

Testimony of

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Before the  
United States Senate  
Committee on Commerce, Science, and Transportation

**“Advancing Innovation and Competitiveness”**

March 10, 2010

Chairman Rockefeller, Ranking Member Hutchison, and members of the Committee thank you for the opportunity to appear before you today to discuss the pending reauthorization of the America COMPETES Act and highlight the President's Fiscal Year 2011 budget request for the National Institute of Standards and Technology (NIST). Mr. Chairman, the COMPETES Act, enacted with overwhelming bipartisan support, and signed into law three years ago, provided an unprecedented opportunity to further enhance and accelerate NIST's contributions to innovation and competitiveness. It put forward a clear statement about the importance of federal research and development in supporting U.S. economic prosperity, reflecting the strong support for advancing an "innovation agenda" through the Congress.

The Act provided a focus for and outlined priorities in the physical sciences, defined roles for agencies within the Act as well as the need to interact and coordinate to leverage each agency's particular strengths. The importance of the Act to NIST cannot be overstated and we commend the Chairman and the entire Committee for the vision and leadership that led to its enactment.

### **America COMPETES – Driving Innovation through Support for Science and Technology**

Numerous reports, such as the "Rising Above the Gathering Storm" in 2005, brought into sharp focus for lawmakers, federal agencies, academia, and other key science and technology stakeholders, the challenges facing America's science and technology policy community. In response, Congress enacted the America COMPETES Act that among other things reauthorized NIST. It had a significant impact on NIST by reaffirming the essential linkage between a strong foundation in physical sciences R&D and the Nation's capacity to innovate and compete effectively in a global market.

The COMPETES Act provided NIST with a focus and direction, highlighting the important role of measurements and standards in areas of critical national priority, as well as reemphasizing the important role that NIST plays in manufacturing and innovation by strengthening existing programs and authorities. My testimony today will highlight the importance of the COMPETES Act in each of these areas and touch upon how the foundation laid for NIST in the COMPETES Act provides the basis for this year's request, as well as the starting point for our discussions with you, Mr. Chairman, on the reauthorization of the COMPETES Act.

### **FY2011 Budget Request – Continuing the Vision of COMPETES While Setting the Course for Tomorrow**

In today's global economy, the ability of the United States to remain competitive relies upon our ability to develop and commercialize innovative technologies. The ability of American manufacturers and entrepreneurs to be technologically innovative both drives and is driven by our ability to observe and to measure. If one cannot measure something -- one will not be able to control it. And if one cannot control it -- one will not be able to reliably manufacture it.

NIST's unique role, or niche, is to advance measurements and standards to enable the next generation of innovation, leading to development and commercialization, thus providing our industries critical tools to remain competitive. Working closely with U.S. industry and academia, as well as providing interagency coordination, NIST plays a central role in advancing and

maintaining this technology support system which helps enable innovations and future technologies that lead to the jobs of the future.

The COMPETES Act prioritized resources for the NIST laboratory programs. It also provided new authorization language strengthening the Hollings Manufacturing Extension Partnership (MEP), one of the COMPETES Act's major successes.

The President's FY 2011 budget request for NIST is \$918.9 million, a 7.3 percent increase over the FY 2010 appropriations. The request is a statement that NIST's mission is more important than ever, and highlights the important role that NIST plays under President Obama's agenda for science and innovation. It also continues the commitment to double NIST's laboratory budget as envisioned under the America COMPETES Act.

The request for NIST's laboratory programs is \$584.5 million, an increase of almost \$70 million above FY10 enacted levels. The budget request specifically targets high priority areas, consistent with the direction provided in COMPETES. The request provides unprecedented support for manufacturing and innovation in a number of areas including:  
advanced manufacturing capabilities necessary to capitalize on advances in nanotechnology and to enable rapid prototyping and manufacture of multiple high technology components;  
measurements to enable the efficient manufacture and regulation of biological drugs; and  
tools to support the establishment of sustainable manufacturing practices.

The request also emphasizes NIST's work in high-priority infrastructure such as electric-power Smart Grid and national health care information systems that hold significant promise to transform our society and revitalize the U.S. economy. In order to succeed, the many interconnected components of these systems must be fully interoperable, in order to ensure that they can exchange information and work together seamlessly and securely.

These are daunting challenges, but well suited to NIST. The request enables NIST to build upon its core competencies in this field, and helps to establish a framework of standards and related test protocols, and conformity assessment requirements that would facilitate seamless, end-to-end interoperability for both of these technologies. As a non-regulatory agency, and a respected and trusted technical partner, NIST is uniquely positioned to bring together stakeholders from industry, government, academia and standards development organizations to establish consensus-based interoperability standards and conformity tests. The President's budget request for NIST will support continued efforts in these critical areas as well as provide the infrastructure necessary to address other emerging interoperability challenges.

One of the key initiatives in the FY2011 request provides \$10 million to address scalable cybersecurity for emerging technologies and threats. The initiative will enable NIST to collaborate with academic and government organizations to strengthen U.S. standards for managing "cryptographic keys," secret numbers absolutely vital to protecting the confidentiality and integrity of sensitive information. It also will enable NIST to develop a framework and plan for multifactor authentication that uses interoperable biometric or cryptographic credentials (in addition to passwords) to increase assurance of a user's claimed identity.

The budget also proposes an increase of \$9 million related to sustainable energy sources and nanomaterials development. Sustainability has become a top priority of the nation. Rapid progress will depend on innovations from many quarters, both private and public. However, a prerequisite for U.S. success will be NIST assistance in establishing agreed upon measurement and data evaluation methods to enable the development and manufacture of new technologies. For example, new nanotechnology-based photovoltaic materials—so called third-generation solar technologies—may greatly enhance the absorption properties of photocells through multi-layer structures optimized to absorb light at specific wavelengths spanning the full spectrum of the sun's output. However, the new materials lack the durability needed for commercial applications and developers need measurement tools to systematically optimize the electricity-generating properties of the devices.

NIST's sustainability initiative will have broad impact. It would help manufacturers improve efficiency, quality, and durability, while lowering the cost of third-generation photovoltaics; allow industry and U.S. regulatory agencies to accurately assess and manage the risks posed by key nanomaterials and products containing them throughout a full product lifecycle; and provide consumers with accurate information on EHS risks associated with specific products containing nanomaterials.

The FY2011 request for the MEP program builds upon the foundation COMPETES established. The proposed budget of \$129.7 million represents an increase of \$5 million over FY 2010 enacted levels to support the Administration's policy initiatives for reinventing domestic manufacturing. This program will assist in creating jobs and responding to future challenges and opportunities in the manufacturing sector. Through locally based MEP centers it supports the adoption of technological innovations that spur economic growth and foster development of new products, expanded markets, and process improvements. It will also facilitate adoption of technological innovations by smaller U.S. manufacturers, especially clean technologies and processes that improve manufacturers' competitive position.

Over its 20-year history, the NIST MEP program has partnered with thousands of companies to provide them the tools with which to reinvest in themselves through process improvement and business growth initiatives. These collaborative efforts, working with partners at the state and local level, have led to more sales, opened up new markets, and facilitated the adoption of technology to deliver new products and services. The COMPETES Act further strengthened the MEP to continue to serve as a resource for manufacturing and innovation by expanding and leveraging resources to couple cost reduction strategies with profitable growth through new product development and market expansion.

If enacted, in FY2011 MEP will build upon efforts initiated in FY2010 to implement and provide a number of new services to U.S. manufacturers in order to promote innovation and competitive practices, including:

- The acceleration of technology adoption and the development of new products and processes
- Green and sustainable manufacturing practices and products

- Market diversification to support development of new markets and supply chain opportunities
- An enabled manufacturing workforce that spans all levels of the organization

### **Supporting Technological Innovation Through High-Risk, High-Reward Research**

As well as highlighting the importance of the NIST laboratory programs and strengthening MEP, the COMPETES Act also provided NIST with a new tool to help stimulate technological innovation and catalyze public-private activities in the form of the Technology Innovation Program (TIP).

Launched in 2008, TIP was created to support innovative, high-risk, high-reward research in areas of critical national need where the government has a clear interest because of the magnitude of the problems and their importance to society. This merit-based competitive program funds cost-shared<sup>1</sup> R&D projects by individual small or medium-sized businesses as well as joint ventures, which may include institutions of higher education, non-profit research institutes, government laboratories, and other organizations.

In December 2009, TIP announced the results of its second competition awarding up to \$71 million in funding through 20 new cost-sharing projects that will support innovative, high-risk research in new technologies that address critical national needs. Examples from the successful proposals include: developing unmanned hovering aircraft for bridge inspections, a high-speed sorting system for recycling aerospace metals, and nanomaterials for advanced batteries. The awards will be matched by other funding sources to achieve nearly \$150 million in new research over the next two to five years.

With its focus on broad participation through targeted partnerships with universities and industry, TIP has the potential to have significant impact in developing new, high-potential technologies that have commercial potential and address urgent national needs.

The President's FY2011 budget request recognizes the potential impact of the Technology Innovation Program (TIP), especially in the area of advanced manufacturing, and includes an increase of \$10 million for the program for a total of \$79.9 million. The request, if enacted, will expand the program to motivate and expedite high-risk, high-reward research focused on the development of advanced, disruptive technologies that enable accelerated development of next-generation, high-performance processes and materials in areas such as nanomanufacturing.

The request also provides \$124.8 million for the Construction of Research Facilities, including \$66.1 million in funds targeting the renovation of NIST's facilities in Gaithersburg and Boulder, and providing a sufficient amount of funds for on-going maintenance and repair of NIST's infrastructure.

### **Looking Forward to Reauthorization of COMPETES**

Looking forward, I believe that the foundation established by COMPETES is the right focus for our on-going discussions. The Act recognized that innovation is more than basic R&D and that

we must optimize the entire process from discovery to production to harness the full economic benefits of the nation's science and technology capabilities. I believe that this broad approach is essential to success and that NIST can play a critical role in this effort.

The process of successfully translating ideas born in our laboratories into successful products and services that are made and sold in the United States is characterized by the breadth of participation. From scientists and engineers working in our university, industry and national laboratories, through a broad spectrum of technology transfer mechanisms, with the lawyers and specialists working on intellectual property, to the bankers, venture capitalists and angel investors that provide funding, to our manufacturers, to our sales and marketing experts working in both domestic and international efforts. These broad efforts, while comprised of very different specialties, must all be effective to realize the economic potential of our technological creativity.

As the Committee considers a reauthorization of the America COMPETES Act, I offer some general thoughts on areas for discussion:

While efforts at the "ends" of the innovation process, namely scientific discovery and commercial activity, have well defined participants, the "middle" of the process is characterized by the diverse mixture of participants. This means that our efforts must provide effective ways for federal agencies to form or catalyze working partnerships between government, university, and industry researchers; and also between these groups and the financial, educational, technology transfer, trade experts, and other critical stakeholders. Authorities provided in COMPETES can work to facilitate these types of partnership activities. The TIP program is a good example of this type of program.

The federal government has an important role, but it is not the only player. States and local governments are essential government partners and play a critical role in establishing the right technology "ecosystem" for innovation to flourish. Programs carried out under COMPETES should support these roles and create incentives for effective partnerships with state and local governments.

Technology infrastructure plays a critical role in creating the conditions for the development of new technologies. Infrastructure technologies, like the internet, are disruptive developments since they enable entirely new classes of products and services. Infrastructure technologies are powered by the standards that define how these systems work together. Our efforts in Smart Grid and Health IT have the potential to revolutionize, not only our ability to manage electricity distribution and medical information management, but also the development of new products and services that we cannot yet imagine. This is a major opportunity if we can facilitate the timely development of effective standards – those that define a system so it works, but do not stifle innovation and creativity.

It is not enough to commercialize technology, we must strive to produce it. Manufacturing plays a critical role in the innovation process. Not only because it provides good, high quality jobs, but also because it has a close relationship with engineering and research.

## Summary

For more than 100 years, NIST has maintained the national standards of measurement, a role that the U.S. Constitution assigns to the Federal Government to ensure fairness in the marketplace. Today, the NIST Laboratories address increasingly complex measurement challenges. The FY2011 budget request for NIST reflects the Administration's recognition of the important role that NIST plays in innovation, the impact that the services NIST provides can have on moving the Nation from recession to recovery, and the path this Committee and the Congress had in mind when it enacted the COMPETES Act.

The COMPETES Act set the tone and direction for NIST to be optimally positioned to meet the pressing critical challenges facing the American economy. I look forward to working with the Chairman to ensure that the overall structure of NIST is aligned with these priorities to ensure that NIST is optimally organized to meet the challenges ahead.

The Act envisioned a robust NIST, focused on world class laboratory science, manufacturing, and technological innovation. It challenged NIST to continue to push the envelope of technological innovation, and incentivize industry and academia, in partnership with NIST, to do the same. It correctly recognized NIST's unique capabilities and roles. Those themes are still the right ones to emphasize as we commence discussions on the reauthorization of the Act.

I look forward to working with you, Mr. Chairman, and all the Members of the Committee, to meet the goal of reauthorizing the COMPETES Act.

## **Dr. Patrick D. Gallagher, Director**



Dr. Patrick Gallagher was confirmed as the 14th Director of the U.S. Department of Commerce's National Institute of Standards and Technology (NIST) on Nov. 5, 2009. Gallagher provides high-level oversight and direction for NIST. The agency promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology. NIST's FY 2009 resources total \$1.6 billion and the agency employs about 2,900 scientists, engineers, technicians, support staff and administrative personnel at two main locations in Gaithersburg, Md., and Boulder, Colo. In addition to \$819 million in FY09 appropriations and \$125 million from other agencies, the American Recovery and Reinvestment Act of 2009 provides a total of \$610 million to NIST for building critically needed research facilities, expanding fellowships and research grants, and addressing important national priorities critical to the nation's future.

Gallagher had served as Deputy Director since 2008. Prior to that, he served for four years as Director of the NIST Center for Neutron Research (NCNR), a national user facility for neutron scattering on the NIST Gaithersburg campus. The NCNR provides a broad range of neutron diffraction and spectroscopy capability with thermal and cold neutron beams and is presently the nation's most used facility of this type. Gallagher received his Ph.D. in Physics at the University of Pittsburgh in 1991. His research interests include neutron and X-ray instrumentation and studies of soft condensed matter systems such as liquids, polymers and gels. In 2000, Gallagher was a NIST agency representative at the National Science and Technology Council (NSTC). He has been active in the area of U.S. policy for scientific user facilities and was chair of the Interagency Working Group on neutron and light source facilities under the Office of Science and Technology Policy.

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<sup>i</sup> TIP funds no more than 50% of the total project direct costs, but not indirect costs (such as overhead), profits, or management fees.