

Testimony of

Patrick D. Gallagher, Ph.D.
Under Secretary of Commerce for Standards and
Technology
United States Department of Commerce

Before the
United States House of Representatives
Committee on Appropriations
Subcommittee on Commerce, Justice, Science and Related
Agencies

American Manufacturing and Job Repatriation

March 28, 2012

Chairman Wolf, Ranking Member Fattah, and Members of the Committee, thank you for the opportunity to appear before you today to discuss the importance of manufacturing in the President's fiscal year (FY) 2013 Budget and how the budget promotes sustainable economic growth based on a revitalized American manufacturing sector. The Administration's budget request for the National Institute of Standards and Technology (NIST), and its emphasis on manufacturing reflects the important role that NIST plays as part of President Obama's "*Blueprint for an America Built to Last*." As the President said recently in Annandale, Virginia, "[An] economy built to last demands that we keep doing everything we can to... keep strengthening American manufacturing." Secretary of Commerce John Bryson amplifies that message when he tells us that in order to create good paying jobs, we need to help more American businesses "*build it here and sell it everywhere*." As the Under Secretary of Commerce for Standards and Technology at NIST, I see every day how critical the United States (U.S.) manufacturing base is to our economy.

A recent report by the National Science and Technology Council, "A National Strategic Plan for Advanced Manufacturing," stated that advanced manufacturing is a matter of fundamental importance to the economic strength and national security of the United States.¹ The President has clearly articulated his plan to bolster the U.S. manufacturing base by calling for a national manufacturing strategy and supporting a number of manufacturing initiatives in the FY 2013 budget.

National Manufacturing Trends – Manufacturing is Key to Strong Economy

As President Obama said in his 2012 State of the Union address, "*We have a huge opportunity, at this moment, to bring manufacturing back. But we have to seize it.*" "*The blueprint for an economy built to last,*" he said, "*begins with American manufacturing.*" By itself, if the U.S. manufacturing sector were a country, it would be the 9th largest economy in the world.² There are nearly 12 million jobs in the manufacturing sector.³ These are high-quality jobs.⁴

Manufacturing is also closely tied to our nation's capacity to innovate. Manufacturing makes a disproportionately large contribution to U.S. innovation, accounting for 70% of private sector research and development (R&D) and developing capabilities that support the next generation of products and processes.⁵ Manufacturing represents 60 percent of U.S. exports and must play a critical role in an expansion of our exports and a move toward more balanced trade.⁶ Manufacturing increases economic activity in other sectors, creates jobs up and down the supply chain, and anchors employment in communities around the country. U.S. manufacturing has been losing ground in the face of global competition. China is edging closer to the U.S. in terms of total volume of manufacturing output, and the U.S. has slipped below Germany, Korea, and Japan in the

¹ The National Science and Technology Council, "A National Strategic Plan of Advanced Manufacturing", 2012.

² Bureau of Economic Analysis Manufacturing Industry Data Tables 2010

³ Bureau of Labor Statistics, February Employment Situation Summary, March 9, 2012, Table B-1.

⁴ NSTC *A National Strategic Plan for Advanced Manufacturing* February 2012 pg 2.

⁵ National Science Board, *Science and Engineering Indicators* 2012, Appendix Table 4-14 and Table 3-32.

⁶ Bureau of Economic Analysis and Census, *U.S. International Trade in Goods and Services*.

rankings of R&D intensity in the manufacturing sector, a critical indicator of future job-creating innovation.⁷ More alarming for the long-term health of U.S. innovative capacity is the trade balance in advanced technology manufactured products, many of them invented in the U. S. The trade balance on these products turned negative in 2001, and the gap has widened in the decade since (currently a \$99 billion deficit as measured by the U.S. Census Bureau⁸).

The President recognizes that these trends threaten the long-term economic security of the country and is committed to putting in place the programs and policy that will help reverse these trends and strengthen the U.S. manufacturing base in the long term.

Progress is being made. During the past two years, we have begun to see positive signs in American manufacturing: the manufacturing sector has added more than 425,000 jobs⁹, and more companies are making the decision to “in-source” - bringing jobs back and making it here. The Administration is working in close partnership with community colleges, apprenticeship programs and other training providers to ensure the U.S. has a technical workforce with industrially relevant training and experience required by industry.

Even so, we must do more. Today’s challenges require stepping up efforts to enhance and strengthen the Nation’s underlying technical infrastructure, which is integral to our innovation and advanced manufacturing capabilities.

To reap the economic benefits of our ability to innovate, our Nation’s manufacturing sector must be able to renew itself by adopting new technology and developing new markets. The Nation’s manufacturers must respond quickly and effectively to an ever-changing mix of requirements, risks, and opportunities, from rising energy costs to emerging technologies and markets.

Revitalizing American Manufacturing

Building on the work of the President’s Council of Advisors on Science and Technology (PCAST) and as part of the Administration’s comprehensive effort to secure the future of the Nation’s global competitiveness in manufacturing, the Departments of Commerce, Defense, and Energy worked together to lead an interagency effort under the National Science and Technology Council’s (NSTC) Committee on Technology to assess the patterns and trends in U.S. Advanced Manufacturing. Through this work it became clear that the acceleration of innovation for advanced manufacturing requires bridging a number of gaps in the present U.S. innovation system, particularly the gap between R&D activities and the deployment of technological innovations in domestic production of

⁷ NSTC *A National Strategic Plan for Advanced Manufacturing* February 2012 pg 5.

⁸ The Census Bureau defines Advanced Technology Products using about 500 of some 22,000 commodity classification codes used in reporting U.S. merchandise trade. Each of the 500 codes meets the following three criteria – (1) the code contains products whose technology is from a recognized high technology field, (2) these products represent leading edge technology in that field, and (3) such products constitute a significant part of all items covered in the selected classification code.

⁹ Bureau of Labor Statistics, calculated from Employment, Hours, and Earnings database, March 19, 2012

goods. To guide the Federal government's efforts to address the gaps, the group developed and made public the "National Strategic Plan for Advanced Manufacturing."

The strategic plan lays out a robust innovation policy that would help to close these gaps and address the full lifecycle of technology. It also incorporates intensive engagement among industry, labor, academia, and government at the national, state, and regional levels. Partnerships among diverse stakeholders, varying by location and objective, are a keystone of the strategy.

This new advanced manufacturing plan provides a solid foundation on which to erect a Federal policy that will enable the United States to fulfill Commerce Secretary John Bryson's vision of: "build it here, and sell it everywhere."

The Administration is taking steps to enhance the integration and coordination of manufacturing policy and programs across the Federal government through organizational efforts such as:

- *The White House Office of Manufacturing Policy.* To improve the coordination of manufacturing policy across the Federal government, President Obama announced on December 12, 2011¹⁰ that Commerce Secretary John Bryson and National Economic Council Director Gene Sperling will be co-chairs of the White House Office of Manufacturing Policy. The office has begun to convene cabinet-level meetings to implement and coordinate priority manufacturing initiatives.
- *The Advanced Manufacturing Partnership (AMP).* Launched in June 2011¹¹, AMP identifies opportunities for industry, academia, and government to collaborate in order to accelerate the development and deployment of emerging technologies with the potential to transform and reinvigorate advanced manufacturing in the U.S. The AMP Steering Committee, working through the PCAST framework, is bringing together leading experts from industry and academia, including CEOs of major manufacturing firms and presidents of leading universities, who are working to develop recommendations for catalyzing manufacturing innovation in the U.S.
- *The Advanced Manufacturing National Program Office (AM-NPO).* To effectively coordinate resources targeting advanced manufacturing across the Federal government, NIST will host the Advanced Manufacturing National Program Office (AM-NPO). The AM-NPO is intended to strengthen interactions with the private sector, to enable the private-public partnerships that are fundamental to improving the U.S. manufacturing sector's competitiveness and innovation, and to link these partnerships to relevant Federal resources. A critical aspect of the AM-NPO is its "whole of government approach." A diverse staff, consisting of representatives from federal government agencies including the

¹⁰ <http://www.whitehouse.gov/the-press-office/2011/12/12/president-obama-names-commerce-secretary-john-bryson-nec-chair-gene-sper>

¹¹ <http://www.whitehouse.gov/the-press-office/2011/06/24/president-obama-launches-advanced-manufacturing-partnership>

Department of Energy (DOE), the Department of Defense (DOD), the National Science Foundation (NSF), and NIST, as well as fellows from industry and academia, will exchange information about their advanced manufacturing programs and plans, to enable better coordination. The AM-NPO will also work closely with the NSTC to coordinate policy.

Manufacturing – the President’s FY 2013 Budget Request

In his State of the Union Address, President Obama laid out “A Blueprint for an America Built to Last”. A central pillar of this vision is focused on manufacturing and creating new job opportunities through sound tax policies, enforcement of our trade laws, and investments in innovation, advanced technology, education, and infrastructure.

The President’s FY 2013 budget has a strong focus on strengthening Advanced Manufacturing capabilities and calls for \$2.2 billion for Federal advanced manufacturing R&D at NSF, DOD, DOE, the Department of Commerce (DOC), and other agencies, a 19 percent increase from FY 2012 and over a 50 percent increase from FY 2011.

NIST plays a central role in these efforts, and providing the measurement tools and other essential technical assistance that U.S. manufacturers need to invent, innovate, and produce—more rapidly and more efficiently than their competitors—is a top NIST priority. The FY 2013 President’s Budget (Budget) for NIST lays out a robust set of initiatives that cover the range of the manufacturing lifecycle spectrum to reduce the gap between cutting-edge science and development and the deployment of advanced manufacturing technologies.

NIST Investment in Advanced Manufacturing - FY 13 Budget Initiatives

The Budget includes an \$81 million increase over the FY 2012 enacted level for the NIST laboratory programs, with \$45 million dollars of that investment targeting NIST Laboratory Investments in Advanced Manufacturing.

Measurement Science in support of Advanced Manufacturing: This \$45 million dollar initiative is part of a larger \$135 million overall investment in advanced manufacturing research at NIST. The initiative will focus on:

- *Metrology Infrastructure and Standards to Support Biomanufacturing* – Under this \$10 million initiative, working closely with industry, the Food and Drug Administration, and standards organizations, NIST will develop the measurement infrastructure needed to gain detailed understanding of biomanufacturing processes and design methods that yield higher-quality therapeutic products. Continuous improvements will enable manufacturing processes that are sufficiently adaptable to accommodate manufacture of next-generation treatments.
- *Measurement Science and Standards to Support Nanomanufacturing* –\$10 million will be spent on development of measurement methods to help companies overcome technical barriers to cost-effective, high-volume manufacturing of

- materials, devices, and systems that exploit the exceptional properties exhibited at the nanoscale. This initiative includes \$2 million for nanotechnology-related environmental, health, and safety research to address potential risks of nanotechnology based products.
- *Measurement Science and Standards to Speed Development and Industrial Applications of Advanced Materials* – This \$10 million effort will accelerate NIST efforts in support of the national Materials Genome Initiative, an interagency program with the goal of significantly reducing the time from discovery to commercial deployment of new materials. NIST will focus on standard reference databases, data assessment and validation, standards development and implementation, and modeling and simulation tools.
 - *Measurement Science and Standards to Support Smart Manufacturing* – \$10 million is slated to support smart manufacturing to exploit advances in sensors, data analytics, modeling, and simulation and integrates these technologies to improve manufacturing performance at all levels, from equipment to factory to supply chain. NIST will develop measurement capabilities and standards for automated in-process quality monitoring and control for factory-level production systems. NIST will also build a testbed to help industry, university, and government collaborators develop an open standards platform for facilitating the simultaneous engineering of the physical and virtual components of manufacturing systems.
 - *NIST Manufacturing Fellowships Program* – The Manufacturing Fellowships program will be funded at \$5 million to provide opportunities for engineers and scientists to work with NIST staff on the measurement and standards required to create cutting-edge tools for manufacturers. Fellowships will be available to qualified researchers from companies and non-profit organizations, as well as to recent recipients of bachelor's or master's degrees in relevant fields.

Advanced Manufacturing Technology Consortia Program

The Advanced Manufacturing Technology (AMTech) Consortia program, a \$21 million investment in a new public-private partnership, will develop road maps of long-term industrial research needs and will fund research at leading universities and government laboratories directed at meeting those needs.

The AMTech program was proposed in NIST's FY 2012 budget but was not funded. The proposed program will provide cost-shared funding to industry-guided consortia that are focused on developing advanced technologies to address major technical problems that inhibit development and widespread adoption of advanced manufacturing capabilities in the U.S. By convening key organizations across the entire innovation lifecycle, AMTech will help to create the infrastructure necessary for more efficient technology advancement and transfer, enabling and accelerating the transformation of inventions into commercially viable processes and products. These consortia will identify and conduct precompetitive research to address long-range basic R&D relevant to manufacturing, currently a weak link in the U.S. innovation ecosystem. AMTech will support high-value-added, knowledge-intensive U.S.-made products that respond to new market opportunities and generate high-skilled manufacturing jobs, discover cost-effective methods for making new products that safely exploit nanoscale materials, and develop

new types of manufacturing tools and processes that allow cost-effective and high-quality small batch production and create new market opportunities for small and mid-sized manufacturers.

Hollings Manufacturing Extension Partnership (MEP)

The MEP, a federal-state partnership, has a national network of MEP Centers located in all 50 states and Puerto Rico. Over 1,400 technical experts are associated with the Centers, helping small and medium-sized manufacturers navigate economic and business challenges and connecting them to public and private resources essential for increased competitiveness and profitability.

Focused on U.S. based manufacturers for the past 20 years, MEP continues to evolve its suite of services to better serve America's manufacturing base. In support of the President's manufacturing strategy, MEP has recently developed a Supplier Scouting Program to support the current needs of the manufacturers it serves across the U.S. The Supplier Scouting Program is designed to help identify potential business opportunities for small U.S. manufacturers with specific capabilities and capacities that could be utilized by a larger domestic manufacturer. In response to the *Buy America* requirements of federal agencies and the supplier requirements of the large manufacturers, MEP leverages its vast knowledge of local manufacturer capabilities to identify and pre-qualify supplier capabilities and capacities and provide assistance to suppliers as needed. To further support this goal, MEP launched a new, searchable, web-based resource – the National Innovation Marketplace - to assist manufacturers in using emerging technologies and finding market opportunities and to move ideas from research in the labs to products. The site will enable businesses and entrepreneurs across the country to easily identify and contact more than 2,000 public-private organizations and initiatives designed to assist them.

National Network for Manufacturing Innovation

The President announced a new \$1 billion proposal to create the National Network for Manufacturing Innovation (NNMI)¹². The President's proposal will catalyze a network of up to fifteen Institutes for Manufacturing Innovation around the country. The Institutes will bring together industry, universities and community colleges, federal agencies, such as the Departments of Commerce, Defense, Energy, and the National Science Foundation, and U.S. states to accelerate innovation by investing in industrially-relevant manufacturing technologies with broad applications to bridge the gap between basic research and product development, provide shared assets to help companies – particularly small manufacturers – access cutting-edge capabilities and equipment, and create an unparalleled environment to educate and train students and workers in advanced manufacturing skills. Each Institute will serve as a regional hub of manufacturing excellence, providing the innovation infrastructure to support regional manufacturing and ensuring that our manufacturing sector is a key pillar in an economy that is built to last.

¹² Speech – <http://www.whitehouse.gov/the-press-office/2012/03/09/remarks-president-manufacturing-and-economy>
Press release - <http://www.whitehouse.gov/the-press-office/2012/03/09/president-obama-announce-new-efforts-support-manufacturing-innovation-en>

This model has been successfully deployed in other countries and represents a gap in the U.S. manufacturing innovation infrastructure that the President's proposal will address. We look forward to working with the Committee on legislation related to the establishment of this initiative.

Summary

The President recognizes that we must do more to enhance innovation in the manufacturing sector, support investment in new products, processes, and industries, and invest in the cross-cutting technologies that can improve the competitiveness of U.S. manufacturing.

The FY 2013 NIST budget request reflects the Administration's recognition of the important role that NIST plays in innovation, as well as the impact that the research and services NIST provides can have the Nation's long- term job creation and prosperity.

In addition to the request for the NNMI, more than half of the proposed increased funding in the NIST budget is focused on advanced manufacturing research at NIST laboratories and through grants to industry-guided consortia. NIST will continue its mission to work with the private sector to ensure that U.S. manufacturers have the research support they need to make the best products in the world and remain globally competitive. The NIST laboratory programs, along with its outreach efforts and standards development work, are dedicated to providing U.S. industry with the tools needed to innovate, compete and flourish in today's fierce global economy.

I look forward to working with you, Mr. Chairman and members of the Committee, and would be happy to answer any questions.

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. He also serves as Under Secretary of Commerce for Standards and Technology, a new position created in the America COMPETES Reauthorization Act of 2010, signed by President Obama on Jan. 4, 2011.

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 2012 resources total \$750.8 million from the Consolidated and Further Continuing Appropriations Act of 2012 (P.L. 112-55), with an estimated additional annual income of \$62.7 million in service fees, and \$128.9 million

from other agencies. The agency employs about 2,900 scientists, engineers, technicians, support staff, and administrative personnel at two main locations in Gaithersburg, Md., and Boulder, Colo.

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. Currently, he serves as co-chair of the Standards Subcommittee under the National Science and Technology Council.