyvex's Board of Directors.

Cellucci is internationally recognized for Cellucci Associates. Inc. (Wellesley, Massachusetts), a highly successful management consulting firm he founded in 1999 which was primarily engaged in raising capital and providing strategic business services to high-tech global firms.

Cellucci has extensive senior executive experience in profitably growing businesses. Most recently, he was President and CEO of Etec, Inc. (Peabody, Massachusetts) and Executive Vice President and General Manager of Integrated Dynamics Engineering (Westwood, Massachusetts and Raunheim, Germany). Prior to joining Integrated Dynamics Engineering, Cellucci held the position of Senior Director at the Newport Corporation (Irvine, California). He was also a Research Chemist for Shell Oil Company (Houston, Texas), where he was also elected President of Shell's then eighteen-thousand member Employee Association.

Cellucci has authored or co-authored over 97 articles on nanotechnology, environmental disturbance control, laser physics, photonics. MEMS test and measurement and high-tech sales and marketing. Cellucci was also a co-author of the ANSI Standard Z136.5 entitled "The Safe Use of Lasers in Educational Institutions" published in March 2001.

Cellucci currently serves on several Boards, most notably on the Board of Edmund Industrial Optics (Barrington, New Jersey), the Laser Institute of America, and serves as special advisor to the Board of MANCEF (Micro- and Nano-Commercialization Education Foundation). In addition, Cellucci is a member of the NRSC Senatorial Trust—a small group of distinguished business and political leaders nom-

inated by United States' Senators to meet on a regular basis with the highest-ranking members of the government. such as the President of the United States, Senators, and Legislators.

Cellueci is a member of the James Smithson Society (Smithsonian), the American Chemical Society, the Autism Advisory Council for the Autism Alliance for the MetroWest region of Massachusetts, and the Big Brothers–Big Sisters Program.

Cellucci holds a Ph.D. in Physical Chemistry from the University of Pennsylvania, an MBA from Rutgers University, and a B.S. in Chemistry from Fordham University. He has also attended several senior executive courses at the Wharton School of Business. MIT's Sloan School of Business, and the Harvard Business School, where he is often invited to speak on nanotechnology.

Chairman EHLERS. Thank you.

Mr. Jasinski.

STATEMENT OF MR. JAMES J. JASINSKI, VICE PRESIDENT OF FEDERAL AND STATE SYSTEMS FOR COGENT SYSTEMS, PASADENA, CALIFORNIA

Mr. JASINSKI. Thank you, Mr. Chairman, for this opportunity to make a short presentation and discussion about the contributions that NIST has made to the United States in our War on Terrorism and in the homeland security front.

There are two areas, which I would like to focus in on. One is the NIST standards that have been developed for AFIS systems, automatic fingerprint identification systems, which we all benefit on a daily basis from. During the 1980's and the 1990's, I worked for the FBI. And during that time, there were a number of AFIS systems that were being developed. Each system did not inter-operate, could not communicate with one another. Because of NIST's leaderships, the systems today are able to communicate with one another. For example, if somebody is arrested in Los Angeles or in London, England or in Moscow, all use the NIST-established AFIS standards. And we are able to search each other's databases to make the determination whether or not somebody is particularly wanted or should be particularly suspicious to the United States or should be held for some other reasons. Those standards are commonly known as the NIST standards and every AFIS system that is deployed around the world is in compliance with the NIST standards, and every procurement that goes on the street always references compliance with NIST. So its impact has been universal around the world.

The second area in which I think that you can see immediately the benefit of NIST is the recent deployment of the U.S.–VISIT program. When U.S.–VISIT was first being proposed, there was a—the system that was being supported was a two-print system. That two-print system had a lot of critics to it. That two-print system, allegedly, was going to have a number of inaccuracies both in identifying somebody and also falsely identifying somebody. During the April/May time frame period of last year, when the system was first being conceived operationally, NIST was able to step in and validate the system that with a two-print system, could achieve a high degree of reliability and a very small degree of selectivity so that the person was not falsely accused.

In addition, as we speak today, NIST is working with Homeland Security in that U.S.–VISIT program in trying to establish threshold standards and trying to determine at what level do you have to set the biometric matching capability so that you would maxi-

mize the performance of the systems. That system is constantly evolving, and it is NIST's leadership in working with Homeland Security in establishing those standards so that the system can be optimized.

NIST has shown itself not simply in those two systems but in—also in providing leadership around the world. Just yesterday afternoon, we had visitors in from Hong Kong who are deploying a new system for their citizens where they are going to issue cards. Those cards are going to obtain the biometrics. That biometric is going to be used in trying to establish your ability to vote, your right to charges, your right to the subway system, your right to withdraw books from the library. They met with NIST yesterday to discuss what works in the biometric field and what standards should be established. They were—we walked away from that meeting, and they were extremely impressed with the insight and knowledge that NIST was able to present to them. Cogent is working with Hong Kong in this and it clearly benefits us in trying to establish those standards.

I thank you.

[The prepared statement of Mr. Jasinski follows:]

PREPARED STATEMENT OF JAMES J. JASINSKI

Thank you for the opportunity to appear before this Committee on Science to review Cogent's experience working with the NIST, to articulate the success derived from that association, and to identify how that success can continue and in fact grow.

Cogent is an American company founded 14 years ago by U.S. citizens. Our corporate headquarters is in South Pasadena, California with affiliated offices in five countries. From our corporate headquarters we have deployed Automated Fingerprint Identification Systems (AFIS) at the national, state and local levels. This includes over 45 foreign countries, such as the United Kingdom, Italy, Bulgaria, Russia, Taiwan, Hong Kong, Singapore, Honduras, Algeria, and dozens of others providing us a presence on five continents. Traditionally, four major AFIS companies have serviced this market. Of these four companies, one other is U.S. based and the remainder are foreign corporations.

The focus of this statement is on two primary topics:

1) NIST's role in establishing fingerprint inter-operability within the United States and around the world;
2) NIST contributions to the universally acknowledged successful deployment of the U.S.–VISIT Program.

1) Inter-operability Standards

The history of AFIS technology in many ways mirrors that of technology in general, i.e., the evolution from proprietary standards to open standards. Just like in the 1970s, the purchase of one information mainframe system meant the inability to inter-operate with that of a competitor, the AFIS users found themselves in a similar situation. This meant that someone arrested in one State could not have his fingerprints automatically searched against fingerprint records of another State. This clearly was unacceptable. Therefore, when the Federal Bureau of Investigation (FBI) undertook its Integrated Automated Fingerprint Identification System (IAFIS) project, open standards had to be developed to ensure that upon the completion of IAFIS the States and the FBI would be able to routinely exchange fingerprint information.

NIST provided the nexus between the system developers and the end users of the systems that allowed the development and acceptance of open standards for exchanging fingerprint information. Today, in the AFIS community, all major government sponsored AFIS acquisitions require any proposed AFIS solution must be "NIST Compliant." "NIST Compliance" is shorthand for approximately 15 standards dealing with fingerprints—from the header, to the image quality, to compression, to today the complete palms. These standards have been openly reviewed, developed, and deployed by all parties working in this area and have been universally accepted.

As a result, around the world today, AFIS systems are routinely inter-operable at the system level. While, these standards allow the systems to work together, at the same time they protect the uniqueness of each system and the investment each company has put into its technology.

As illustrative of the success of those NIST standards, while I was in the FBI, I chaired Interpol's AFIS Expert Working Group. At that time Interpol was acquiring an AFIS system for itself and for interfacing with over 100 members. The solicitation for that procurement required "NIST Compliance" for any vendor proposed system. The value of such a system is proven everyday when countries around the world exchange their fingerprint data with one another—all because of NIST leadership.

2) U.S.–VISIT

For many years the U.S. has been aware of the problem of tracking visitors to the United States. As part of the initial efforts to try and establish a process for such a tracking system, Homeland Security announced on April 29, 2003 a plan to begin establishing a biometric system to perform this task by the end of 2003. In establishing this system, a number of issues sprung up; how many fingers were necessary—from 2, 4, 6, 8, 10, should they be rolled or flat captures, can a database of mixed flat and rolled fingers be accurately searched, operational accuracy, as well as a host of other related issues.

At this time, a series of inaccurate, wrong, deceptive and self-serving representations were made by a number of alleged biometric experts. Each sounded authoritative and knowledgeable, but each had more theory than reality in their pronouncements. This complicated any decision to proceed with this too often delayed national defensive system for if the critics were right, millions of dollars would be wasted. Fortunately, NIST helped resolve the outstanding issues and validate operational feasibility so U.S.–VISIT could be deployed. Before discussing NIST's role in resolving these issues, please let me take a few moments to provide some background information on AFIS systems.

In assessing the performance of a system you look at four major factors:

1) Accuracy;
2) Database size/composition;
3) Number of fingers searched;
4) Throughput—how many comparisons can be done in a set time.

In AFIS technology accuracy is a term of art. Accuracy has two sides—finding someone in a database (called "reliability," "Type1 Rate," "True Acceptance Rate" (TAR)) and falsely finding someone (called "selectivity, Type 2 Rate," "False Acceptance Rate" (FAR). These accuracy rates are a set of measures used to understand the performance of the system with respect to the system's ability to correctly process the presences or absence of an individual's fingerprints in a database. Therefore, the terminology is as follows:

- Accuracy is the measure of ability of the system to correctly match the fingerprints of an individual to that person's fingerprints in the database.
- Type 1 Errors, also known as False Reject or False Non-Match is the measure of the system's inability to correctly match a set of fingerprints to a mating set of fingerprints that are in the database.
- Type 2 Errors, also known as False Accept or False Match is the measure of the system's inability to correctly differentiate between a set of fingerprints and another set of fingerprints within a database.

AFIS systems are impacted by the amount of data, the quality of the images, and whether what is stored is a rolled or flat fingerprint image. The size of the database determines how much time is necessary to determine if there is or isn't a match. In making that comparison, the quality of the images either being searched or stored significantly affect search results. As NIST has stated, 35 bad images are not as valuable as one good one. Then, for most AFIS systems, whether the image is rolled or flat or whether they are intermixed will impact search results.

Additionally, how many fingers that are searched will impact system accuracy. As a general rule, more quality images are better than fewer quality images, but results are not linear. That means one cannot project that a search of a finger with certain results proportionately improves with each additional finger searched. Rather accuracy is a function of many factors such as the design of the search process, the quality of the images, the time for the search, etc.

Finally, AFIS systems performance are impacted by throughput—how many transactions do you need to process within a set amount of time. Frequently, to achieve greater throughput accuracy is sacrificed.

In assessing the performance of an AFIS system the above factors must be balanced with the application environment in determining effectiveness.

When U.S.–VISIT was announced, a number of companies, foreign and domestic, immediately attacked the biometric approach. Their representations were presumptive and unfounded, but because of their position in the market, given credibility. As the U.S.–VISIT system was being developed, with the proposed approach to expanding the proven technology used by DHS for its IDENT program, a number of inaccurate reports and statements became common in newspapers, trade periodicals, and commentaries. For example, a leading system integration organization issued a White Paper to DHS that made the following comments regarding the plan to use IDENT technology for U.S.–VISIT:

> "However, the current IDENT system has not been proven to meet the IDENT system Accuracy & Type 1 Error Rate requirements and further is believed to fall substantially below expected Accuracy. The engineering estimate values used in this evaluation were 75 percent accuracy, 25 percent Type 1 Error Rate and 0.6 percent Type 2 Error Rate."

Such assessments raised unfounded concerns about the viability of the biometric deployment for U.S.–VISIT, for if accurate would essentially mean an unacceptable low reliability rate of 75 percent with every fourth traveler being sent to a secondary examination.

The above White Paper then went to state:

"As the current IDENT system is not meeting Accuracy and Type 1 Error Rate specification,.. . .The spreadsheet contains an engineering estimate of the real values. The engineering estimate is based on an extrapolation of the independent Criminality Study as well as a small ad-hoc system test.. . .This data was not truly randomly sampled and had a quantity of low quality data removed from the set. Those factors skewed the results indicating higher Accuracy than is believed to be truly available in the current environment. A further indication that the values were skewed was that these values taken together as an "operational point" represent a significantly higher capability than is currently published as state-of-the-art for commercially available AFIS systems. These "best measured" values were not developed from a realistic test and are not believable.. . .

This report was based upon based the Systems Integrator's knowledge of their AFIS system's capability coupled with a flawed mathematical calculation in the referenced criminality report.

That criminality report was published in October 2000 entitled IDENT/IAFIS IQS. Cogent had no participation in that report and as a result the basis for the number comes from *IAFIS* results of a two fingers search using the

IAFIS system—*not the Cogent IDENT system.* Of particular note, in calculating the number of Cogent errors, the report did not convert the measured Type 2 error rate of .16 percent correctly as they did not convert the type 2 percentage to a decimal number.

In addition, other alleged experts were heavily spreading misinformation on the proposed system's overall performance and falsely charging an inability to grow with the workload.

Given this context, NIST was tasked to validate the system—from accuracy to throughput. NIST timely performed its mission. However, in performing this testing NIST stretched its equipment capacity as shown by running CPUs at 100 percent utilization, storage contentions, database management software licenses, and using old chemical labs instead of computer facilities to perform the testing. Their successful testing of the system and repudiation of the many false statements allowed the scheduled deployment to proceed as announced. This means a safer America for with the system in place, since January 5, 2004, hundreds of individuals have been identified for further investigation prior to their being allowed to enter this country. Some are subsequently banned from entering, some are arrested and some are allowed entry, however each determination is made with the greater certainty than was ever before deemed possible. In fact one Immigration officer described the system as "a wonderful Christmas gift."

Even today, after the successful implementation of U.S.–VISIT, the same critics who predicted system failure and performance problems continue to push their less than honest agenda. To be sure, all systems are a balancing between operational requirements, business procedures, and acceptable performance characteristics. No one would argue that more data is better than less data, however the context for

that question is what is the impact to your business processes in acquiring that additional data, what is its cost, and what are its advantages. In making those judgment calls, NIST must continue to perform the roll of the honest broker so that Agencies understand what are the true trade-offs for the final decision in implementing biometric technology.

For example, with U.S.–VISIT, the decision to capture more fingers in future applications must trade off the additional equipment and labor costs in capturing those fingers with the improvements to the TAR (reliability) and the FAR (selectivity) with less manpower in the back-end of the system. To date, NIST has shown that the TAR for a two print system remains constant as the system grows, at least for the limits of its available database size of about 6 million subjects, while the FAR rises in a predictable linear fashion. That same testing has shown that good images are more important for the system's TAR/FAR results than multiple bad images taken from the same person. Simultaneously, the testing has shown that more fingers does increase the probability of obtaining more usable data and that FAR levels can be essentially maintained as the database grows. Additionally capturing more fingers allows for sequence checking and is of greater value for latent searches. All of this is subject to current NIST database sizing limitations and highlights the continuing important role for NIST in U.S.–VISIT.

This is but an example of the importance of their role in validating technology claims and clearly indicates the importance of increasing and enhancing that role. As technology grows within society the resources required to validate them correspondingly grow. Illustrative is the Fingerprint Vendor Technology Evaluation (FpVTE) 2003. That evaluation addressed system performance of fingerprint matching algorithms. It required significant equipment, vast amounts of data, and knowledgeable personnel to perform the evaluation. Due to resource limitations the scope of the test was restricted to areas that NIST could independently validate with its available resources. That means that the test could measure only targeted areas not total system performance. And even in performing the targeting testing, because of resource limitations ranging from equipment to data, the testing could not empirically validate all of its target performance objectives but rather had to defer to extrapolations of data.

Cogent believes that if NIST was appropriately funded, NIST can perform fuller and more robust empirical testing of systems, technologies, and theories. With that additional funding, instead of merely testing a target objective, it can perform empirical system testing of products that could not only demonstrate American technology, but assist in keeping its leadership by either exposing or disproving unreliable systems.

BIOGRAPHY FOR JAMES J. JASINSKI

Employment History

Cogent Systems, Inc., Reston, Virginia, Vice President for Federal and State Systems, May, 2002–Present. Mr. Jasinski is responsible for Cogent's Federal and State systems. His duties include personnel, facilities, operations, and performance standards for Cogent's Federal and State customers. He reports directly to Cogent's Chief Operations Officer, Ming Hsieh.

DynCorp Systems and Solutions, Chantilly, Virginia, Vice President Civil Systems, 2000–2002. Mr. Jasinski was responsible for directing a staff of business development specialists assigned a variety of federal agencies. He had budgetary and personnel authority with specific goals and objectives for each employee and agency. During his tenure, his staff both by employee and agency achieved their assigned objectives.

Federal Bureau of Investigation, 1978–2000. Mr. Jasinski retired as a Special Agent and as a member of the Senior Executive Staff, Level 4 with 23 years of service. During his service he had the following assignments:

- IAFIS Program Manager, 1997–2000—This Presidential Priority Program was the largest development project ever undertaken by the FBI. The total budget for the program was 8640 million and at its peak had almost 1000 federal and contract employees working on the project. Its objective was to convert the FBI's fingerprint identification system of 40 million cards from a semi-automated system into a fully automated system using specially trained personnel for search results verification. The primary objective of the system was to eliminate the 3 million fingerprint card backlog and reduce the FBI's response time for criminal history searches from months to 24 hours or less,

while processing over 62,000 requests per day. When the system went operational, all articulated system and operational requirements were either met or exceeded. Since going operational in July of 1999, the system has received numerous accolades and accomplishments and is universally recognized as an unqualified success.

- FBI's Chief Contracting Officer, 1984–1997—Responsible for the management of the FBI's centralized system for all covert and overt procurements. His duties included overseeing a staff of over 90 procurement specialists and attorneys. This staff of professionals was responsible for fulfilling all the operational procurement requirements of a large federal agency with full compliance to all federal procurement regulations.
- FBI Litigation Attorney, 1982–1984—Staff attorney responsible for providing legal counsel to FBI field office special agents conducting ongoing investigations and representing the FBI in judicial proceedings. His work included all aspects of legal litigation and administrative reviews.
- FBI Field Office Special Agent, 1978–1982—General investigative duties ranging from employment background investigations to criminal and foreign counter intelligence investigations.
- Attorney, 1976–1978—Private practice attorney in New York State, with a primary focus in contract law and contract litigation.

Education

Juris Doctor, Albany Law School, Union University, 1976.

Bachelor of Arts, State University of New York at Buffalo, 1973.

- Approximately 1700+ hours of Procurement and Program Management classes while working for the FBI.

Chairman EHLERS. And thank you.

And to end this panel's testimony with a blaze and give a fiery speech, we turn to the expert on fire, Mr. Biechman.

STATEMENT OF MR. JOHN BIECHMAN, VICE PRESIDENT FOR GOVERNMENT AFFAIRS FOR NATIONAL FIRE PROTECTION ASSOCIATION

Mr. BIECHMAN. Thank you, Chairman Ehlers, Ranking Member Udall, and Members of the Committee. I am honored to appear before you today. NFPA is a non-profit organization with a mission to save lives through education and training, fire research and analysis, and the development of consensus codes and standards that are adopted by governmental jurisdictions throughout the United States and widely used by the Federal Government.

NFPA's 300 codes and standards are accredited by ANSI and developed by fire protection engineers, enforcement officials, architects, the fire service, and other technical experts participating as volunteers in the consensus process, a process that Congress has affirmed with the passage of the National Technology Transfer and Advancement Act of 1995 and OMB clearly defined in its Circular A–119. And currently, at least 12 NIST employees participate in the NFPA consensus process committees.

I wish to express NFPA's support for the Building and Fire Research Laboratory at the National Institute of Standards and Technology, NIST, and to urge the Committee to ensure adequate funding for the BFRL and other laboratories in fiscal year 2005. Additionally, we believe that the Committee should consider reauthorization of the NIST labs to include their increased duties and responsibilities in a post-9/11 world.

NFPA's relationship with NIST, known at the time as the National Bureau of Standards, began just over 100 years ago, fol-

lowing a devastating fire in Baltimore that we heard a little bit about earlier. Response to the fire came from departments as far away as New York. However, similar to communications systems problems encountered on September the 11th, the departments responding to the fire in Baltimore could not use one another's fire hoses due to differing hose threads. Following the fire, the Bureau of Standards called upon NFPA and others to assist in the study of hose couplings. Based on that research, NFPA adopted its first Standard for Fire Hose Connections.

Over the past century, NIST has successfully aided in the knowledge and advancement of fire and building safety measures that include improvements at many levels of government and facets of safety. For example, in the area of fire modeling, the first use of NIST's resources was at an NFPA fire investigation at the DuPont Plaza Hotel fire in Puerto Rico in 1986. The Fire Research Division of the BFRL has also studied fires in the Urban/Wildland Interface with research benefiting those in our rural communities. From this type of research, the BFRL is able to develop computer fire modeling to help the fire service better understand fire dynamics, protect occupants and firefighters, and assist in building safer buildings in the future.

The State of New York, in its effort to reduce fire deaths caused by fires ignited by cigarettes, has utilized NIST's testing protocol to determine the efficacy of the "fire safe" cigarette. NIST led an investigation team, including NFPA, to Kobe, Japan following the 1995 earthquake to study building collapse, infrastructure, and the fire that followed the earthquake. The BFRL developed a gas burner to reproduce fire situations experienced in mattress fires. Further, the CPSC is now working with NIST to develop a test to identify non-compliant mattresses in the marketplace that would support an open-flame standard currently proposed by CPSC.

In an agreement with the U.S. Fire Administration, NIST research will lead to the development of more effective firefighter protective clothing and will work to enable the Department of Homeland Security to continue to adopt the equipment standards similar to the NFPA standards for firefighter protective clothing that was recently adopted by the Department.

It is not enough, however, to simply recount the good works of NIST. We believe that the BFRL now finds itself in the position of being asked to do more with less at a crucial time. This has been asked by the National Construction Safety Team Act of 2002 to conduct an investigation into the collapse of the World Trade Center Towers. As part of that investigation, NIST is working on the causes of building failure and issues, such as fire and smoke resistance construction. NIST is also working with the American Society of Mechanical Engineers, NFPA, the elevator industry, and others to begin developing the technical basis for revisions to elevator standards for use in occupant evacuation and fire service access during emergencies in high-rise buildings. The Construction Safety Team is also investigating the deadly fire at the Station Night Club in Rhode Island.

To date, the Congress has not appropriated funds to enable the Construction Safety Team to conduct its work. Without appropriate funding, NIST will not be able to properly train or equip staff to

conduct additional investigations, should the need arise. Additionally, legislation has been passed by the House of Representatives and awaits Senate approval reauthorizing the National Earthquake Hazard Reduction Program, the House-passed bill authorizes NIST's Building and Fire Research Laboratory to become the responsible federal agency for the program.

Mr. Chairman, there is no other laboratory in the United States as capable as the NIST Building Fire and Research Laboratory, conducting research for the public good. I am not aware of any outside source of funding to conduct such needed research. The proposed fiscal year 2005 funding for the BFRL still does not approach the kind of funding necessary to carry out the added workload of the lab. The consequences of the budget restrictions this year in NIST have resulted in a difficult reprioritization of ongoing projects and planned research being delayed. NFPA trusts that the Congress will ensure that the labs receive the authority and the funding necessary to conduct their important business.

Thank you, Mr. Chairman, for this opportunity to address the Committee, and I would be happy to take questions, if you have any.

[Statement of Mr. Biechman follows:]

PREPARED STATEMENT OF JOHN BIECHMAN

Chairman Ehlers, Ranking Member Udall and Members of the Committee, I am honored to appear before this committee today. My name is John Biechman and I am Vice President for Government Affairs of the National Fire Protection Association (NFPA). NFPA is a non-profit organization, founded more than 100 years ago, with a mission to save lives through fire and life safety education and training, fire research and analysis, and the development of consensus codes and standards that are adopted by governmental jurisdictions throughout the United States and widely used by the Federal Government.

Today NFPA has approximately 300 codes and standards addressing safety, each accredited by the American National Standards Institute (ANSI) and developed by fire protection engineers, enforcement officials, architects, the fire service and other technical experts all participating as volunteers in the consensus process. This process ensures that all interested parties have a say in developing codes and standards, a process that Congress affirmed and supported with the passage of the *National Technology Transfer and Advancement Act of 1995* (P.L. 104–113) and the Office of Management and Budget clearly defined in OMB Circular A–119.

I am here today to express NFPA's support for the Building and Fire Research Laboratory (BFRL) at the National Institute for Standards and Technology (NIST) and to urge the Committee to ensure adequate funding for the BFRL and NIST's other laboratories in the Fiscal Year 2005 budget. Additionally, we believe that it is appropriate that the Committee consider reauthorization of the NIST labs to include its increased duties and responsibilities in a post-9–11 world.

NFPA's relationship with NIST, known at that time as the National Bureau of Standards, began just over 100 years ago as the result of a devastating fire in the City of Baltimore, destroying 2,500 buildings in an 80-block area in the heart of the City. Response to the fire came from fire departments as far away as Washington, DC, Philadelphia, and New York City. However, similar to the problems encountered with a lack of inter-operable communications systems at the World Trade Center Towers on September 11th, the various fire departments responding to the Baltimore fire found that they could not use one another's fire hoses because of Baltimore's hydrant system and differing fire hose threads from the various departments. Shortly after the fire the National Bureau of Standards called upon NFPA and others to assist in a study of hose couplings across the Nation. Based on the research provided by NBS, the NFPA adopted as national models in 1905 a standard hose coupling and an interchangeable coupling device for non-standard hoses. Today the document is recognized as NFPA 1963, *Standard for Fire Hose Connections* providing a level of uniformity enabling fire departments to provide coverage to one another.

Over the past century NIST and the BFRL have successfully aided in the knowledge and advancement of numerous fire and building safety measures that include improvements at many levels of government and facets of safety, for example:

In the area of fire modeling the first major use of NIST's resources on modeling was an NFPA fire investigation at the DuPont Plaza Hotel fire in Puerto Rico in 1986. The Fire Research Division of the BFRL has also studied fires in the Urban/Wildland Interface with research benefiting those responsible for protecting our rural communities. From this research the Fire Research Division is able to develop computer fire modeling to help the fire service better understand fire dynamics and protect occupants and firefighters, and assist in building safer buildings in the future.

The State of New York, in its effort to reduce the number of fire deaths caused by fires ignited by cigarettes, has utilized NIST's testing protocol to determine the efficacy of "fire safe" cigarettes.

NIST led an investigation team, including NFPA, to Kobe, Japan following the January, 1995 earthquake to study building collapse, infrastructure and the fire that followed the earthquake.

The NIST BFRL developed a gas burner to reproduce fire situations experienced in mattress fires. The State of California has passed into law an open flame standard for mattresses and utilizes the protocol developed by NIST which will lead to the production of less flammable mattresses. Further, the CPSC is working with NIST to develop a test to identify non-compliant mattresses in the market place that would support a national open-flame standard currently proposed by CPSC.

Following catastrophic events at nightclubs in Rhode Island and Chicago, NFPA incorporated changes to its codes and standards. Experts from the BFRL worked within the NFPA code amendment process and ensured that the changes made to the code were based on sound technical information. Currently at least 12 NIST employees participate on NFPA Standards Development Technical Committees.

Current research, under cooperative agreements with the U.S. Fire Administration, at the BFRL will lead to the development of better and more scientifically grounded methods of measuring the effectiveness of firefighter protective clothing in protecting the wearer from burns. Work such as this will enable the Department of Homeland Security (DHS) to continue to adopt equipment standards similar to the five NFPA standards for firefighter personal protective clothing adopted by DHS earlier this year.

It is not enough, however, to simply recount the many instances that the good works of NIST and the BFRL have benefited the standards development outcome at NFPA and elsewhere. We believe that the BFRL now finds itself in a position of being asked to do more with less at a crucial time in our nation's history.

NIST's role in firefighter personal protective equipment, flammability testing, fire modeling and seismic investigation are just a few examples of NIST's previous work. NIST and its Building and Fire Research Laboratory have now been tasked by the National Construction Safety Team Act of 2002 to conduct an investigation into the collapse of the World Trade Center Towers. As part of that investigation NIST is working on the causes of building failure and on issues such as fire and smoke resistant construction. NIST is also working with the American Society of Mechanical Engineers, NFPA, the elevator industry and others to begin developing the technical basis for revisions to elevator standards for use in occupant evacuation and fire service access during emergencies in high-rise buildings.

In addition to the World Trade Center investigation the Construction Safety Team has also been assigned to investigate the deadly fire at the Station Night Club in Rhode Island where 100 lives were lost in the winter of 2003.

To date the Congress has not appropriated funds to enable the Construction Safety Team to conduct its work. Without appropriate funding NIST will not be able to properly train or equip staff to conduct additional investigations should the need arise.

Additionally, legislation has been passed by the House of Representatives and awaits Senate approval reauthorizing the National Earthquake Hazard Reduction Program (NEHRP), the House passed bill authorizes NIST's Building and Fire Research Laboratory to become the responsible federal agency for program implementation.

Mr. Chairman, there is no other laboratory in the United States as capable as the NIST Building Fire and Research Laboratory; conducting research for the public good. I am not aware of any "outside" source of funding to conduct needed research. The proposed FY 2005 funding for the BFRL, while an increase over this year's budget, still does not approach the funding necessary to carryout the added workload of the lab.

The consequences of budget restrictions this year at NIST have resulted in a difficult reprioritization of on-going projects and planned research being delayed. NFPA trusts that the Congress, understanding the importance of the NIST laboratories to our nation's safety and security will see to it that the labs receive the authority and funding necessary to conduct their very important business.

Thank you again Mr. Chairman for this opportunity to address the Committee. I will be happy to take questions you may have.

BIOGRAPHY FOR JOHN BIECHMAN

John Biechman serves as Vice President, Government Affairs for the National Fire Protection Association (NFPA). He has more than 25 years experience in government relations, public affairs and trade association activities. He serves as the primary advocate for NFPA's policies, programs and products within the Federal Government and as information liaison between Congress, federal agencies and Washington-based allied private sector organizations.

Prior to joining NFPA in March 2001, Biechman served as Deputy Assistant Secretary for Congressional Relations at the U.S. Department of Housing and Urban Development (HUD).

Biechman's background also includes government relations positions with the Washington-based Building Owners and Managers Association International (BOMA). Prior to coming to Washington, Biechman served as Field Representative to former Representative Norman Y. Mineta, in San Jose, California and served on the City Council in Morgan Hill, California.

DISCUSSION

IMPACT OF NATIONAL INSTITUTES OF STANDARDS AND TECHNOLOGY (NIST) FUNDING ON CURRENT AND FUTURE DEVELOPMENTS WITHIN THE SCIENCE AND TECHNOLOGY INDUSTRY

Chairman EHLERS. Thank you, to all of you, for your testimony. It was excellent, and it gives us a good start.

At this point, we will open our first round of questions. The Chair recognizes himself for five minutes. You have intimated this in your testimony, but I want to get some very direct statements for you. What would be the impact on your company or the organization—your organization or the companies you represent within your organization if NIST did not exist or if the funding remained stagnant or significantly declined? Mr. Hatano, we will just go right down the line. What would—how would it affect you in your industry, your organization, if NIST ceased to exist or its funding declined?

Mr. HATANO. Our industry has grown because of Moore's Law, the ability to continue to shrink the transistor. We would not be able to do that without metrology. If we can't measure it, we won't be able to make it. So without NIST's activities and advancing the science and metrology, we would not be able to continue to increase the number of transistors on the chip and the subsequent decrease in costs that have allowed us to really create a lot of other industries downstream.

Chairman EHLERS. Thank you.

Ms. Grubbe.

Ms. GRUBBE. Quite simply, our business would stop, in my opinion. One starts to look at the ability to export and the need for measures and standards to export, the ability to use the atomic clock for global positioning systems. If you don't know where your freight is, if you don't know where your deliveries are, it is very

hard to serve customers on a global basis. So if you take a look at very simple things, it grinds to a halt or makes it much more difficult. On a development end, it would definitely slow our ability to create more jobs, and it would hurt our profitability.

Chairman EHLERS. Thank you. Dr. Cellucci.

Dr. CELLUCCI. From my perspective, there are three items. We would lose global competitiveness to commercialize nanotechnology. Secondly, we could not further increase the development of products and services in the nanotechnology arena without the much needed nanometrology standards and measurements we need to get to these very tiny scales. And finally, there is one trend that everyone around the world agrees with in manufacturing: tolerances will get tighter and tighter and resolution requirements higher and higher. And without consensus standards, this will have a great impact on our ability to produce goods that people would want to spend their money on.

Chairman EHLERS. Mr. Jasinski.

Mr. JASINSKI. There will be three areas, also. One is that biometric standards are still evolving, and if NIST isn't there to provide the leadership, who would be in that position to provide their leadership? Second is the ability to expose fraudulent claims, misleading claims. And the third is to validate the technology.

Chairman EHLERS. Mr. Biechman.

Mr. BIECHMAN. NFPA's codes and standards are based on scientific evidence. NIST is the entity that really promotes and studies the scientific evidence. If we didn't have that, we would be basing a lot of our efforts on simply experience in the field, and the evidence would come in much more slowly, and therefore the updated codes and standards would be developed more slowly.

INDUSTRY SUGGESTIONS ON NIST BUDGET INCREASES

Chairman EHLERS. I have another question for the panel as a whole. And that is can any of you give examples of technological opportunities currently not being exploited because of NIST's current funding levels, the fact that they are not being adequately funded? It is open to anyone who would wish to comment on that.

Ms. Grubbe.

Ms. GRUBBE. Mr. Chairman, in my testimony that is on the record, and I also spoke to it, we identified four areas where we saw that if NIST had additionally funding, they would be able to help us accelerate development and help other industries accelerate development. One was in material science, more specifically bio-based materials. This is a new area where we are using enzymes to take the place in—the corn genome to take the place of oil and using that as intermediates for things like fabrics. The second area is in robotics, and NIST would be helpful in trying to accelerate the process of making more and more efficient and more cost-effective robots. The third is characterization of multi-component films, primarily for the packaging industry and also for the electronics industry. And fourth is the standardizing of protocols for thermoelectric measurements. There is not a lot of work going on in those areas right now.

Chairman EHLERS. Thank you.

Dr. Cellucci.

Dr. CELLUCCI. Yes, Mr. Chairman. In my view, no one is better prepared than NIST to help in something we are all familiar with in the papers, and that is creating manufacturing jobs. A company like Zyvex has a long-term vision to revolutionize manufacturing. Think of a world where you had a capability to manufacture with atomic precision, building things atom by atom, molecule by molecule. This would have enormous impact on virtually every industry and homeland security, et cetera. And in order to time compress our timelines, we need a partner like NIST. We don't need a handout; we need a partner to help us compress that timeline to make sure that we win the global competition in having this capability and creating high value manufacturing jobs.

Chairman EHLERS. Thank you. Mr. Hatano.

Mr. HATANO. I mentioned that we have this Semiconductor International Technology Roadmap for Semiconductors. That lists over 100 measurements that are critical to our industry. What we do is look at what is the requirement. How much accuracy do we need in each of those measurements two years out, three years out, five years out, all of the way out to 2018. To give you an example of the situation we are in, if we look five years out, if we look out to 2008, of those 100-plus measurements, over half of them are colored red on our chart. Red means that there is no manufacturable solution that we currently have for that requirement. These are measurements to certain precisions that we are expected to do five years from now in the manufacturing environment and we don't have the solution today—that is why we need NIST. There are quite a few examples as you go through that list, and I have mentioned a few of them in my testimony.

Chairman EHLERS. Thank you. Mr. Jasinski.

Mr. JASINSKI. The biometric area is a whole area that is just emerging, and if NIST doesn't provide the leadership, I am afraid that the United States might not be in the position to be in the forefront to developing that emerging market.

Chairman EHLERS. Thank you.

Anyone else?

Thank you very much. Now I am pleased to recognize the Ranking Member, Mr. Udall.

Mr. UDALL. Thank you, Mr. Chairman.

I want to pick up on your line of questioning, if I might. It has been very helpful to me to hear about the opportunities, frankly, that we have in front of us that if we don't have a fully operating and well-funded NIST, we are going to miss. Dr. Cellucci, pardon me, I pick up on your commentary on page nine where you talk about "we are in an economic battle," an economic war, if you will, and there is a lot of indications that this is the most important front in the War on Terrorism, because unless we maintain our economic competitiveness and our leading role in the world, we are not going to have the resources nor the standing to pursue these people who threaten us and the ideology, as well as the hope, the despair, the illiteracy, the oppression that feeds terrorists, because we have to raise standards of living all over the world. So I think you are really onto something, and I hope you will continue to deliver that message wherever you go. In fact, we ought to take this panel on the road and—because you all have some very compelling

examples of why this is so important across the technological landscape.

If I could pick up on what the Chairman was talking about and go across the panel, if we did increase NIST's budget, what should that increase be? If all of you would like to comment, that would be very appropriate. Starting with Mr. Hatano, do you have any number—do you have a number in your head or an idea of what we are talking about here?

Mr. HATANO. We don't have a number for the total NIST budget. There are a lot of parts within NIST that we don't have the expertise on. We are supporting the Administration's proposal with regard to the lab's budget for the semiconductor-related technologies, the AML, the Advanced Measurement Labs, and the equipment facilities that go with that, as well as the manufacturing research piece. And we see that as a first step toward an increase more in line with a doubling their semiconductor effort. A few years back, in the mid-1990's, the—NIST formed an Office of Microelectronics, and when that was formed, they envisioned that it would be twice the size of what it is today. They formed it, and it never really increased, and so we would like to get it to the level that was originally envisioned when it was created.

Mr. UDALL. You would propose a doubling of the budget in that particular area, the semiconductor——

Mr. HATANO. Right.

Mr. UDALL.—microconductor area?

Ms. Grubbe.

Ms. GRUBBE. Mr. Congressman, I can't speak to an exact number, however, I think what we should do is identify all of the areas of program where there could be a hard value brought, and then from there, do the work around what needs to be supported, so let us start with what the work is rather than shoot for the number.

Mr. UDALL. Number.

Dr. CELLUCCI. I would like to amplify what my colleague had just mentioned that. I tend to be a bottoms up kind of person. Let the people that are working on proposals have that reviewed by people, but I will tell you that from my perspective, it is well under budget if we are very serious about creating manufacturing jobs and keeping our competitiveness. In fact, I had a rare honor to give Karl Rove, the President, to brief him recently, talking about using nanotechnology to create energy independence. And one of the view graphs in there shows the number of Ph.D.s and hard science being generated in Asia versus the United States. And Asia kind of goes like this, the United States like this, and the sad part about the United States' slope is that many of the people in the United States who get their degrees go back to their originating countries. And so I ask them to think of a scenario where China is not only a low-cost producer but has the technological marbles. And that is a scary scenario for me, being a laser physicist who was stupid enough to get an MBA that we want the technological marbles, because that is a driver for our economy. So I think that more people than just the NIST people, in fact, should be involved in what the NIST budget is, because it is so pervasive, just as nanotechnology may be pervasive across the number of industries, so is NIST. It is one of these things. People don't recognize it, because it is not

squeaking, it is not broken, but it is vital, in my view, in terms of technological competitiveness in the world.

Mr. UDALL. Mr. Jasinski.

Mr. JASINSKI. I don't think there is any way I can give you an exact figure on that. I can say that based upon my experience of working with NIST that their facilities are out-moded. If you go to their testing facilities for the biometric area, it is an old chemical lab as opposed to a computer lab. The equipment that they use for doing the testing is many times overwhelmed by the tasking, so the CPUs are working at 100 percent utilization, and the staffing is always that they are multitasked at the same time, so that you would define the goal of what you want to achieve. If you want to achieve the leadership, you have to at least double the staff and funding that is currently available for NIST.

Mr. UDALL. Mr. Biechman.

Mr. BIECHMAN. Mr. Udall, thank you.

I would agree with Ms. Grubbe in that we need to do a good study of what it is that needs to be done by the NIST labs and base a budget on that. You indicated in your opening remarks that there were authorizations in excess of $100 million. I guess that that is probably the tip of an iceberg. There is much work to be done. I know they are doing work for CPSC, Department of Homeland Security, FEMA, and so forth and so on that are not appropriated funds. Those agencies may be transferring funds, but my guess is, not to cover all of the work they have to do. I would be happy to participate in helping make a listing of the things that do need to be done.

Thank you.

Chairman EHLERS. The gentleman's time has expired. Next we turn to the gentleman from Texas, Dr. Burgess.

ADVANTAGE OF THE SCIENCE AND TECHNOLOGY INDUSTRY GAINING FUNDING FROM NIST VERSUS FROM OTHER FEDERAL AGENCIES

Dr. BURGESS. Thank you, Dr. Ehlers. I want to thank you for convening this panel today. Acknowledging the Ranking Member's comments about taking the show on the road, in fact, we had a field hearing in the Science Committee down in my District in December, right after the President signed the nanotechnology bill, and Dr. Cellucci, I believe someone from your company, Zyvex Corporation, was there and testified at that hearing, so indeed we have taken the show on the road.

My question for Dr. Cellucci is, and I appreciate your comments on the value added that NIST brings when you are able to site NIST as the source for verifying your data, but would it work as well if those funds came from some other federal agency? We have increased the NIST budget—or the President has increased the asked for the NIST budget in this year, but would those dollars be as wisely spent if they just came from some other federal agency that has jurisdiction over nanotechnology or nanometrology?

Dr. CELLUCCI. That is an excellent question. It is very—the—my answer will be what I normally give one of our sales and marketing people who continuously talks about the product. And what I will say to them is the product is much more than the entity that we

put in a box and ship. We are part of the product. And in the same way, what I value so much with NIST is not the money. Quite frankly, we are a growing company. We are very excited. We are a leader in this space, but it is dealing with the personnel. It is not a cakewalk to work with NIST. We have put money in. They have put money in. These folks have a lot of experience. The best way I describe it is a relationship of tough love. They are like a mom. We have had six consecutive quarters of commercial success with our NIST–ATP. I am very proud of that, but what you don't see is every other week someone from NIST calling me, "How are we doing with the commercialization?" It is that constant prodding, that tough love, that expertise, sharing of the scars, so to speak, of trying things in technology that are just as vital to me, and in fact, in many ways, more important to a company like Zyvex than the money.

Dr. BURGESS. So the value added that NIST brings to your company is not just having their logo stamped on the box, it is also the expertise and the relationship you have built over the years?

Dr. CELLUCCI. Absolutely.

Dr. BURGESS. Thank you.

Chairman EHLERS. Thank you. And we now have a new name for NIST: "Mama NIST." Just like Mom's Diner.

We have time for another round of questions, so we will continue.

Ms. Grubbe, in your testimony, you say there has been a disconnect between the Department of Homeland Security and NIST. And although NIST had the prior proven track record in technical matters, DHS was given the funding to do technical work and much time was wasted getting DHS up to speed. Could you expand further on this topic and, perhaps, give more specifics?

Ms. GRUBBE. My understanding is that there are some technologies that are currently in use or proposed use by the Department of Homeland Security with regards to airplane travel detection, threat detection that is being worked on, but could be—the work can be accelerated and can be increased and brought, you know, along in a faster timeline if there was more money put to it. I mean, you are—when you are limited, you are limited.

Chairman EHLERS. Thank you. I appreciate that, and I agree with you. I had an idea for improving detection of dangerous materials in suitcases and passed it on to TSA. They all agreed it was a good idea. Nothing happened. Now I have passed it on to the Department of Homeland Security, DHS, and we will see what happens there. It is a very simple idea, not hard to implement, just nothing happens.

INTEGRATION OF NIST STUDY RESULTS INTO FIRE AND BUILDING CODES

Mr. Biechman, I wonder if you could just give the Committee some examples, just for the record, for—of how building and fire codes have or may have changed as a result of the World Trade Center and the Rhode Island fire investigations, how is this process working? Do the results from NIST actually end up going into the fire codes and the building codes?

Mr. BIECHMAN. Yes. The studies that they have done on equipment of sprinklers and that kind of equipment certainly end up in

our codes and standards. I think the issues of studying the Rhode Island fire and, you know, the World Trade Center collapse are, in many respects, behavior studies, those—in terms of what individuals did when the fire broke out. And we need to learn more about that kind of thing. The '93 explosions—bombing of the World Trade Center, NFPA and others went back in and helped developed better evacuation efforts, both from the building perspective as well as the human behavior perspective. Because of those improvements, I think a lot of individuals were able to get out of the World Trade Center on September 11. That kind of information that we have learned from fires, such as the Station fire, or the collapse of the Towers, will help us in developing codes and standards that affect people in the future.

Chairman EHLERS. And do the codes and standards folks pretty well pick up on what NIST says follow through?

Mr. BIECHMAN. Yes. And they participate in our process as well. As you know, the Technology Transfer Act urges federal agency employees to participate in the process, so they not only bring, you know, a document that indicates their findings, but they actually are able to participate in the consensus process. So there is a give and take, and an understanding that I think adds more than just text or just an academic assessment, talking out the issue. The process, I think, is very, very beneficial to future safety.

Chairman EHLERS. Thank you.

My time is almost expired. Mr. Udall, you have one question?

Mr. UDALL. Thank you, Mr. Chairman.

If I might, I would focus on Ms. Grubbe's comments for a minute. You talked about the MEP and how it helped DuPont and helped your Corian finishers. Can you give some idea of what would have happened without that MEP assistance?

Ms. GRUBBE. When one looks at our Corian finishers, at some level, because they are so dispersed, it is very difficult for them to—for us to communicate to them, because they are not only selling Corian, they are selling other kinds of materials. And the skills that are required for Corian are sometimes different than the skills required for—to install other kinds of materials. And so without a unifying body that is local to them, like MEP that is located wherever we sell it, which is countrywide, without that, we are not able to touch the local manufacturer as much as possible in the supply chain. So the more times that we can touch them, we not only improve the skill sets for them to install Corian, we are also improving their overall employee skill sets for them to make their business better. The question would be without that, our business would be diminished. It would not be able to grow as far as the consumer demand would require it, I believe, number one. And number two, the skill sets of the people that are in those businesses would be greatly reduced, and they would not be as competitive, which puts local jobs at risk.

Mr. UDALL. So arguably, this is an example of everybody operating with an enlightened self-interest motive, if you will?

Ms. GRUBBE. It works every time.

Mr. UDALL. It works every time. Yeah, it does.

THE NATURE AND SIGNIFICANCE OF THE ADVANCED TECHNOLOGY PROGRAM (ATP) OF THE NIST

I want to still keep you in the spotlight here and ask you, as a member of the Review Committee, the NIST Review Committee, what is your impression of the level of support for NIST by the Technology Administration and the Commerce Department?

Ms. GRUBBE. Excellent question. I believe that we have support. I believe we could use more support, in, you know, short answer. We have had interactions. We have had good discussion. I think there could be a lot more interactions and a lot more discussion.

Mr. UDALL. Understood, and hopefully registered, by all involved. Thank you for your service, by the way, on that board.

Ms. GRUBBE. My honor and pleasure, thank you.

Mr. UDALL. I think I have got a little bit of time left, and I thought I would come across the panel again and throw this question out at you. We have been discussing this implicitly, but you hear people talk about ATP as a form of corporate welfare. How do we answer that claim?

Maybe we will start over here with my city council friend here, by the way, congratulations. Congressman Ehlers and I have not had the strength to remove ourselves from elective politics and you have and are clearly on and doing great things in your new profession, so thank you for your service more seriously as a councilman in California. Why don't we start there? Talk about the ATP and how we answer that claim that it is corporate welfare.

Mr. BIECHMAN. Certainly, I don't believe that the building and fire research laboratories are near corporate welfare. The product, if you will, the technology that is developed or researched there is very specific to the safety of the firefighting community, building safety, modeling to teach firefighters and building engineers how to do things better so that occupants and firefighters come out alive. I just don't see, frankly, any connection where it would be considered corporate welfare. I call this the public research and technology for the public good. That is exactly what it is. For their investment on behalf of all of us, it saves lives.

Mr. UDALL. That is a good way to respond to it. Mr. Jasinski, do you have a response?

Mr. JASINSKI. I am sorry, but we don't participate in that program.

Mr. UDALL. All right.

Dr. CELLUCCI. I think it is an excellent question. In fact, the Committee may be interested that I have given, I think, six or seven briefings to Senators Bill Frist, Kay Bailey-Hutchinson, Jim Talent, Senator George Allen on this subject, and it is one of those issues where perception becomes reality. When you ask someone, "Where did you hear this from?" no one can provide facts. And I tend to be like Joe Friday from Dragnet to say, "Let us concentrate. Just the facts." If you look at the facts related to the NIST–ATP program, I can tell you that we are a living, real-world example of a small business working with a large business with government and the university, commercializing nanotechnology that allows new types of technology to go on the marketplace, not in some R&D lab hidden off somewhere, but we are actually commercializing

technology. NIST doesn't give us a handout. NIST is our business partner. And again, we rely just as much on the constructive criticism of the NIST personnel as much as their money. And again, I think you are dealing with perception becomes reality, but when you examine all of the facts, like I had the opportunity to do, which I would be more than happy to provide to this committee, you will see that there are numerable examples of small businesses succeeding and putting out new products in the marketplace because of the NIST–ATP program. It is a very unique, worthwhile program that, in my view, should be an example to many government agencies on how to get the collaboration of, again, government, small and big businesses, and universities.

Mr. UDALL. Ms. Grubbe.

Ms. GRUBBE. Yes, I would like to give a specific example of a large company work with ATP. This goes back into the '90s, but at that time where we made a proposal for an ATP program around high-temperature, superconducting materials, DuPont had already been involved in a research program that was three years old. And we were debating whether or not to disband that research effort, because it had a lot of high technical uncertainty. So we went ahead and we applied and were given an ATP grant to the tune of $1.5 million. We contributed another $800 thousand to that effort, kept the research going, and was able to achieve some breakthroughs around technology development and it would not have happened without the ATP award. So I don't see it necessarily as welfare. I see it, again, as was mentioned by my colleagues earlier, a form of partnership where it gives assistance and helps one deal with some efforts of uncertainty.

Mr. UDALL. Maybe there is some utility in using some of the language in the debate here when we reformed the welfare system. We talked about work fair. We talked about other benefits of that kind of system. Perhaps there are lessons there that we could use in the 30 seconds we often have to explain why ATP is important.

Mr. Hatano, do you want the last word?

Mr. HATANO. We have spent a lot of time discussing the ATP. A number—and we actually are neutral with regard to ATP. A number of our members believe that ATP is doing solid research that otherwise would not be undertaken because of the risky nature of those particular projects. We have other members who are concerned about the perception that you raised and are concerned that that would distract away from our efforts to increase research at national labs and universities. And given those different views we have within our association, we have decided to be neutral. I would say, though, that you have hit on the broader point of trying to address skeptics to the whole effort we are doing to increase research, not just ATP but NIST, and not just NIST in general, but rather NSF and the broader picture here. Some of the answers that we give them is to point out—put aside the benefits to the overall economy, and just look at the Federal Government as somebody who is making an investment, just as a company, or anyone else, would make an investment.

Looking at the Federal Government as a purchaser of semiconductors and computing power, the Bureau of Economic Analysis at the Department of Commerce projects that spending on com-

puting power was about $9 billion for governments as a whole (Federal, State, and local) in 2003. And if the governments have to buy that same level of computing power at 1994 prices, they would have spent $106 billion. So cumulatively, over the last decade, we have—using the Bureau of Economic Analysis' numbers, about $363 billion of free computing power, that is computing power that they are able to purchase because of the fact that we have continued to lower prices.

So you know, the first point we make is the government needs to spend the money to do the research to allow us to continue on Moore's Law, to allow us to continue to lower costs and benefit not just the whole economy, but also the government in its role as a purchaser as well.

We also note that the government gets a big return in terms of tax revenues from the economic growth in productivity that we are generating. The Congressional Budget Office, as you know, says that we have about a $2 trillion budget deficit over the next 10-year window. And that is assuming that the 0.7 percentage point growth—surge in productivity doesn't continue. So they are assuming that the recent gains we had in productivity doesn't continue into the future. But they do note that computers and other information technologies are transforming our economy and have caused this surge in productivity, arguably, and that is still an open question among economists. But that if, in fact, this is going to be more permanent because of what semiconductors are doing, you have got a huge increase in productivity. I mean, it doesn't sound huge, "0.7 percent," but they note that every tenth of a percentage point in GDP growth represents $236 billion in lowering the federal deficit due to increased tax revenue.

So you have from those investments that you are making in science, you are able to get the productivity increases that the government gets a huge return on in terms of tax revenues and impact on the federal deficit. I think the answer to people who say that the added cost in this time of deficit is a difficult thing for us to deal with, I think the answer is that we can't afford not to make these sort of investments.

Mr. UDALL. Thank you.

Thanks again to the panel.

Chairman EHLERS. The gentleman's time has expired. We will do a brief third round, and call it quits.

First, Mr. Jasinski, it appears that all of the funding for biometrics research development goes to the Department of Homeland Security and the Department of Justice even though NIST is deeply involved in the technical work. Should NIST, in your view, have its own in-house program and funding, and if so, why and how much?

Mr. JASINSKI. Yes, I strongly would recommend that they have their own independent budget. I think that everyone always responds to their funding source and that if you have your own funding source, you are more independent than if you are dependent upon a transfer of funds from another agency the extent of that funding, I think, depends upon the goal that you would want to achieve in trying to establish that. The doubling of their facilities

is really just critical in every sense of the word, both in manpower and equipment.

Chairman EHLERS. Thank you. I appreciate that.

WILL THE ESTABLISHMENT OF INSTITUTIONS SIMILAR TO NIST IN OTHER COUNTRIES CONTRIBUTE TO THE RELOCATION OF INDUSTRY ACTIVITIES, PARTICULARLY RESEARCH AND DEVELOPMENT, TO THESE COUNTRIES?

And Ms. Grubbe, you mentioned about other countries are trying to establish institutions of their own that would replicate NIST. Would these—the existence of these institutions be an incentive for companies to relocate their businesses, particularly their R&D in those countries, and if so, why? And also how would the existence of these institutions stimulate the growth of industry in those foreign countries that are already getting our jobs? Any comment?

Ms. GRUBBE. I am aware of some work going on right now in the European Union with regards to technology standards development. And my impression, and this is primarily through touchstones in the aerospace industry, that it is affecting decisions around what gets imported, where it gets made, because if you are part of the club, so to speak, it is easier for you to accomplish things than if you are sitting on the outside trying to move in. I am also aware that there is some standards development going on in China. I am not an expert in this area of, you know, WiFi, for example, but I know that China is working on some standards in this area and have seen other issues there. So the question becomes where do we want to place ourselves as a nation. Do we want to be the lead dog on the sled or do we want to be somewhere else in line? And my perspective is that our nation's interest is served better and our future is served better and our people are served better if we are the lead dog on the sled if we can afford it, in all cases. And at this point, we are in a spot where we are going where we can't afford that. We are showing that we don't want to invest there, and that is a mistake, I believe.

Chairman EHLERS. All right. Thank you very much. That will conclude our questioning for today. And I certainly want to thank the panelists for attending. I neglected to introduce Dr. Smirgem, who is also in the audience. I have introduced Dr. Bement earlier, but Dr. Smirgem is helping out in taking over one or the other and at NIST as well, and we appreciate your attendance as well.

So it is my pleasure to thank you for everything you have contributed. It has been very, very good and very, very helpful to us as we try to improve the funding for NIST. If there is no objection, the record will remain open for additional statements from the Members and for answers to any follow-up questions the Subcommittee may ask of the panelists. Without objection, so ordered.

The hearing is now adjourned, but I would like to ask the witnesses to join me briefly in the Chairman's lounge: there is something I would like to discuss with you. Thank you very much.

[Whereupon, at 11:30 a.m., the Subcommittee was adjourned.]

Appendix:

Additional Material for the Record

FY 2004 Budget Cut Impacts Summary

The following contains a summary of how the FY 2004 budget cuts will impact NIST. Efforts are being made to minimize staff reductions and elimination of programs necessary to fulfill the NIST mission. The summary was compiled from reports submitted by the individual NIST OUs in January, 2004. The impacts comprise the following:

- missed cost savings to industry and reduced industrial competitiveness
- staff reductions
- missed improvements in homeland security and public safety
- missed benefits to public health
- missed developments and improvements in basic science.

The specific impacts are listed below.

NIST Laboratories—Gaithersburg

Building and Fire Research Laboratory (BFRL)

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

- None planned.

Missed cost savings for industry

- Reduction in materials science and engineering research will result in:
  - **delayed** benefits of reduced cement and concrete testing time and consequent reduced construction time. The work also has $0.4M of support by an industrial consortium.
  - **delayed** benefits of greater inter-operability of building equipment by slowing development of inter-operability standards.

Missed Improvements in Homeland Security, Public Safety, and Critical Infrastructure Protection

- Across the board rescission will have homeland security, public safety, and critical infrastructure protection impacts:
  - **delayed** evaluation of explosive and flammable vapor detectors, a critical first step in development of standardized test procedures
  - **delayed** development of a standard on electronic pre-incident plans for first responders
  - **delayed** benefits of improved security for building automation and control systems due to reduced efforts in software development.
  - **reduction of** an already-decimated national fire grants program, the only federal program supporting fundamental fire research programs at U.S. universities

Chemical Science and Technology Laboratory (CSTL)

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

- Maximum number of anticipated staff reductions: 9

CSTL plans to implement the remaining budget reductions through decreased other object) spending and reduced laboratory overhead costs.

Missed Cost Savings by Industry, Reduced Industrial Competitiveness

- **Delayed** release of the next national reference standard AGA–8 due to research to extend the reference thermodynamic equations-of-state for natural gas being delayed by more than one year. This effort is part of NIST interactions with the American Gas Association in support of its national and international standards for the custody transfer of natural gas. This work directly, which is part of NIST's efforts to support the American Gas Association (AGA) in its develop affects the sales and pricing of natural gas in the market place. In an era of dramatically rising energy prices, the world needs accurate data on which to base commerce.

- Critical data on refrigerant mixtures proposed as possible replacements for existing formulations **delayed** by one year or more. NIST works with the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) to develop predictive models, based on reference standard thermodynamic equations-of-state. Failure by U.S. industry to produce improved replacements for currently used refrigerant blends will weaken the market position for refrigeration and air conditioning equipment (especially in Asia where the Japanese are our biggest competitors) and make it difficult to compete in sales of the refrigerant mixtures in the world market.

Missed Improvements in Homeland Security, Public Safety, and Critical Infrastructure Protection

- **Reduction** to, at best, a one-half staff year effort for the development of computational models and supporting engineering data used for engineering design of advanced cryocoolers (light weight, extremely long lived cryogenic refrigeration devices) required for satellite-and space-borne observation and communication systems, severely reducing NIST output and innovation.

Missed Improvements in Public Health

- **Reduction** of efforts in classical analytical chemistry from eight to three staff-years. Classical methods for chemical analysis are important because more and more of the instruments that are being manufactured are automated "black boxes" with increased uncertainty in the instruments' analytical capabilities. Primary methods like gravimetry, titrimetry, and coulometry are important to maintain a stable comparison basis for our national chemical measurement system across instrument platforms. These budget cuts are expected to adversely affect a broad spectrum of industry and quality of life issues from pollution controls to health care diagnostics. To meet U.S. industry needs we are required to keep pace and even ahead of the industry that we serve in terms of measurement technologies. In the current budget climate, this has come at the expense of "core competencies" like classical analytical chemistry.
- The loss of senior staff at NIST's Center for Advanced Research in Biotechnology is causing severe **reduction** in programs in membrane proteomics, computational biology and bioinformatics. These are areas that have been targeted for significant growth in response to stakeholder interest (FDA, NCI/NIH, and several for profit companies). In addition, the ability of NIST to leverage expertise at the University of Maryland in equivalent areas has all but disappeared. This reduction in our measurements and standards research will make initiatives by NIST to help improve the efficiency and reliability of U.S. industry in the areas of health care, industrial biotechnology, agbiotechnology and biomanufacturing much more difficult.
- NIST lost one of its most productive senior-level scientists. If we are unable to replace this individual because of the reduced funding in the FY04 budget, there will be a severe impact on our ability to fulfill our obligations to the microelectronics industry and other stakeholders. For example, this individual was a critical member of the research team working on the development of SiGe thin film standards for the semiconductor industry (see *New York Times* article July 30th, 2003.) His absence has **delayed** the release of these materials and without a suitable replacement will result in the need to develop different measurement technologies which will **delay** the program by at least 12 months.

Electrical and Electronics Engineering Laboratory (EEEL)

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

NOTE: EEEL will not need a RIF to maintain solvency, largely due to breathing room from the 30-person RIF taken in FY 2003. This is based also on the assumption that the target for cuts is $ 2.4M (excluding carryover rescission), a redirection of $300k of external nanotechnology funding to internal efforts, receipt of $296.8k of new nanotechnology funds from the Physics sub-activity line item, and allocation of $400k of new FY04 Competence funding. EEEL was also given $270k to cover the carryover rescission based on the $811k of AML equipment money that didn't get through procurement in FY03. EEEL served as the buyer for all of NIST's AML equipment and therefore was not held to be responsible for all of the AML part of its carryover.

Missed Cost Savings by Industry, Reduced Industrial Competitiveness

- **Delayed** benefits to industry of basic standards work, including improvements in the SI unit for impedance, by eliminating contractors for making the AML laboratories functional and placing the burden on NIST staff.
- **Eliminated** benefits of plasma processing metrology to the semiconductor industry by no longer providing the techniques, data, and models needed to optimize and thereby reduce the costs of semiconductor processing techniques.
- **Delayed** introduction of advanced manufacturing techniques and additional costs to small and medium size electronics manufacturers due to reductions in planned functionality of the Web Portal for the Inter-operability Testbed.
- **Delayed** introduction of new electronics chip and other products by reduction or elimination of development of semiconductor test methodology to assure quality control.

Missed Improvements in Homeland Security, Public Safety, and Critical Infrastructure Protection

- **Delayed** remediation of vulnerabilities of control systems used by the electric power, water, gas, and other industries by reducing support for development of secure supervisory control system and data acquisition systems (SCADAs).

Information Technology Laboratory (ITL)

- The cuts will impact support of the Federal Government computer security, have impacts on homeland security. They will increase costs to IT and communications equipment manufacturers, communication networks, Internet service providers, health care providers.

Anticipated staff reductions via voluntary separation, details, reductions in force, redirection to reimbursable projects

- 15 (no RIFS are planned; hoping to reduce rolls by 15 through VERA, buyouts, details, and redirection to reimbursable projects).

Missed Improvements in Homeland Security, Public Safety, and Critical Infrastructure Protection

- **Hindered** federal agencies' ability to remediate security vulnerabilities by leaving them without hands-on expert guidance by elimination of NIST's Computer Security Expert Assistance Team (CSEAT) program.
- **Delayed** remediation of a critical set of core Internet vulnerabilities by reducing efforts to develop new Internet security protocols; next generation first responder systems using ultra-wideband (UWB) techniques by reducing support for protocol development; and vulnerabilities of wireless networks used by small business and home users by reduction of efforts in development of minimum security requirements.

Missed Cost Savings by Industry, Reduced Industrial Competitiveness

- **Increased time delay and costs** to commercial laboratories and vendors of product certifications needed for federal procurements by delaying the Federal Information System (FISMA)-mandated development of checklists and guidelines for procurement of commercial off-the-shelf (COTS) security technologies.
- **Delayed** transition to the new Internet Protocol version 6 (IPv6) by cutting efforts to, understand its implementation and use while the core infrastructure continues to operate using the previous version 4, and to provide advice to the National Telecommunication and Information Administration, Department of Defense, and Department of Homeland Security on the transition from IPv4.
- **Increased national annual cost** (to IT developers) due to inadequate infrastructure for software testing estimated to range between $22.2M to $59.5 billion and reduction of quality to the IT industry including Microsoft, IBM, Xerox, Accenture, Intel, and other federal agencies (Defense Advanced Projects Research Agency, National Security Agency, Central Intelligence Agency) by eliminating support for development of automatic test generation (ATG) standards and reduction of development of XML conformance tests.

- **Increased costs** of health care by delaying the development of a framework for exchange of critical health care information in conjunction with the American Telemedicine Association (ATA).
- **Delayed** introduction of IT systems expected to be in the marketplace in under three years and delay in other NIST physical science projects due to reduction in support for: understanding wired and wireless complex networked systems; analyzing and using enormous data and information stored in global cyber systems; building trust and confidence in integrated dynamic systems; and development of unique mathematical and theoretical statistical models to support NIST physical science projects.

Elimination of New Voting Standards Development

- **Termination** of activities under the Help America Vote Act—intended to assure voters' confidence in election systems and singled out as critical at a recent conference on voting standards and technologies needs.

Manufacturing Engineering Laboratory (MEL)

The cuts will increase costs and development times for manufacturers including semiconductor, automotive, and aerospace industries, and cause delays in the remediation of vulnerabilities in critical infrastructure industries such as electric power, water, gas, chemical, manufacturing, and many others.

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

- None planned.

Missed Cost Savings by Industry, Reduced Industrial Competitiveness

- **Delayed** development and **reduction in quality** of next-generation microelectronics standards having sub-50 nanometer features by delay in development in scanning electron microscope (SEM) measurements and modeling.
- **Delayed** development of needed length and force standards for the developing nanotechnology industry.
- **Delayed** development of emerging technologies due to reduction of support in exploratory projects that develop NIST competence and agility in support of the emerging needs of industry.
- **Delayed** development of improved supply chain inter-operability and added costs to manufacturers by delaying integration supply chain integration and measurement standards development resulting from a $500k cut in the Systems Integration for Manufacturing Applications program.
- **Increased costs and difficulties** to U.S. manufacturers globally by reducing U.S. representation in international standardization and conformance testing efforts in the areas of electronic commerce B2B, manufacturing and metrology inter-operability, including product data, process data and simulation technology.
- **Increased costs and difficulties** to U.S. manufacturers globally by reducing U.S. representation in international standardization and conformance testing efforts in the areas of electronic commerce B2B, manufacturing and metrology inter-operability, including product data, process data and simulation technology.
- **Additional costs** to manufacturers conducting business in global markets by reducing MEL participation in international standards to ensure the fair representation of U.S. interests in the technical areas of mass metrology, force metrology, acoustics metrology (including hearing aid standards), mechanical vibration and shock, machine tool performance evaluation methods, and sensor networking and integration.

Missed Improvements in Homeland Security, Public Safety, and Critical Infrastructure Protection

- **Delayed** benefits of greatly increased security for control systems used by the electric power, water, oil and gas, chemical, manufacturing, and many other process control industries by delaying the development of IT security requirements for industrial control systems under the Critical Infrastructure Protection program.

Materials Science and Engineering Laboratory (MSEL)

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

- Maximum number of anticipated staff reductions: 10–15

Missed Cost Savings by Industry, Reduced Industrial Competitiveness

- **Delayed** development of technologies in fuel cells, thermal barrier coatings for jet engines, biomaterials for tissue engineering and implants and nanotubes for electronics by eliminating NIST contribution to beamline operating expenses and contract staff support for the UNICAT team (comprising the University of Illinois, Oak Ridge National Laboratory, and UOP Corporation) at Argonne National Laboratory, which may result in breakup of UNICAT, which has a unique x-ray facility at Argonne.
- **Loss of economic advantage** to U.S. manufacturers via further reduction in the time-to-market for new materials by eliminating support to the NIST Combinatorial Methods Center that would extend mass spectrometer and scan probe microscopy capabilities.
- **Delayed** development of next-generation microelectronic devices by reducing support for the collaboration with International Sematech on Low-k Nanoporous Thin Film Dielectrics.
- **Delayed** development of new nanocomposite materials by cutting work with a small instrument manufacturer for online nanocomposite measurements.
- **Delayed** development of solid oxide fuel cells by delaying NIST introduction of new x-ray methods.
- **Increased** time-to-market time for high-efficiency solid-state lighting, which is projected to result in a $50B annual energy savings, by eliminating support for the EEEL efforts in wide bandgap optoelectronic materials.
- **Reduced** service to customers as a result of reduced support for operations in the NIST Center for Neutron Research:
  - Delayed development of critical new instrumentation and possible default on inter-agency partnerships.
  - Operation of two existing instruments in 2004.
  - Indefinite postponement of the completion of beamlines needed for continuation of high priority Physics and Chemical Science and Technology Laboratory programs, including a competence project for imaging of fuel cells.

Missed Improvements in Public Health

- **Delayed** introduction of lead-free solders by delaying the delivery by NIST of measurements to qualify lead-free solders for high-reliability commercial and military electronics.

Missed Improvements in Homeland Security, Public Safety, and Critical Infrastructure Protection

- **Delayed** developments needed by the Department of Defense, including armor applications, advanced tungsten projectiles to replace depleted uranium, and amorphous metals for structural applications by eliminating NIST funding of the Powder Processing for Defense Applications project, which is now co-funded by the Army.

Physics Laboratory

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

- **Reduction in Force** of two staff and positions eliminated for 11 contractors and guest scientists. Reductions are temporarily relieved by expectation of increased other agency funding, primarily from DHS.

Missed Cost Savings by Industry, Reduced Industrial Competitiveness

- **Delayed or hindered** developments in a broad range of areas including high performance computing, radiation therapy and diagnostics, and nanoscale and optical science and engineering, by reducing contracts and collaborations with

technical experts, industrial consortia, and standards-writing organizations and committees.

- **Reduced** responsivity of the Office of Electronic Commerce for Scientific and Engineering Data (ECSED) to the growing needs of industry and the technical community for critically evaluated reference data delivered to the desktop and the work bench. About 500,000 webpages are downloaded monthly by industry, academia, and other federal agencies from the ECSED website.
- **Delayed** developments by and **reduced** quality for the semiconductor industry by reduction in NIST support for plasma diagnostics.
- **Delayed** development of many new commercial devices, such as the very high information density wavelength division multiplexing (WDM) devices that will increase capacity of existing fiber communication networks, by delaying the development of frequency combs for higher accuracy time and frequency standards.
- **Delayed** development of and **decreased** quality of new semiconductor devices by reducing the x-ray metrology project, which supports the semiconductor industry.
- **Reductions** in developments in basic neutron science due to reduction in support of the Cold Neutron Research Facility research stations.

Missed Basic Science Developments and Improvements

- **Delayed** advances in basic science and ability to discover new phenomena by reduction of grants to universities for measurement research under the Precision Measurement Grant program.

Missed Improvements in Homeland Security, Public Safety, and Critical Infrastructure Protection

- **Delayed** developments of new optical technologies, such as for Homeland Security, microscopy, remote sensing, and industrial applications by reducing support for development of national standards of optical radiation and associated measurement services.

Technology Services (TS)

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

- **Reduction in Force** (RIF) of 10 and elimination of three other positions.

Missed Cost Savings by Industry, Reduced Industrial Competitiveness

- **Increased fees** to private sector users of the National Voluntary Laboratory Accreditation Program (NVLAP), by recovering costs for international NVLAP activities now covered by NIST.
- **Delayed** remediation of unnecessary duplication in conformance assessment programs among federal agencies as provided for by the National Technology Transfer and Advancement Act of 1995 by reassigning NIST staff to perform work previously planned to be done by contractors.
- **Reduced** fair representation of U.S. manufacturers' interests resulting in the increased likelihood of de facto trade barriers being raised by elimination of $515k in grants to the American National Standards Institute (ANSI) to strengthen U.S. representation on international standards development committees.

Office of the Chief Information Officer (OCIO)

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

- None planned

Missed Basic Science Developments and Improvements; Missed Cost Savings by Industry, Reduced Industrial Competitiveness; Missed Improvements in Homeland Security, Public Safety, and Critical Infrastructure Protection

- **Hindered** work of NIST Boulder scientists by deferring procurement of a replacement scientific computing server.
- **Hindered** NIST work by reducing the number of scientific computing packages procured and maintained by OCIO.

NIST Laboratories—Boulder

Electrical and Electronics Engineering Laboratory (EEEL)

Missed Cost Savings by Industry, Reduced Industrial Competitiveness

- **Delayed** deployment of new commercial very high density wavelength division multiplexing (WDM) devices that will increase capacity of existing fiber communication networks as the industry emerges from its slump by delaying the development of high accuracy frequency combs for advanced wavelength metrology.
- **Delayed** in advancements and developments of emerging technologies including wireless, magnetic storage, high-speed digital, IT and electro-optics devices due to delay in delivery of new metrology tools by the electro-optics, nonlinear and nano-magnetics programs.

Missed Improvements in Homeland Security, Public Safety, and Critical Infrastructure Protection

- **Delayed** introduction of commercial chemical and biological sensors, including those to be used for Homeland Security threat detection, by delaying new blue and ultraviolet laser wavelength and detector standards.

Materials Science and Engineering Laboratory (MSEL)

Missed Improvements in Public Health

- **Delayed** medical research developments for the Colorado Health Sciences Center, the National Jewish Medical Research Center, and the Children's Hospital of Denver by cutting the NIST biomaterials reliability program in half, greatly reducing NIST ability to provide measurements of single cell properties.

NIST Extramural Programs

Baldrige National Quality Program (BNQP)

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

- None planned.

Missed Cost Savings by Industry, Reduced Industrial Competitiveness

- Reductions in educational materials and outreach about the Baldrige award criteria and program that helps guide companies, schools and health care institutions to improve management excellence—at a time when quality and budget crises and manufacturing challenges require greater efficiency and strategic thinking.

Manufacturing Extension Partnership(MEP)

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

- Maximum number of anticipated staff reductions: 24 from a total staff of 49.

Missed Cost Savings by Industry, Reduced Industrial Competitiveness

- Reduced support for small manufacturers because of a significant reduction in the total number of Centers as a result of recompetition of all existing MEP Centers within a budget of $20.0M.

Advanced Technology Program (ATP)

Anticipated Staff Reductions Via Voluntary Separation, Details, Reductions in Force, Redirection to Reimbursable Projects

- None planned.

Missed Cost Savings by Industry, Reduced Industrial Competitiveness; Missed Improvements in Homeland Security, Public Safety

- **Reduction** in developments in measurements, standards, homeland security, and public safety through reduction in ATP intramural funding of projects in the NIST laboratories.

STATEMENT BY THE AMERICAN CHEMICAL SOCIETY

Fiscal Year 2005 Appropriations

BY THE AMERICAN CHEMICAL SOCIETY

The American Chemical Society urged the Subcommittee on Commerce, Justice, State, and Judiciary to increase investment in the National Institute of Standards and Technology. ACS supports the President's FY 2005 request to provide $417 million for the NIST Laboratories. This 25 percent increase is needed to address problematic cuts last year and shortfalls in previous years. ACS does not support the proposed termination of the Advanced Technology Program and urges Congress and the Administration to work toward a bipartisan solution to fund ATP at the FY 2004 level of $170.5 million.

ACS supports increased investments in NIST to advance the research, measurement methods, and standards that are vital to American industry and to the Nation's economic competitiveness and security. Increased funding is necessary to meet ongoing private sector needs for NIST measurements and standards as well as growing needs in homeland security, advanced manufacturing, and nanotechnology.

NIST Laboratories

NIST laboratories serve as the technological nerve center for countless products and services across industries. By advancing research, extremely accurate measurement technology, and consensus-based technical standards, NIST enables universal quality control technologies that support industrial productivity and efficiency improvements and faster product development. In addition to fostering economic growth, NIST plays a critical role in advancing public health and safety, environmental progress, and the Nation's security. NIST's calibration and related measurement methods are critical to the national adoption of incredibly precise measurements in areas such as emission control, fuel composition, smoke detector sensitivity, electricity meter readings, the energy efficiency of appliances, and the velocity of light traveling through optical fibers. Without NIST's consensus-based measurement standards and the research and facilities that ensure their cutting-edge quality, companies simply would be less innovative, less efficient, and less competitive in world markets.

ACS is concerned that recent cuts in standards-related programs will hamper NIST's ability to promote international acceptance of U.S. standards and facilitate global trade. Additional funding is also needed to support NIST's increased role in nanotechnology, information technology, and homeland security—including measurement technologies for detecting and countering terrorist threats. ACS applauds NIST's Chemical Science and Technology Laboratory for its high-quality research and technology support for the chemical and other industries. The work performed at NIST laboratories requires cutting-edge laboratory conditions, and ACS supports increased investment in facilities to address problems associated with air cleanliness, temperature and humidity control. Many independent studies show that every dollar invested in NIST measurement and standards programs returns at least three dollars in national economic benefits.

Advanced Technology Program

ACS also continues to support NIST's Advanced Technology Program (ATP), which strengthens the ability of small and large companies across industrial sectors to pursue and accelerate high-risk research and technologies that would not likely be funded absent government support. Small start-up firms, for example, have relied on ATP funding to achieve technological advances that would not otherwise be possible given scarce venture capital funding in many long-term research areas. The ATP program provides an incentive for firms to perform research that has greater risks than typical industrial R&D and holds great promise for broad economic impact. ACS opposes the Administration's proposed termination of ATP, which will impact negatively on economic growth. We urge Congress and the Administration to work toward a bipartisan solution that retains the goals and sustains funding for this program.

STATEMENT OF THE AMERICAN SOCIETY FOR QUALITY

The American Society for Quality (ASQ) wishes to commend the Science Committee for holding hearings on funding for the National Institute of Standards and Technology, an agency that plays an important role in the American quality movement.

ASQ has worked closely with NIST since the mid-1980s. Our organizations came together due to our mutual interest in the need at that time to restore American competitiveness through product and service quality. The result of that interest and need was the establishment of the Malcolm Baldrige National Quality Award, which is administered by NIST's Baldrige National Quality Program office. ASQ has also maintained a close working relationship with NIST over the years on standards-related matters, including most recently standards related to homeland security. As the Nation's leading quality improvement organization, ASQ has been closely involved with the Baldrige Award since its inception. The expertise of ASQ members was instrumental in formation and refinement of the highly acclaimed Baldrige Award Criteria. Furthermore, ASQ represents the primary network of quality professionals in the United States, who form the core of the extensive volunteer activity supporting the Baldrige process throughout the country.

The services provided by NIST in managing the Baldrige Award program are not available elsewhere—due to the unique nature of the Baldrige process and the roles that NIST plays in this unparalleled public-private collaboration.

NIST provides a safe forum for firms to share information about their quality models and processes, which normally would not be shared because of its proprietary nature. NIST has an impeccable reputation for high standards and objectivity, an essential condition for entities to reveal sensitive information about their programs. NIST brings national prestige to the quality improvement initiative.

NIST has proven to be very effective in leveraging the efforts of the private and voluntary sector organizations that provide extensive monetary, professional, and in-kind services and support for the Baldrige Award activities—organizations such as ASQ and the private-sector Foundation for the Malcolm Baldrige National Quality Award.

Baldrige has provided a rigorous, nonpolitical examination process for its applicants that has proven effective in understanding and recognizing those organizations that have achieved superior results because of quality management—and in sharing those results across all sectors. The Baldrige process is perceived as fair, and without its own agenda. In addition, the business, education, and health care communities have expressed the need for a NIST-managed Baldrige program that is independent of agencies with regulatory oversight.

None of these functions can be undertaken by the private sector alone or by another government agency; they are truly unique to NIST.

The Baldrige Award program, a key element in defining quality practices in all sectors of the economy, is affected by the reduction in NIST's funding in two primary ways.

Because of budget considerations, two positions (out of 36) in the Baldrige National Quality Program that have become vacant through staff departures will not be filled.

A second major impact is that NIST will delay its efforts in developing e-processes. These include distance and web-based learning modules for Baldrige Examiners, electronic submission of Baldrige applications, and secure web-based application review by Examiners. These e-processes represent potential cost savings in the administration of the award program and potential cycle-time reductions for applicant feedback. The greatest desire of Baldrige applicant customers is more rapid feedback.

ASQ supports an increase in funding for the Baldrige Award program of $1.5 million for Fiscal Year 2005 that would fund activities related to the expansion of the Baldrige Award to cover the not-for-profit sector. This move will allow the Malcolm Baldrige National Quality Award to reach its full potential as a force for positive change within our nation's economy by permitting not-for-profit organizations, representing a significant portion of the U.S. economy, to apply for the Award and benefit from its assessment and feedback processes.

In addition to ASQ, the independent Foundation for the Malcolm Baldrige National Quality Award, the Baldrige Board of Overseers, the Secretary of Commerce, and the President have all endorsed the expansion, and the Foundation has indicated its willingness to determine additional fundraising that may be necessary to support a new not-for-profit category.

USACM

April 29, 2004

The Honorable Sherwood Boehlert
Chairman, Committee on Science
U.S. House of Representatives
Washington, DC 20510

Dear Chairman Boehlert:

As representatives of two leading computing societies together representing more than 200 computing research institutions and over 85,000 computing professionals, we write to express our great concern with the current funding level for the National Institute of Standards and Technology (NIST) Laboratory Program, and to commend you for your efforts to fund the program at the President's requested level of $422 million for FY 2005.

The NIST Labs have played an important role in the progress of computing research – research that has, in turn, enabled the new economy. Advances in information technology have led to significant improvements in product design, development and distribution for American industry, provided instant communications for people worldwide, and enabled new scientific disciplines like bioinformatics and nanotechnology that show great promise in improving a whole range of health and communications technologies.

Within NIST's Labs, the Computer Security Division (CSD) has played a historic role in computer security by conducting security research on emerging technologies, promoting security assessment techniques, providing security management guidance, and facilitating a greater awareness of the need for security. In particular, the CSD has demonstrated NIST's ability to blend science and technology with commerce by working in partnership with industry and the cryptographic community to develop an Advanced Encryption Standard (AES). The CSD's work on AES and its numerous other contributions have been good for the U.S. government, information technology industry, research enterprise, and the overall security of the Internet.

Current work underway at the NIST Labs will have important impact in cybersecurity and voting technologies, semiconductor manufacturing, and nanotechnology research that could help unlock future advancements in computing. Unfortunately, this work and the successful efforts to recruit a core of talented researchers are in jeopardy as a result of funding levels enacted as part of the FY 2004 appropriations process. The President's request of $422 million for FY 2005 represents the minimum increase required – only enough to cover the cuts Congress imposed last year. To avoid jeopardizing NIST's ability to produce materials trusted by the community, impairing its ability to conduct research, and detracting from some of its vital standards-orientated work, we urge you to make this funding a priority for FY 2005.

The Computing Research Association (CRA) and the U.S. Public Policy Committee of the Association for Computing Machinery (USACM) stand ready to assist you address this important issue. We appreciate your continued support for research and development funding and would be happy to answer any questions you or your staff might have.

Sincerely,

James D. Foley, PhD.
Chair
Computing Research Association

Barbara Simons, PhD. Eugene H. Spafford, PhD.
Co-Chairs, US ACM Public Policy Committee (USACM)
Association for Computing Machinery

STATEMENT BY THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.–UNITED STATES OF AMERICA (IEEE–USA)

The IEEE–USA is pleased to express its support for the National Institute of Standards and Technology, whose laboratory and extramural programs play a critical role in providing essential measurement and other enabling technologies that underpin the competitiveness of U.S. industry. With respect to the FY 2005 NIST budget request, IEEE–USA appreciates and strongly supports the significant increase in funding for NIST's vital laboratory programs but are concerned that the increase will not adequately compensate for the major decrease in funding in the previous fiscal year. We believe that strong reassurances of stability of funding are necessary. Furthermore, we oppose the elimination of the Advanced Technology Program (ATP) and the corresponding reductions to the Manufacturing Extension Partnership (MEP) program.

The ATP provides critical resources for high risk, long-term research and development and relies on cost sharing, peer review and competition to ensure that only deserving proposals are funded. It is a model for collaboration between the Federal Government and the private sector in funding advanced technologies. Over the past decade, the ATP has awarded 709 projects. Four out of five ATP projects result in new products or processes introduced into the marketplace, and half of all ATP projects result in a patent application. One prosthesis technology project alone is projected to deliver $15 billion in the economy. This is exactly the type of payoff Americans expect for their tax dollars.

The MEP has a proven track record of promoting innovation and economic growth. The MEP has helped over 150,000 small and mid-size businesses to grow, modernize, and improve productivity. The MEP program is instrumental to re-vitalizing the manufacturing industry and to creating and keeping jobs in the U.S. Given the significant benefit it provides to American innovation, economic prosperity and job creation, cutting the MEP at this time would be a serious mistake.

We understand the difficult decisions that Congress must make in a very constrained budget environment. However, we believe that eliminating the ATP and reducing the MEP budget is short-sighted and would be detrimental to the United States' international competitiveness. We strongly urge you to support funding the ATP at the level of $145 million and the MEP at $106 million, as provided in the FY 2004 budget, while sustaining the requested budget for the NIST laboratory program.

IEEE–USA is an organizational unit of the IEEE, which was created in 1973 to advance the public good and promote the careers and public policy interests of the more than 225,000 technology professionals who are U.S. members of the IEEE. Our members are employed in industry, academia, and government.

We are submitting this statement for the information of the Committee and ask that it be incorporated into the hearing record.

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May 10, 2004

The Honorable Sherwood Boehlert
Chairman, House Science Committee
2320 Rayburn HOB
Washington, DC 20515

Dear Mr. Chairman:

As a U.S.-based specialty materials company, with over 17,000 employees and annual sales revenue of approximately US$6.4 billion, we ask that you strongly support the National Institute of Standards and Technology (NIST) within the Department of Commerce.

Appropriations Committees in both the House and Senate and the Presidents Council of Advisors for Science and Technology recognize that federal investment in physical sciences and engineering research have over the years provided significant return in U.S. competitiveness, economic strength, environmental improvement, health for citizenry, and positive impact on balance of trade. NIST plays a particularly important central role for the following reasons:

- NIST has had an especially close relationship with industry from its inception. It understands the needs of industry for certain pre-competitive technologies and has a long history of research programs in these areas.
- The result of almost every laboratory or field experiment rests on the quality of a measurement. Excellence in measurement science, driven by NIST, positions U.S. industry and universities to more quickly solve problems. Just as important, increased precision and sensitivity enables significant observations of previously unseen phenomena, often initiating basic studies leading to practical applications of high value for the citizens of the U.S.
- NIST has been the home of an important partnership program, the Advanced Technology Program, which brings together teams of researchers from different organizations to reduce leading edge, but high risk, science to products and services.

This program has repeatedly yielded high returns on the federal investment entrusted to its stewardship. Within these partnerships, 75% of the companies are small or medium sized. Occasionally partnering with a large company provides access to technologies and equipment unavailable to a smaller organization. A Position Paper supporting this program was published earlier by IRI. It is enclosed.

- The Malcolm Baldrige National Quality Award program has inspired many companies to improve the quality of their processes and offerings to customers.
- NIST has been charged with new responsibilities in critical areas such as homeland security, construction safety, and nanotechnology. Congress' recognition of the importance of these areas is laudable but, without appropriately added resources, key core programs of NIST will suffer.
- NIST's work in developing standards is crucial at a time when other nations wish to take the lead in this area. They recognize that those who participate in standards setting generally have a head start in the development of products to meet the standards.

Last year's most unfortunate late budget cuts have resulted in the loss of senior personnel, taking with them years of invaluable experience at a time when it is most needed in NIST's support of job creation. We support this year's administration request of $422 million for the NIST laboratories as a minimum needed to begin the recovery of capability of staff and facilities to address this broad range of responsibilities. We also request the restoration of funds sufficient to sustain and grow two other programs acclaimed globally for their effectiveness, the Manufacturing Extension Partnership and Advanced Technology Program.

We recognize tough decisions must be made in today's economic climate. However, tough times require discipline to adequately support the long-term future. Support of the meta-technologies that underlie so much of the physical sciences is an especially high leverage use of resources. Industry in the U.S. can ill afford to have this valuable resource crippled at such a crucial juncture in our nation's drive to build its innovation capacity.

Thank you for your consideration.

Sincerely,

Gary Calabrese

Dr. Gary S. Calabrese
Vice President
Chief Technology Officer

ASTRA, The Alliance for Science &
Technology Research in America
1155 16th Street, N.W.
Washington, D.C. 20036

April 20, 2004

The Hon. J. Dennis Hastert
Speaker of the House
U.S. House of Representatives
235 Cannon House Office Building
Washington, D.C. 20515

Dear Mr. Speaker:

The undersigned companies, associations, universities, professional societies and individuals write to you representing more than one million scientists and engineers, and 90 percent of America's industrial capacity. We urge Congress to increase investment in the National Institute of Standards and Technology (NIST), which is vital to our industrial innovation, global competitiveness, and national security.

We support the Administration's request to provide $422 million for **NIST's Laboratory Program**. While seemingly high, a 25% increase in large measure will only partly compensate for damaging cuts during FY 2004. Moreover, we oppose the proposed termination of the **Advanced Technology Program** and recent cuts to the **Manufacturing Extension Partnership**.

Sustaining the documented success of the ATP and MEP efforts will require FY 2005 appropriations of at least FY 2003 levels for these programs ($179 and $106 million, respectively). In the last two years, the House has passed three NIST authorizations—for enterprise integration, cybersecurity, and nanotechnology—and we call for these programs to also be properly funded.

NIST Laboratories. The world-leading standards and measurement work carried on by NIST for a century underlies every test or experiment carried out in industry and higher education and provides the foundation for U.S. quality control.

Any list of specific applications is lengthy and impressive and includes: building and fire research, including smoke detector sensitivity, thus preventing deaths every year and dealing with the terrorist threat; bullet-proof body armor; precision machining and semiconductor manufacturing in particular; nanotechnology; cybersecurity; voting technology; fuel composition; and the energy efficiency of appliances. Moreover, the appropriation from Congress provides a foundation for NIST laboratories to conduct critical, and compensated, work on behalf of numerous other Executive Branch agencies.

Many independent studies show that every dollar invested in NIST measurement and standards programs returns at least three dollars in national economic benefits. In the last few years, NIST scientists garnered two Nobel prizes in physics, yet the cuts in the FY '04 budget guarantee a significant reduction in force. Also not to be overlooked are the **Baldrige Quality Award**, and the need to fund multiple new assignments to NIST under the Administration's manufacturing initiative.

Advanced Technology Program (ATP). This program addresses the short-term focus of capital markets that makes it extremely hard for businesses to find funding for promising but long-term and high-risk projects. It marries two time-tested government funding mechanisms: the peer review of scientific grants, and the cost-sharing mechanism typical of weapons development programs.

The resulting ATP program has worked so well that several other nations have copied it. About 75 percent of ATP grants are awarded to small businesses. World "firsts" that have issued from ATP grants include laser-guided boring, digital X-ray and mammography, and corn-derived polymers. A National Academy of Sciences Panel recently concluded, "The ATP is an effective government-industry program."

Manufacturing Extension Partnership (MEP). The MEP program is the only federal program that provides direct support to small and mid-size manufacturers wishing to modernize and to improve productivity. The MEP maintains, in cost-sharing partnership with state governments and fee-paying clients, a national network of 400 assistance centers in all 50 states that have served 150,000 of small businesses to date, notably including defense suppliers.

MEP clients have boosted their capital investment, increased profits as a direct result of their MEP involvement, and have paid increased federal taxes which more than pay for the program itself. We join with the numerous executives who have testified to Congress or the Commerce Department in favor of the program, as well as the 200 members of the House who supported the MEP last year.

We also support increases in the **Malcolm Baldrige National Quality Award Program** of $1.5 million to accommodate a new category for this prestigious program. The Baldrige National Quality Program is focused on strengthening U.S. competitiveness by helping to improve organizational practices, capabilities, and results. An independent study in 2001 by economists Link and Scott documented that this unique, highly-leveraged private-public partnership delivers a benefit-to-cost ratio for the economy as a whole of 207-to-1.

Mr. Speaker, NIST is a vital agency whose work to make American industry the most efficient and productive in the world should be promoted, not cut back.

Sincerely,

The Undersigned (See attached Listing)

cc: Representative Pelosi
Representative Young
Representative Obey
Representative Wolf
Representative Serrano
Representative Boehlert
Representative Gordon
Representative Ehlers
Representative Udall

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Coalition for NIST Funding

Support Signatures for NIST Funding Letter
to U.S. House Speaker Dennis Hastert — April 19, 2004
Bolded Entry indicates Endorsing Organization or Individual

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Center for Internet Security
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Dr. Y. V. Murty
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Dr. Silvia Mioc, President
Colorado Photonics Industry Association
Longmont, Colorado

CombineNet, Inc.
Pittsburgh, PA

Corning Incorporated
Corning, NY

DuPont
Wilmington, DE

Eastman Kodak
Rochester, NY

EDUCAUSE
Boulder, Colorado

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and Lawrence J. Rhoades, President
Extrude Hone Corporation
Irwin, PA

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Information Technology Association of America
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Internet Security Alliance
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President & CEO
INTRINSIC Semiconductor Corporation
Sterling, VA

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Lucent Technologies, Bell Labs Innovations
Murray Hill, NJ

Dr. Sherry Challberg
President and CEO
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Ijamsville, MD

Materials Research Society (MRS)
Warrendale, PA

Bruce Mehlman
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Microsoft Corporation
Redmond, WA

Michael Wojcicki
President
The Modernization Forum
Livonia, MI

Moore Tool Company, Inc.
Bridgeport, CT

National Association of Counties (NACO)
Washington, DC

National Association of Manufacturers (NAM)
Washington, DC

The National Center for Manufacturing Sciences
Ann Arbor, MI

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Dr. Jeffrey S. Vitter
Dean of Science
Purdue University
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Dr. William J. Williams, Chief Scientist
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Frank Bevc
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SPIE — The International Society for Optical Engineering
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Wayne Geyer
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United Telecom Council
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William R. Moroney
United Power Line Council
Washington, DC

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President & CEO, Secat Inc. and
Director, Center for Aluminum Technology
University of Kentucky
Lexington, KY

Dr. David Burress
Associate Scientist/Research
Economist
Policy Research Institute (formerly Institute
for Public Policy and Business Research)
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Chairman, CEO and EVP of
Research and Technology
UtopiaCompression Corporation
Los Angeles, CA

David B. Spencer, Sc. D.
Chief Executive Officer
wTe Corporation
Bedford, Massachusetts

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The National Institute of Standards and Technology (NIST) is a crown jewel of U.S. scientific achievement. Founded in 1901 as the National Bureau of Standards, NIST is administered as a part of the U.S. Department of Commerce's Technology Administration. NIST is an essential part of a now-deteriorating federal scientific infrastructure. A decade-long failure to adequately fund NIST will have dire consequences for U.S. job creation, competitiveness, and scientific leadership in the 21st Century world economy.

U.S. Industry & Science Need A Healthy National Institute of Standards and Technology

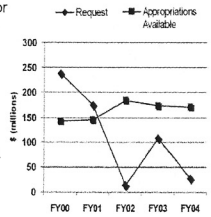
Four critical NIST Programs have been allowed to languish over the past decade, each of which has tremendous impact on **U.S. job creation, innovation, and scientific progress.** Current plans to further cut NIST (i.e. another 14% of its budget in FY 05) and eliminate key programs like the Advanced Technology Program ATP) and putting the Manufacturing Extension Partnership (MEP) on a survival basis may result in the further loss of American jobs, innovation and competitiveness. Even in a tight budget climate, the Nation needs a healthy NIST if it is to have a healthy scientific, technological, and economic future.

Creating New Jobs & Industries: The Advanced Technology Program (ATP): A World-Emulated Program Bridging the Gap Between Invention and Innovation

NIST's **Advanced Technology Program** (ATP) has been one of the most successful of all federal R&D programs. ATP bridges the gap between the lone researcher with a break-through idea, the entrepreneur, the research lab and the market place. ATP creates new jobs and helps struggling small companies survive their perilous journey through the so-called "valley of death," i.e. the period between invention and proof of concept of a technology, and the actual financing, development and commercialization of the technology.

ATP has awarded 709 project grants from a universe of more than 5,200 deserving applications over the past decade. ATP creates partnerships within the private sector. It matches all taxpayer funds, on average, on a one-for one basis. ATP's early stage investment has been accelerating the development of innovative technologies that promise significant commercial payoffs and widespread benefits for the nation.

"Zeroing Out" ATP (Again)



ATP has also changed the way industry approaches R&D. It provides a mechanism for industry to extend its technological reach and "push out the envelope" of what can be attempted. During the disastrous "tech bubble" of 2000-2003 in which trillions of dollars in shareholder value was lost to the U.S. economy, venture capital dried up. Yet ATP was able to salvage a few ideas in spite of funding cuts. Other promising companies, patents and inventions were simply purchased by eager overseas interests.

Out of 709 projects selected by the ATP since its inception, well over half of the projects included one or more universities as subcontractors or joint-venture members. Seventy-nine percent of all single-company awards are won by small firms, and half of all joint ventures are led by small or medium-sized companies. The ATP is the most thoroughly reviewed federal R&D program -- and it has held up to the scrutiny.

A National Academies of Science panel headed by Intel co-founder Gordon Moore (of "Moore's Law" renown) found as follows: ***"The ATP is an effective federal partnership program*** *... [I]t appears to have been successful in achieving its core objective, that is, enabling or facilitating private-sector R&D projects ... where social returns are likely to exceed private returns to private investors."*

NIST Laboratories — From Nobel Laureates to Layoffs

The NIST laboratories play an important, niche-role in today's complex technology-driven economy. Industry relies on the NIST labs for measurements and standards that no one else can provide. We need NIST's measurements and

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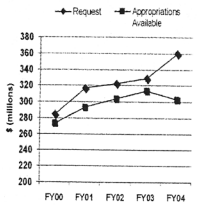
standards capacity so that we can make and improve products and services. For example: measuring and manufacturing nano-sized scale materials and devices; developing new and secure information and communications technologies that work together easily; improving the efficiency and quality of U.S. manufacturing; and enhancing homeland security.

NIST Lab Appropriation Consistently Below Request

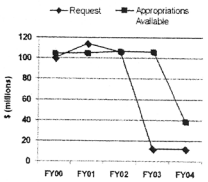


The labs cover practically every area of science and technology. Their work is carried out by a relatively small but very talented team of researchers – ***who have garnered two Nobel Prizes in Physics and a MacArthur "Genius Award" in just the past six years.*** Yet, this year NIST will have to lay off Ph.D. scientists!

The impact of the NIST labs' work is documented in dozens of economic studies showing an enormous return on investment: every dollar invested in NIST labs returns at least three dollars in economic benefits to the nation. Too often, because of their relatively small size, their location in the Commerce Department, and the "nuts and bolts" infrastructural role that the labs play, they are overlooked when R&D budgets are set.

The NIST Manufacturing Extension Partnership (MEP)

MEP Appropriation Down 63% from FY 2003



The MEP is a nationwide network of centers that supports centers that provide hands-on technical and business assistance to smaller manufacturers. Working through not-for-profit managed centers, the Centers are funded by federal, state, local and private resources to serve manufacturers. That makes it possible for even the smallest firms to tap into the expertise of knowledgeable manufacturing and business specialists all over the U.S.

These specialists are people who have had experience on manufacturing floors and in plant operations. Each center works directly with area manufacturers to provide expertise and services tailored to their most critical needs, which range from process improvements and worker training to business practices and applications of information technology. Solutions are offered through a combination of direct assistance from center staff and outside consultants.

Centers often help small firms overcome barriers in locating and obtaining private-sector resources. MEP has assisted over 149,000 firms to date. In a survey of NIST MEP clients served from October 2002 through September 2003, 5,015 companies around the country reported that as a result of NIST MEP services, they: **created or retained 35,028 jobs; increased sales by $953 million and retained another $1.84 billion in sales; invested $940 million in modernization.**

The MEP was sliced by two-thirds despite support by more than 300 Members of Congress

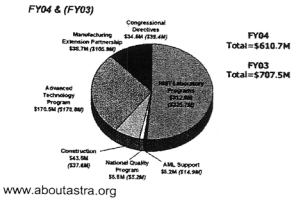
NIST's Malcolm Baldrige National Quality Award Program is a Huge Success ...

... that costs almost nothing — a mere $5 million or so, matched by 20 times that effort in industry — and each year numerous companies have vied for a handshake with the President at the White House. A hypothetical portfolio of the stocks of award-winners has outperformed the S&P 500 Index in 9 years out of 10, and by margins of up to 6:1. How many federal programs far surpass original expectations?

Q: What Can Congress do to Help Restore Discovery, Job Creation & Competitiveness Through NIST?

A: INCREASE NIST FUNDING!

NIST FY 2004 Appropriation Down 14% from FY 2003



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