

Testimony of

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Assembling the Facts: Examining the Proposed National
Network for Manufacturing Innovation

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Chairman Quayle, Ranking Member Edwards, and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the Administration's National Network for Manufacturing Innovation (NNMI) initiative. As the President has said, "[An] economy built to last demands that we keep doing everything we can to... keep strengthening American manufacturing."¹ Secretary of Commerce John Bryson amplified that message when he told 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 manufacturing base is to our economy.

A 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.² The President has articulated a plan to bolster the U.S. manufacturing base, outlining a blueprint for American manufacturing and supporting a number of manufacturing initiatives in the FY 2013 budget, including the NNMI.

National Manufacturing Trends – Manufacturing is Key to a 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.³ There are nearly 12 million jobs in the manufacturing sector.⁴ These are high-quality jobs.⁵

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.⁶ 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.⁷ Manufacturing increases economic activity in other sectors, creates jobs up and down the supply chain, and anchors employment in communities around the country. Until recently, U.S. manufacturing had been losing ground in the face of global competition. China is edging closer to the United States in terms of total volume of manufacturing output, and the United States has slipped below Germany, Korea, and Japan in the rankings of R&D intensity in the manufacturing sector, a critical indicator of future innovation.⁸ 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

¹ Remarks by the President on the Budget, February 12, 2012; ¹ <http://www.whitehouse.gov/the-press-office/2012/02/13/remarks-president-budget>

² The National Science and Technology Council, "A National Strategic Plan of Advanced Manufacturing", 2012.

³ Bureau of Economic Analysis Manufacturing Industry Data Tables 2010

⁴ Bureau of Labor Statistics, April Employment Situation Summary, May 4, 2012, Table B-1.

⁵ NSTC *A National Strategic Plan for Advanced Manufacturing* February 2012 pg 2.

⁶ National Science Board, *Science and Engineering Indicators* 2012, Appendix Table 4-14 and Table 3-32.

⁷ Bureau of Economic Analysis and Census, *U.S. International Trade in Goods and Services*.

⁸ NSTC *A National Strategic Plan for Advanced Manufacturing* February 2012 pg 5.

in 2001, and the gap has widened in the decade since (a \$99 billion deficit in 2011 as measured by the U.S. Census Bureau⁹).

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, and more companies are making the decision to “in-source” - bringing jobs back and making their products here. The Administration is working in close partnership with community colleges, apprenticeship programs and other training providers to ensure the United States has a technical workforce with the 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 technologies and developing new markets. The Nation’s manufacturers must respond quickly and effectively to an ever-changing mix of requirements, risks, and opportunities, such as 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 advanced 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 manufacturing production. To guide the Federal government’s efforts to address these gaps, the NSTC 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 calls for 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, and part of the requirements to support increased private sector

⁹ 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.

investment in both manufacturing technology development and advanced manufacturing production capacity.

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 to "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 would co-chair the White House Office of Manufacturing Policy. That 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 United States. 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 United States. Those recommendations are expected very soon.
- *The Advanced Manufacturing National Program Office (AM-NPO)*. To effectively coordinate resources targeting advanced manufacturing across the Federal government, NIST is hosting 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 Department of Energy (DOE), the Department of Defense (DOD), the Department of Education (ED), NASA, the National Science Foundation (NSF), and NIST, as well as fellows from industry and academia, will coordinate activities across agencies that have a stake in advanced manufacturing. The AM-NPO will also work closely with the NSTC to coordinate policy.

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>

National Network for Manufacturing Innovation

A centerpiece of the President's efforts to strengthen U.S. manufacturing is the establishment of the National Network for Manufacturing Innovation (NNMI). In his remarks on March 9, 2012 in Virginia, the President announced his proposal to create the NNMI made up of a number of Institutes for Manufacturing Innovation (IMIs) around the country.

The IMIs are designed to 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. state, tribal and local governments to accelerate manufacturing innovation. Specifically, the Institutes will invest 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 and medium-size manufacturing enterprises – 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.

This model has been successfully deployed in other countries and would address a gap in the U.S. manufacturing innovation infrastructure. We look forward to working with Congress on the legislation related to the establishment of this initiative.

To facilitate input from key stakeholders, the participating agencies, led by NIST, have issued a Request for Information specific to the NNMI and have begun a series of workshops across the country to gain insight from academia, industry, other public sector agencies at the state and local level, and private citizens on some of the technical issues regarding the design and structure of a National Network of such Institutes. The first one was held in April at Rensselaer Polytechnic Institute in Troy, NY, with the second scheduled on July 9th in the Cleveland area. Others are still to be scheduled.

This consultative process for the NNMI will have similarities to the consultative process for the pilot Institute (which I will discuss in a minute) but will be broader in scope. Through these outreach efforts, the U.S. Government will seek to identify a wide-ranging set of technology focus areas for the IMIs. The RFI and workshops also will explore institutional design and governance issues, such as the ownership and handling of intellectual property generated by the NNMI and management of the NNMI as a whole to amplify the impact of its member Institutes. All of these elements, if constructed and organized well, will greatly enhance the contribution that these Institutes can make to U.S. manufacturing competitiveness.

Key Principles of the NNMI

In parallel with the RFI and public workshops, an interagency team has been working to define a series of high-level principles that will help guide the programmatic design of the NNMI, focusing especially on the activities and governance of the IMIs and the process of setting up the Institutes in the first place. They are specifically set forth in the following description:

Activities and Governance of the IMIs:

As currently envisioned, each Institute would integrate capabilities and facilities required to address cross-cutting manufacturing challenges that have the potential to retain or expand industrial production in the U.S. on an economically rational basis. IMI activities are envisioned to include: applied research and development and demonstration projects that reduce the cost and risk of commercializing new technologies or solve generic industrial problems, education and training at all levels, development of innovative methodologies and practices for supply chain integration, and engagement with small and medium-size manufacturing enterprises (SMEs).

As currently envisioned, the IMIs would optimally involve a core team of two or more companies, and have significant industrial involvement in the agenda setting of the IMI and direct participation by industry scientists and technologists in IMI projects.

Institute Formation

An inter-agency program management team would be responsible for defining the NNMI and IMIs' organizational design, managing an open, competitive selection process and executing the awards process.

The inter-agency team would define the selection criteria, and identify criteria to add or modify as a result of input received from the public input process, including the RFI noted above.

The Administration anticipates that awards would be in the form of grants, contracts, and cooperative agreements, and could be executed in multiple rounds of awards. Awardees would be expected to show how the federal investment stimulates co-investment from the organizations and institutions making up the partnership entity or from other non-federal sources. Subsequent federal support would be contingent on demonstrating co-investment and progress to sustainable operations as well as progress toward and impact on NNMI goals. IMIs are expected to become financially sustainable within seven years.

Pilot Institute

The NNMI is an exciting opportunity to catalyze our companies, large and small, to work synergistically with one another and with academic and other partners to advance technological innovation at a pace much faster than any one company could on its own. While the process of engaging with industry, academia and other potential stakeholders, and working with Congress, takes time, the President challenged a group of agencies to

do what we could to work together within existing resources and within existing authorities to demonstrate the NNMI concept. To that end, at a March 9th event in Virginia, the President announced the impending creation of a collaborative interagency effort. In April, an interagency team led by the Department of Defense announced that the collaborative effort would focus on additive manufacturing. Additive manufacturing (including “3-D printing”) is a game-changing set of technologies with enormous implications for national security, energy and resource use, and process and product innovation in many sectors of the manufacturing economy.

The technology focus of the pilot was selected in part based on a determined national security need to field unique specialty parts, on-demand, in relatively low volumes. While several agencies already support programs in the area of “additive manufacturing”¹², the pilot affords the opportunity to bring agencies together to make a concerted push towards developing manufacturing tools that will both address an essential national security need and potentially revolutionize the way we mass-customize products.

Broadly speaking, the Department of Defense-led competition is designed to use collaboration among educational and research organizations, and companies – big and small – to convert promising new technology into repeatable manufacturing processes and tools and promote workforce development through unique educational opportunities. This effort will demonstrate the value of problem-solving and asset-building that could also occur on a broader scale with an entire network of Institutes for Manufacturing Innovation.

On May 16, the interagency team hosted an Industry Day to share our ideas about the pilot institute and to answer questions from interested parties. The response was overwhelming – nearly 300 leaders from academia, industry, government, and other organizations attended, prompting us to set up two overflow rooms to handle the crowd. The Industry Day provided an opportunity for networking among potential team partners, and many brought posterboards to show their strengths. We feel confident that we will receive a number of excellent proposals for the pilot institute, again demonstrating the strong demand from industry for the collaborative innovation model envisioned by the President’s NNMI proposal.

Conclusion

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

The NNMI is a critical piece of innovation infrastructure that can help U.S.-based manufacturing to remain globally competitive by fostering cutting-edge technological advances, solving problems of interest to a wide range of manufacturing sectors,

¹² Additive manufacturing is defined in ASMT 2792 as a process of joining materials to make objects from three dimensional model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies.

supporting small and medium-size manufacturing enterprises, and strengthening the skills of workers, managers, and entrepreneurs.

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