AN OVERVIEW OF THE FISCAL YEAR 2014 BUDGET PROPOSAL AT THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

HEARING

BEFORE THE

SUBCOMMITTEE ON TECHNOLOGY

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRTEENTH CONGRESS

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THURSDAY, APRIL 18, 2013

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON TECHNOLOGY
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Subcommittee met, pursuant to call, at 10:03 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Thomas Massie [Chairman of the Subcommittee] presiding.

LAMAR S. SMITH, Texas
CHAIRMAN

EDDIE BERNICE JOHNSON, Texas
RANKING MEMBER

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House of Representatives
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Subcommittee on Technology Hearing

An Overview of the Fiscal Year 2014 Budget Proposal at the National Institute of Standards and Technology (NIST)

Thursday, April 18, 2013
10:00 a.m. - 12:00 p.m.
2318 Rayburn House Office Building

Witness

Dr. Patrick Gallagher, Under Secretary of Commerce for Standards and Technology and Director, National Institute of Standards and Technology

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON TECHNOLOGY

HEARING CHARTER

An Overview of the Fiscal Year 2014 Budget Proposal at the National Institute of Standards and Technology (NIST)

Thursday, April 18, 2013
10:00 a.m. - 12:00 p.m.
2318 Rayburn House Office Building

1. Purpose

On Thursday, April 18, 2013, the Subcommittee on Technology will hold a hearing to examine the Administration's proposed fiscal year 2014 (FY14) budget request for the National Institute of Standards and Technology (NIST).

2. Witness

Dr. Patrick Gallagher, Under Secretary of Commerce for Standards and Technology and Director, National Institute of Standards and Technology

3. Hearing Overview

The National Institute of Standards and Technology (NIST) is a non-regulatory agency within the Department of Commerce. Originally founded in 1901 as the National Bureau of Standards, NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. By working closely alongside industry, NIST has become recognized as a provider of high-quality information utilized by the private sector.

NIST operates two main research laboratories in Gaithersburg, Maryland, and Boulder, Colorado, as well as radio stations in Hawaii and Colorado. NIST also maintains partnerships with the Hollings Marine Labs in Charleston, South Carolina, the Joint Institute for Laboratory Astrophysics (JILA) with the University of Colorado in Boulder, as well as the Center for Advanced Research in Biotechnology (CARB) and the Joint Quantum Institute with the University of Maryland.

NIST employs about 3,000 scientists, engineers, technicians, support, and administrative personnel. NIST also hosts an additional 2,700 associates and facility users from academia, industry, and other government agencies each year. NIST also partners with 1,300

manufacturing specialists and staff at about 400 Manufacturing Extension Partnership (MEP) service locations around the country.[1]

National Institute for Standards and Technology (NIST) Spending

(dollars in millions)

Account	FY12 Enacted	FY13 CR (Annualized)	FY13 CR (final*)	FY14 Request	FY14 Request vs. FY12 enacted	
					$	%
Scientific & Technical Research and Services (STRS)	**567.0**	**570.5**	**577.9**	**693.7**	**126.7**	**22.3**
Construction of Research Facilities (CRF)	**55.4**	**55.7**	**55.8**	**60.0**	**4.6**	**8.3**
Industrial Technology Services (ITS)	**128.4**	**129.2**	**133.0**	**174.5**	**46.1**	**35.9**
Manufacturing Extension Partnership (MEP)	*128.4*	*129.2*	*119.5*	*153.1*	**24.7**	**19.2**
Advanced Manufacturing Technology Consortia (AMTech)	*0.0*	*0.0*	*13.5*	*21.4*	**21.4**	**100.0**
Totals:	**750.8**	**755.4**	**766.7**	**928.3**	**177.5**	**23.6**

**estimate based on final FY13 CR, sequester, rescissions*

NIST Budget Summary

The FY14 budget request for NIST is $928.3 million, an increase of $177 million or 23.6 percent from the FY12 enacted level. NIST received modified funding in the final FY13 continuing resolution, so when comparing the FY14 request with what NIST expects to actually spend in FY13, the year-over-year increase is 21 percent.

The budget for NIST is divided into three main accounts: Scientific and Technical Research and Services (STRS), Construction of Research Facilities (CRF), and Industrial Technology Services (ITS). The FY14 budget also requests an authorization of $1 billion in mandatory spending (as opposed to discretionary spending for other NIST accounts) for a National Network for Manufacturing Innovation (NNMI), first announced by President Obama one year ago.[2] However, the Committee did not receive either authorization legislation or detailed funding information for the new initiative from the Administration last year.

[1] http://www.nist.gov/public_affairs/general_information.cfm (Updated April 11, 2013).
[2] http://www.whitehouse.gov/the-press-office/2012/03/09/president-obama-announce-new-efforts-support-manufacturing-innovation-en

Scientific and Technical Research and Services (STRS)

The FY14 budget request would provide $694 million for NIST's Core Laboratory research programs in the Scientific and Technical Research and Services (STRS), an increase of $127 million over the FY12 enacted. The proposed increase for STRS focuses on the following initiatives: supporting Advanced Manufacturing activities ($50 million); cybersecurity research and standards ($15 million) and education ($1 million); developing measurement tools and standards for cyber physical systems ($10 million); advancing broadband communications ($10 million); creating a competitive grant program for Universities to establish four NIST Centers of Excellence ($20 million); addressing challenges within Forensic Science ($5 million); support for Health Information Technology testing and conformance ($3 million); disaster resilience ($5 million); and continued support for the National Strategy for Trusted Identities in Cyberspace (NSTIC) ($8 million).

Construction of Research Facilities (CRF)

The FY14 budget request for Construction of Research Facilities (CRF) is $60 million, an eight percent increase over the FY12 enacted level. CRF funding would support construction of new facilities and maintenance and repair of existing NIST buildings.

Industrial Technology Services (ITS)

In addition to the NIST laboratories, NIST manages several extramural programs supporting industry. The FY14 budget request for Industrial Technology Services (ITS) is $175 million, an increase of $46 million or 36 percent over the FY12 enacted level.

ITS funding includes $153 million for the Manufacturing Extension Partnership (MEP) program, and $21 million for the Advanced Manufacturing Technology (AMTech) Consortia Program.

The $153 million request for the Manufacturing Extension Partnership (MEP) program is a $25 million or 19 percent increase from the FY12 enacted level. The MEP program is a public/private partnership run by Centers in all 50 states and Puerto Rico that provides technical assistance for small- and medium-sized manufacturers to modernize their operations and adapt to foreign competition. MEP Centers are supported by equal contributions from federal funds, state funds, and industry client fees.

The proposed MEP increase would support a new initiative, the Manufacturing Technology Acceleration Centers (M-TAC) program, which would create teams of experts in specific technology/industrial sectors, offering specialized services to groups of small manufacturing firms with the goal of strengthening the supply chain for specific technologies. The requested funding increase would support 3-4 pilot M-TACs in FY14.

The FY14 budget request includes $21 million for the Advanced Manufacturing Technology Consortia (AMTech) Program, an increase of 45 percent over FY13 appropriated funding of $14.5 million. This program has not been authorized. Modeled after the Nanoelectronics Research Initiative (NRI), a partnership between NSF, NIST, industry, and universities across

the nation, the AMTech program will establish industry-led consortia to identify and prioritize research projects supporting long-term industrial research needs. The program will provide cost-shared funding to 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 United States.

The budget request also includes $20 million to establish four competitively selected Centers for Excellence in measurement science areas defined by NIST. Under this program, grants would be awarded to multi- or single university centers for five to seven years to provide an interdisciplinary environment where NIST, academic, and industry researchers can collaborate on basic and applied research focused on innovations in measurement science and new technology development. The FY13 CR also included $20 million for this program.

NIST currently operates six laboratory units which conduct research and development for measurement science, standards, and technology:

- **Material Measurement Laboratory (MML):** The MML serves as the national reference laboratory for measurements in the chemical, biological, and material sciences. The MML provides measurement services used by a broad set of industries including but not limited to: healthcare (biomarkers), renewable energy (measuring the quality of fuels) and forensic science (biometric identification techniques).
- **Physical Measurement Laboratory (PLM):** The PLM develops and disseminates the national standards of measurement, e.g., length, mass, force and shock, acceleration, time and frequency, electricity, temperature, humidity and pressure. This information supports consistent timekeeping, on which many technologies like GPS rely, and underpins the safety of our national electricity grid.
- **Engineering Laboratory (EL):** The EL develops and disseminates advanced manufacturing and construction technologies, guidelines, and services to the U.S. manufacturing and construction industries. Examples of EL work include researching ways to reduce the spread of fire in residential buildings and developing performance metrics for advanced manufacturing processes.
- **Information Technology Laboratory (ITL):** The ITL develops and disseminates standards, measurements, and testing for interoperability, security, usability, and reliability of information systems, including cyber security standards and guidelines for federal agencies and U.S. industry. ITL works in areas such as cloud computing, health information technology, and advanced voting technologies.
- **Center for Nanoscale Science and Technology (CNST):** The CNST is the only national nanotechnology center focused on commerce. The facility offers shared space – utilized by a variety of public and private stakeholders – for nanoscale fabrication and measurement, and develops innovative nanoscale measurement and fabrication capabilities.
- **Center for Neutron Research (NCNR):** The NCNR provides a national user facility, utilized by universities, government and industry, to study neutron-based measurement capabilities. The level of measurement capabilities is unavailable anywhere else in the country, allowing researchers to answer questions in nanoscience and technology with a broad range of applications.

National Network for Manufacturing Innovation (NNMI)

The FY14 budget request includes a proposal for $1 billion in mandatory funding to revitalize U.S. manufacturing through the establishment of a National Network for Manufacturing Innovation (NNMI). The NMMI anticipates collaboration between NIST, the Department of Defense, the Department of Energy, the National Science Foundation, the National Aeronautics and Space Administration, and other agencies to promote the development of manufacturing technologies with broad applications and to support manufacturing technology commercialization by bridging the gap between the laboratory and the market. Although the program has not been authorized, the Administration diverted funds from other programs to establish the National Additive Manufacturing Innovation Institute or NAMII in Youngstown, Ohio in August 2012. [3]

The NAMII is a pilot project separate from current NIST manufacturing programs, such as the Manufacturing Extension Partnership program and Advanced Manufacturing Technology Consortia. The Administration announced plans to launch three additional pilots (through DOD and DOE) in the 2013 State of the Union address, but has not provided any additional information on these pilots in the NIST budget.

[3] http://manufacturing.gov/nnmi_pilot_institute.html

Chairman MASSIE. The Subcommittee on Technology will come to order.

Good morning. Welcome to today's hearing entitled "An Overview of the Fiscal Year 2014 Budget Proposal at the National Institute of Standards and Technology." In front of you are packets containing the written testimony, biographies, and truth-and-testimony disclosures for today's witness panel. I now recognize myself for five minutes for an opening statement.

Today, we examine one portion of the President's budget proposal—the Fiscal Year 2014 budget request for NIST. Last week, I had the opportunity to visit NIST's campus in Gaithersburg, Maryland, and to see a sample of ongoing research activities. In my time there, I was able to visit the Net-Zero Test Facility, the Center for Nanoscale Science and Technology, and the Center for Neutron Research. Dr. Gallagher, I want to thank you and let you know that your staff took very good care of me and my staff as well. And their enthusiasm for NIST's work was apparent throughout my tour.

The Fiscal Year 2014 budget request for NIST totals $928 million, an increase of $177.5 million or almost 24 percent from the Fiscal Year 2012 enacted level. Now, this Committee has a long, bipartisan record of support for NIST and its contributions to research and development, but I think I need to repeat that figure. The President has requested a 24 percent increase for NIST in Fiscal Year 2014. That type of increase in a time of decreasing budgets will be very difficult to achieve and require significant changes in other areas.

The requested increases would be devoted in large part to bolster advanced manufacturing initiatives by NIST, as well as in areas such as cybersecurity, disaster resilience, forensic science, and broadband communications.

We are here today to learn more about the justification for this request and I am appreciative of the opportunity to learn more about how Fiscal Year 2014 funds would be prioritized by NIST. I thank our witness, Dr. Gallagher, for his time today.

I now recognize the Ranking Member, the gentlelady from Florida, Ms. Wilson, for an opening statement.

[The prepared statement of Mr. Massie follows:]

PREPARED STATEMENT OF CHAIRMAN THOMAS MASSIE

Good Morning. I would like to welcome everyone to today's hearing. Today we will examine the fiscal year 2014 budget request for the National Institute of Standards and Technology (NIST).

I would like to thank Dr. Gallagher for appearing before us today.

Today, we examine one portion of the President's budget proposal, the fiscal year 2014 budget request for NIST. Last week I had the opportunity to visit NIST's campus in Gaithersburg, Maryland, and to see a sample of ongoing research activities. In my time there, I was able to visit the Net Zero Test Facility, the Center for Nanoscale Science and Technology, and the Center for Neutron Research. Dr. Gallagher, I want you to know that your staff took good care of me, and their enthusiasm for NIST's work was apparent throughout my tour.

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Ms. WILSON. Thank you, Chairman Massie, for holding this morning's hearing to examine the Fiscal Year 2014 budget request for the National Institute of Standards and Technology. I would also like to thank Dr. Gallagher for testifying today and for his leadership in NIST. It is good to see you again, Dr. Gallagher.

NIST is an economic engine for this Nation. For more than 100 years the Institute's broad and deep technical expertise has advanced measurement science, standards, and technological innovation, strengthening our manufacturing sector and boosting innovation. In this time of painfully high unemployment, we need NIST. We need NIST's expertise more than ever.

And this time in which developing nations are taking the lead not only in assembling products, but also inventing products, we need strategic investment in research, development, and education. I am pleased that the President's budget recognizes the importance of NIST and gives the agency a prominent role in the Administration's efforts to revitalize American manufacturing.

The Administration's budget includes a number of initiatives that can strengthen and reinforce the competitive position of the United States. For instance, the Advanced Manufacturing Technology Consortia program that will create public-private partnerships to address technical barriers that are stopping the growth of advanced manufacturing here at home. It simply makes sense to leverage Federal resources to bring companies together to solve common challenges. It bolsters innovation and creates jobs. And that is what we should be concerned about: jobs, jobs, jobs.

The President's proposal also advances emerging fields such as biomanufacturing and nanomanufacturing. This research will provide a foundation for new and existing companies to flourish, producing high-quality, high-paying jobs that will remain with us over the long haul. Whether we like it or not, the truth is that most of our competitors are putting significant and targeted resources towards helping businesses, small and large, accelerate the commercialization of innovative technologies. They are doing it. I don't think we can afford to just stand by and watch these companies set up shop somewhere else. I don't think we can afford to just watch as these technologies and jobs take hold somewhere else.

We need to support the Administration's proposal for a National Network for Manufacturing Innovation. This proposal is intended to help bridge the gap from research and development to commercialization through proof-of-concept activities and direct collaboration with industry. It is also intended to build up the skills of our workforce, preparing students for the manufacturing jobs of the future. I often worry about the class of 2013, high school and college. While some questions remain about these manufacturing institutes, I believe the concept has merit and I am looking forward to learning more about it today.

I am also interested in learning more about how the current budget request will advance NIST's effort to make our communities more resilient to natural disasters. I was born and raised in South Florida. I have seen my fair share of the devastation of severe weather. While we cannot stop hurricanes, tornadoes, or earthquakes from happening, we can and must do all that we can to make sure that our communities have the capacity and the tools they need to respond and recover from these events.

Mr. Chairman and I look forward to working with you and our colleagues to ensure that NIST has the resources it needs to fulfill its crucial role of promoting innovation, increasing competitiveness, and enhancing our security. And I yield back the balance of my time, two seconds.

[The prepared statement of Ms. Wilson follows:]

PREPARED STATEMENT OF RANKING MINORITY MEMBER FREDERICA S. WILSON

Thank you, Chairman Massie, for holding this morning's hearing to examine the fiscal year 2014 budget request for the National Institute of Standards and Technology. I'd also like to thank Dr. Gallagher for testifying today and for his leadership at NIST. It's good to see you again.

NIST is an economic engine for this nation. For more than 100 years, the institute's broad and deep technical expertise has advanced measurement science, standards, and technological innovation—strengthening our manufacturing sector and boosting innovation.

In this time of painfully high unemployment, we need NIST's expertise more than ever. In this time in which developing nations are taking the lead not only in assembling products but also in inventing products, we need strategic investments in research, development, and education.

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The Administration's budget includes a number of initiatives that can strengthen and reinforce the competitive position of the United States. For instance, the Advanced Manufacturing Technology Consortia program will create public-private partnerships to address technical barriers that are stopping the growth of advanced manufacturing here at home. It simply makes sense to leverage federal resources to bring companies together to solve common challenges. It boosts innovation and creates jobs.

The President's proposal also advances emerging fields such as biomanufacturing and nanomanufacturing. This research will provide a foundation for new and existing companies to flourish-producing high-quality, high-paying jobs that will remain with us over the long-haul.

Whether we like it or not, the truth is, that most of our competitors are putting significant and targeted resources towards helping businesses—small and large—accelerate the commercialization of innovative technologies. I don't think we can afford to just stand by and watch those companies setup shop somewhere else. I don't think we can afford to just watch as those technologies and jobs take hold somewhere else. We need to support the Administration's proposal for a National Network for Manufacturing Innovation.

This proposal is intended to help bridge the gap from research and development to commercialization through proof-of-concept activities and direct collaboration with industry. It is also intended to build up the skills of our workforce—preparing students for the manufacturing jobs of the future. While some questions remain about these manufacturing institutes, I believe the concept has merit and I am looking forward to learning more about it today.

I'm also interested in learning more about how the current budget request will advance NIST's efforts to make our communities more resilient to natural disasters. Born and raised in South Florida, I have seen my fair share of the devastation of severe weather. While we cannot stop hurricanes, tornadoes, or earthquakes from happening, we can and must do all that we can to make sure that our communities have the capacity and the tools they need to respond and recover from these events.

Mr. Chairman, thank you again for holding this hearing and I look forward to working with you and our colleagues to ensure that NIST has the resources it needs

to fulfill its crucial role: promoting innovation, increasing our competitiveness, and enhancing our security.

Chairman MASSIE. Thank you, Ms. Wilson.

If there are Members who wish to submit additional opening statements, your statements will be added to the record at this point.

At this time I would like to introduce our witness. Our witness is Dr. Patrick Gallagher, the Under Secretary of Commerce for Standards and Technology and the Director of the National Institute of Standards and Technology. Dr. Gallagher is the 14th Director of NIST and the first to hold the position of Under Secretary of Commerce. He received his Ph.D. in physics at the University of Pittsburgh. Thanks again to our witness for being here this morning.

As our witness should know, spoken testimony is limited to five minutes after which the Members of the Committee will have five minutes each task questions. I now recognize Dr. Gallagher to present his testimony.

TESTIMONY OF THE HONORABLE PATRICK GALLAGHER UNDER SECRETARY OF COMMERCE FOR STANDARDS AND TECHNOLOGY, AND DIRECTOR, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Dr. GALLAGHER. Chairman Massie, thank you very much for this opportunity to be here today, and Ranking Member Wilson, it is great to see both of you. And since this is my first official event in front of the Subcommittee, let me congratulate both of you on your leadership positions and to say for the record that I am looking forward to working with both of you.

Today, I would like to discuss and give you a quick overview of the President's Fiscal Year 2014 budget request for NIST. This budget reflects the important role that NIST plays as part of the President's "Plan to Make America a Magnet for Jobs by Investing in Manufacturing."

From transforming communities across the country into global centers of manufacturing through the establishment of the National Network for Manufacturing Innovation to strengthening supply chains through MEP to supporting innovative manufacturing technologies by investing in the R&D of the NIST laboratories, the proposed Fiscal Year 2014 budget reflects NIST's role in the Administration's efforts to strengthen manufacturing through critical investments in research and development.

NIST's mission is to promote innovation and industrial competitiveness through advancing measurement science, standards, and technology and it is well-aligned with the priority goals articulated by the President. The NIST budget is comprised of three discretionary spending accounts, as well as a mandatory proposal.

Mr. Chairman, the President's discretionary funding request for $928.3 million reflects an increase of 177.5 million above Fiscal Year 2012 enacted levels, and more than half of the proposed increased funding would be focused on advanced manufacturing research both at NIST laboratories and through industry-led con-

sortia. This budget was carefully crafted to address pressing needs for standards and measurement work principally in emerging technology areas and to provide the seed funding to encourage industry and academia to come together to address common technology problems that are too large for individual institutions to tackle by itself.

The request for the laboratory programs of $693.7 million recognizes the important role NIST labs play in advancing innovation. The request is an increase of 126.7 million from the Fiscal Year 2012 enacted level. Within the request, current Administration priority areas targeted for budget increases include advanced manufacturing, cybersecurity, healthcare information technology, disaster resilience, forensics, advanced communications, and the NIST Centers of Excellence Program. The request will help ensure that NIST laboratory research, facilities, and service programs continue to work at the cutting edge of science and will assist U.S. industry as well as the broader science and engineering communities with the measurements, data, and technologies they need to further innovate and make sure the United States remains industrially competitive.

The request for the NIST Industrial Technology Services account is $174.5 million representing an increase of $46.1 from the Fiscal Year 2012 enacted level. The account includes $153.1 million for the Hollings Manufacturing Extension Partnership program, or MEP, and $25 million for the Advanced Manufacturing Technology Consortia program, or AMTech. AMTech will establish industry-led consortia to identify and prioritize research projects supporting long-term industrial research needs.

The Construction of Research Facilities request is $60 million. This is an increase of about $5 million. The increased funding will allow NIST to reduce the backlog of maintenance projects on its facilities and to improve the overall condition of them. This construction request also provides for the first year of a major project to renovate Wing 5 of the Building 1 laboratory complex at NIST's Boulder facility. This building has been undergoing renovations in stages for some years now and the continuation of this project is critical.

As part of the Administration's effort to revitalize manufacturing, the budget proposes a $1 billion mandatory account to establish a National Network for Manufacturing Innovation, or NNMI, which aims to bring together companies, universities, and community colleges.

Mr. Chairman, also included in this request are scientific programmatic initiatives that are tied to the overarching themes of this budget. In addition to the strong advanced manufacturing request, the cybersecurity request for protecting the Nation's cyber infrastructure is a top priority of the Administration. The initiative will enable NIST to strengthen its core cybersecurity R&D program that are the critical foundation upon which our ability to effectively engage with industry on cybersecurity is built.

The NIST laboratory programs, along with its outreach efforts and standards development work, are dedicated to providing U.S. industry with the tools they need to innovate and compete and

flourish in today's fierce global economy. And I look forward to working with you and the Members of the Committee.

Thank you.

[The prepared statement of Dr. Gallagher follows:]

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 Science, Space, and Technology
Subcommittee on Technology

An Overview of the Fiscal Year 2014 Budget for the National Institute of Standards and Technology

April 18, 2013

Chairman Massie, Ranking Member Wilson, and members of the Subcommittee, thank you for the opportunity to appear before you today to present the President's Fiscal Year (FY) 2014 budget request for the National Institute of Standards and Technology (NIST). This budget reflects the important role that NIST plays as part of President Obama's Plan to Make America a Magnet for Jobs by Investing in Manufacturing" that was laid out in the State of the Union. From transforming communities across the country into global centers of manufacturing through the establishment of the National Network for Manufacturing Innovation (NNMI) to strengthening supply chains through MEP, to supporting innovative advanced manufacturing technologies by investing in the R&D of the NIST laboratories, the proposed FY 2014 budget reflects NIST's critical role in the Administration's efforts to strengthen manufacturing through critical investments in key research and development areas.

The NIST mission is to promote U.S. innovation and industrial competitiveness through measurement science, standards and technology. This mission is very well-aligned with the priority goals as articulated by the President. The FY 2014 budget for NIST reflects that alignment. The NIST budget is comprised of three discretionary spending accounts, as well as a mandatory proposal.

Mr. Chairman, the President's discretionary funding request for $928.3 million, excluding transfers, reflects an increase of $177.5 million above FY 2012 enacted levels. More than half of the proposed increased funding would be focused on advanced manufacturing research both at NIST laboratories and through a new industry-led consortia program. This budget was carefully crafted to address pressing needs for standards and measurement work in emerging technology areas and provide seed funding to encourage industry and academia to come together to address common technology problems too large for individual institutions to tackle. Moreover, this budget is consistent with the President's Plan for Science and Innovation and the goals of the America COMPETES Reauthorization Act of 2010, both of which call for significant increases in basic federal R&D funding to make America more competitive.

Scientific and Technical Research and Services (STRS) Account
For the NIST Scientific and Technical Research and Services (STRS) account, which funds our laboratory programs, the 2014 President's Budget request of $693.7 million recognizes the important role NIST programs play in advancing innovation. The request is an increase of $126.7 million from the FY 2012 enacted level. Within the $693.7 million request, current Administration priority areas targeted for budget increases include Advanced Manufacturing, Cybersecurity, Healthcare IT, Disaster Resilience, Forensics, Advanced Communications, and NIST Centers of Excellence in measurement science and new technology areas The request will help ensure that NIST research laboratories, facilities and service programs continue to work at the cutting edge of science to ensure that U.S. industry, as well as the broader science and engineering communities, have the measurements, data and technologies they need to further innovation and industrial competitiveness.

Industrial Technology Services (ITS) Account
For the NIST Industrial Technology Services (ITS) account, the budget requests a total of $174.5 million, an increase of $46.1 million above the FY 2012 enacted level. The account includes

NIST's external programs: the Hollings Manufacturing Extension Partnership (MEP) program and the Advanced Manufacturing Technology Consortia (AMTech) program.

The request includes $153.1 million for MEP, a $24.7 million increase from the FY 2012 enacted level. MEP is a Federal-State-private sector partnership that provides U.S. manufacturers with access to technologies, resources, and industry experts. The program consists of MEP Centers that work directly with their local manufacturing communities to strengthen the competitiveness of our Nation's domestic manufacturing base. The budget request for MEP includes newly requested funding of $25.0 million for MEP Manufacturing Technology Acceleration Centers (M-TAC).

The request also includes $21.4 million for the AMTech program. This program will establish industry-led consortia to identify and prioritize research projects supporting long-term industrial research needs. AMTech creates the incentive for manufacturers to share financial and scientific resources with universities, state and local governments and non-profits. The proposed program is a critical component of the Administration's emphasis on advanced manufacturing as a way to accelerate innovation and create high-quality U.S. jobs.

Construction of Research Facilities (CRF) Account
The budget requests $60 million for the Construction of Research Facilities (CRF) account which is a $4.6 million increase over the FY 2012 enacted level. The increased funding will allow NIST to reduce the backlog of maintenance and repair projects by up to three percent and improve NIST's overall Facilities Condition Index (FCI)—a measure of a building's condition relative to its intended purpose—by a similar amount. This construction request also provides for the first year of a major project to renovate Wing 5 of the "Building 1" laboratory complex at NIST's Boulder, Colorado facility. The increase in funding for the Wing 5 renovation is balanced by a decrease in funding for the renovation of Wing 6, which will be completed using funding from FY 2013. Critically needed renovations to the 60 year old Building 1 in Boulder began in FY2010. The building houses the majority of research and measurement laboratories on the NIST Boulder campus, supporting discovery and development in a number of critical areas, including public safety communications and telecommunications, precision timing, electromagnetic interference, and quantum computing.

Mandatory Funding Account
As part of the Administration's efforts to revitalize manufacturing, the President's budget proposes a $1 billion mandatory account to establish a National Network for Manufacturing Innovation (NNMI), which aims to bring together companies, universities and community colleges, and government to co-invest in the development of cutting-edge manufacturing technologies.

Mr. Chairman, also included in this request are scientific and programmatic initiatives that are tied to the overarching themes of this budget: Advanced Manufacturing, Cybersecurity, Advanced Communications, Forensic Science and Disaster Resilience. These themes directly relate to the President's plans for an innovative and vibrant economy built on American manufacturing.

Advanced Manufacturing – Building Prosperity Through Innovation

Manufacturing is critical to the U.S. economy. As President Obama said in his 2013 State of the Union address, "*Our first priority is making America a magnet for new jobs and manufacturing.*" By itself, if the U.S. manufacturing sector were a country, it would be the 12th largest economy in the world.[1] Over 11 million Americans have manufacturing jobs.[2] Many of these are high-quality jobs.[3] Total hourly compensation in the manufacturing sector is, on average, 19% higher than that in the services sector.[4] After ranking as the world's largest manufacturer for more than a century, the U.S. is facing some stiff competition and has lost ground to China on total volume of its manufacturing output. It has also slipped below Germany, Korea, and Japan in the rankings of research and development manufacturing intensity, a critical indicator of future job-creating innovation.[5]

However, during the past three years of the Obama Administration, we have begun to see positive signs in American manufacturing. After shedding jobs for more than 10 years, our manufacturers have added about 500,000 jobs over the past three. Caterpillar is bringing jobs back from Japan. Ford is bringing jobs back from Mexico. And this year, Apple will start making Macs in America again.

To accelerate and strengthen these trends the President has laid out a comprehensive set of programs and priorities including new partnerships, investments in R&D, workforce training, and tax-reform. NIST plays a key role in this effort and the NIST FY2014 budget includes robust investments in a set of initiatives that covers the entire range of the manufacturing lifecycle spectrum to reduce the gap between cutting-edge science and development and the deployment of advanced manufacturing technologies. 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.

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. The revitalization of the U.S. manufacturing base is critical to driving innovation and job creation in the future, and will play a major role in building an economy that can help raise the standard of living for all Americans.[6]

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[1] Bureau of Economic Analysis Manufacturing Industry Data Tables 2010

[2] Bureau of Economic Analysis, 2012 ***Persons Engaged in Production by Industry.***

[3] NSTC *A National Strategic Plan for Advanced Manufacturing* February 2012 pg 2.

[4] Bureau of Labor Statistics, 2012 ***Employer Costs for Employee Compensation,*** Table 6.

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

[6] Overview to the National Science Board's *Science and Engineering Indicators 2012*; pp 16-20

The NIST FY2014 initiatives targeting manufacturing include:

Measurement Science for Advanced Manufacturing (+$50 million)

The largest overarching NIST initiative is the $50 million dollar effort targeting Advanced Manufacturing. Manufacturing plays a central role in realizing the benefits of technological innovation and in the overall growth and health of the U.S. economy. The ability to rapidly introduce product innovations will provide a foundation for future U.S. manufacturing market growth, competitiveness, and creation and retention of high skill, well-paying jobs. With its FY 2014 budget request, NIST is expanding its laboratory efforts in the following areas critical to advanced manufacturing:

Developing the measurement science and data infrastructure for the manufacture of emerging materials – Much of advanced manufacturing depends upon the ability to make at scale or integrate the use of new materials into existing manufacturing processes. To support this need NIST will continue to invest in strengthening its efforts to develop the standards and data needed to support advanced materials modeling and design. These efforts are central to NIST's role in the Material's Genome Initiative.

Supporting the manufacture of emerging technologies – There is enormous potential for U.S. leadership in the manufacture of products in emerging technology areas, which have grown out of the U.S. investment in the biosciences and nanotechnology. NIST will provide the measurement science, data, and tools that are needed for efficient manufacturing in these areas. NIST programs in the areas of: nanomanufacturing will ensure that materials can be produced at scale and at viable cost; and, biomanufacturing where NIST research will help create new manufacturing paradigms that use cells as factories for fuels, pharmaceuticals and specialty chemicals.

Precision measurements for manufacturers – Precise manufacturing metrology enables high-quality, high-throughput production, increasing the competitiveness of U.S. manufacturers. Current methods for calibrating machinery and assessing quality can introduce cost and time delays to manufacturing processes. Through increased investment in miniaturization techniques and quantum-based measurement capabilities, NIST will be able to deliver self-calibrating measurement science technology that can be directly integrated into instruments and processes on the manufacturing floor, and thus, eliminate the need for costly calibrations.

Measurement science to enable the integration and use of smart manufacturing technologies – The next generation of smart manufacturing processes and equipment such as automation, distributed sensing, and advanced control systems need to be optimized to enable cost-effective and agile manufacturing of high-tech products and systems. NIST will continue to strengthen its efforts focused on standards for the closer integration of robotics and humans in the manufacturing environment, and in the development of a testbed to evaluate the performance of automated in-process quality monitoring and control systems which are critical to the efficient operation of modern factories.

Advanced Manufacturing Technology Consortia Program (+21 million)

The proposed $21 million AMTech program will provide grants to leverage existing consortia or establish new industry-led consortia to develop road-maps of critical long-term industrial research needs. The program will also fund research at leading universities and government laboratories directed at meeting these needs. This program would be based on NIST's experience with the Nanoelectronics Research Initiative (NRI) partnership and would expand and improve on that model.

Hollings Manufacturing Extension Partnership (MEP) – Manufacturing Technology Acceleration Centers (M-TAC) (+$25 million)

The MEP, a federal-state partnership, has a national network of MEP Centers located in all 50 states and Puerto Rico. There are over 1,400 technical and business experts 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. The budget request for MEP includes newly requested funding of $25.0 million for MEP Manufacturing Technology Acceleration Centers.

U.S. small manufacturers are a critical segment of our economy, comprising 90 percent of all manufacturing establishments and 45 percent of employment. U.S. small and mid-sized manufacturers are playing a growing role in technology innovation, including product and process technologies. This trend has been supported by the expanded portfolio of services for small and mid-sized manufacturers offered by the Hollings Manufacturing Extension Partnership (MEP) program through MEP's Next Generation Strategies. These strategies include: technology acceleration, supply chain development, sustainability, continuous improvement and workforce.

Many of these efforts, especially technology acceleration and supply chain development, require deep expertise specific to a given supply chain or sector. Small manufacturers have proven to be flexible and adaptable in their approach to profitable growth through new markets, customers, products, and processes. Yet, there remains a gap between the research being performed through universities, federal labs, consortia, and other entities with the readiness of many small manufacturers to adopt new technologies into their products and processes.

The gap is most readily identified along the continuum of MEP's Technology Framework for Small Manufacturers, and commonly referenced as the "valley of death." In fact, the valley includes both the "immediately before" with limited translation of available technologies into market opportunities and the "immediately after" with manufacturers struggling to incorporate new technologies into their processes and new product portfolio. The "valley of death" includes technology transfer, technology transition, and technology diffusion steps.

In order to address this broadly-defined gap of "technology transition," MEP is proposing to create Manufacturing Technology Acceleration Centers (M-TAC). The M-TAC approaches this problem through a focus on supply chains so that the flexibility and adaptability common to many U.S. manufacturers results in increased job creation and economic growth. The M-TACs

will provide technology transition services to U.S. small manufacturers through a program that is locally driven and nationally connected, by fostering the small manufacturer's readiness to adopt and adapt advanced technologies into their manufacturing processes and products.

National Network for Manufacturing Innovation (NNMI) (+1 billion)

In addition to the discretionary programs described above, the FY2014 request also includes a request for $1 billion in mandatory appropriations to establish the National Network for Manufacturing Innovation that is a cornerstone of the President's plan to strengthen American manufacturing as mentioned in the State of the Union.

This funding would catalyze the creation of a network of institutes where researchers, companies, and entrepreneurs can come together to develop new manufacturing technologies with broad applications. Each institute would have a unique technology focus. These institutes, to be known as Manufacturing Innovation Institutes (MII), will help support an ecosystem of manufacturing activity in local areas. The MII would support manufacturing technology commercialization by helping to bridge the gap from the laboratory to commercialization.

This initiative is designed to:

- Induce industry and non-federal co-investment to rapidly seize innovation opportunities that lead to industrial capabilities, bridging the gap between fundamental technical discoveries in the U.S. and manufactured products.
- Promote direct collaboration on industry-relevant research and development to address emerging technology areas where market failures are causing U.S. innovations to be scaled and manufactured elsewhere
- Facilitate the adoption of new manufacturing technologies, tools, and methodologies that will make U.S. manufacturers more competitive, especially recognizing the role of small and medium manufacturers in supply chains and innovation
- Build workforce skills and enhance education needed in advanced manufacturing
- Support identification and diffusion of "best practice" approaches to governance structure, IP management, partnering, facilities access, etc.

In addition to addressing key challenges in advanced manufacturing the President's FY2014 request for NIST also provides support for NIST programs addressing other critical priorities including:

Cybersecurity R&D and Standards (+15 million)

Cybersecurity is a strategic asset and vital to the economic and national security interests of the United States. In addition to nearly $200 billion of e-commerce transactions in the U.S. alone for 2011, interconnected networks of computers are essential for critical functions such as air traffic control, factory operation, and electric power distribution. NIST requests an increase of $15 million to improve the security and interoperability of our nation's cyberspace infrastructure, accelerate the development and adoption of cybersecurity standards in support of Administration priorities, and to support the leading-edge work of the National Cybersecurity Center of

Excellence (NCCoE).

Of that $15 million increase, $8 million would fund cybersecurity research and development in areas such as security for federal mobile environments and techniques for measuring and managing security. The request continues and expands efforts to improve the cybersecurity of current and future information technologies, while improving the trustworthiness of IT components such as claimed identities, data, hardware, and software for networks and devices.

In addition, $2 million would fund development of cybersecurity standards. The availability of cybersecurity standards and associated conformity assessment schemes is essential for improving the security and resiliency of critical U.S. information and communication infrastructure. NIST support for industry-developed consensus standards enhances the deployment of sound security solutions and builds trust among those creating and those using the solutions throughout the country.

A $5 million increase would fund the National Cybersecurity Center of Excellence. The NCCoE is a public-private collaboration of experts from industry, government, and academia. The center designs, implements, tests, and demonstrates integrated cybersecurity solutions and promotes their widespread adoption. Participants develop practical, interoperable cybersecurity approaches that address the real-world needs of complex information technology (IT) systems.

Advanced Communications (+$10 million)

This $10 million initiative will support research, standards, and testing efforts in the area of advanced communications for the development and deployment of next-generation and emerging communication technologies through the NIST Center for Advanced Communications Technologies headquartered at its Boulder laboratories.

Rapid advances in communications technology have fundamentally changed the way we as a nation work and live. With these advances have come significant challenges that if not addressed will significantly impact our nation's ability to reap its civilian and economic benefits while ensuring that our national security needs are met. Examples of these challenges include: the exponential growth of wireless data usage – scarce spectrum must be more efficiently used to meet the demand; the evolution of broadband access in the home – this has moved from a luxury to a necessity with increasing needs for ever-higher bandwidth; and, the vulnerability of all internet capable devices to various security threats.

To address these challenges, the budget request includes funds for research, testing, and evaluation in the areas of spectrum sharing, testing, standards coordination, public safety communications, electromagnetics and quantum electronics, among others. By taking advantage of and leveraging the critical mass of NIST and NTIA research and engineering capabilities concentrated in Boulder, Colorado, the Department of Commerce will create a unique national asset that will provide the infrastructure necessary for effective engagement and collaboration with industry and government partners that is required to effectively and efficiently address current and future communications challenges. NIST's efforts in this area will:

- Promote interdisciplinary research, development, and testing in advanced communication related areas such as Radio Frequency (RF) technology, digital information processing, cybersecurity, interoperability, and usability.
- Provide a single focal point for engaging both industry and other government agencies on advanced communication technologies, including testing, validation, and conformity assessment.

Cyberphysical Systems (+10 million)

This $10 million FY 2014 budget initiative will help U.S. manufacturers create a new generation of "smart" systems to support the Administration's priorities in advanced manufacturing and networking technology for complex systems. The convergence of networking and information technology with manufactured products, engineered systems of products, and associated services are enabling a new generation of "smart" or cyber-physical systems (CPS). These CPS are critical components and key value added features of items that consumers use every day from cars and telecommunications to buildings and medical devices. As CPS have grown exponentially in complexity, dramatic improvements in the systems engineering, integration and testing are needed. This initiative will enable NIST to develop the measurement tools and standards to address three key problem areas that cut across all CPS: model-based diagnostics and prognostics needed to manage and optimize the performance of CPS (like electric grids, and transportation networks); time synchronization, which is critical to the efficient operation of systems; and, secure operation in order to ensure that widely deployed CPS systems have appropriate risk-based security solutions.

NIST Centers of Excellence (+20 million)

The proposed $20 million will fund the NIST Centers of Excellence. The NIST Centers of Excellence support collaboration on the front end of the manufacturing spectrum that builds upon a legacy of successful consortia with universities. With the requested funding, NIST will provide grants to establish four competitively selected Centers of Excellence in measurement science areas defined by NIST. The grants to multi- or single-university centers are envisioned to be for multiple years, contingent upon available resources. Each Center of Excellence will provide an interdisciplinary environment where NIST, academic, and industry researchers would collaborate on basic and applied research focused on innovations in measurement science and new technology development.

Health Information Technology (+3 million)

Moving to electronic health records and automation of health IT is a major component of efforts to improve the value and quality of health care. With this $3 million initiative NIST will work in coordination with the Department of Health and Human Services Office of the National Coordinator for Health Information Technology (HHS/ONC) to advance work to develop interoperability standards and the supporting testing and validation infrastructure for the meaningful use of electronic health records (EHR). The funding would support work that advances detailed interoperability standards in support of the Meaningful Use Stages 2 and 3 as

defined by the Centers for Medicare & Medicaid Services (CMS) EHR Incentive Programs that govern the use of (EHR). The funding would also support demonstration of EHR interoperability and the traceability of software application interactions, as well as patents, publications, and presentations related to EHR interoperability and conformance. The initiative will also support development of a test infrastructure to help industry measure their software's conformance to standards and of more efficient and accurate data analysis methods.

Measurement Science and Standards in Support of Forensic Science (+5 million)

The forensic science community needs standards and measurements to strengthen and improve the accuracy and efficacy of crime scene investigations and laboratory analyses of forensic evidence. This initiative focuses on programs and research efforts to develop innovative measurement systems, standards, quality assurance tools, and validated test methods. The products developed as a result of this initiative will ultimately strengthen the scientific foundation of the forensic sciences and, in turn, strengthen the U.S. justice system while reducing costs. This $5 million proposed initiative will enable NIST to create a strategic program to broadly address the most critical issues in forensic science today, such as new reference methods and technologies for understanding crime scenes and identifying criminals, including the uncertainty and standards associated with those techniques. A major outcome of this initiative will be to strengthen the utility and reliability of forensic evidence in the courtroom. This work also has the potential for significant cost savings for the U.S. justice system by reducing the number of mistrials or retrials related to questions about forensic analysis. One economic analysis of cost savings from forensic DNA testing alone estimated a cost savings of $35 for every dollar invested.

Public trust in the justice system relies on the validity and certainty of evidence presented to the courts. Increasingly that evidence is gathered and analyzed with innovative forensic technologies. Working with the Department of Justice under a recently signed Memorandum of Understanding (MOU), NIST will support:

- efforts with the forensic science community to develop agreed-upon standards, methodologies, and accreditation systems for key forensic science disciplines;
- new reference methods and technologies for understanding crime scenes and identifying criminals, including the uncertainty and standards associated with those techniques;
- improved calibration systems, reference materials and databases, and technology testbeds for ensuring reliable and accurate forensic practices; and
- the development of rigorous training programs.

Disaster Resilience (+5 million)

A $5 million initiative will support the measurement and standards for disaster resilience and reduce the risk from natural hazards. With a large percentage of the nation's buildings and infrastructure clustered in disaster-prone regions, U.S. communities can and do suffer catastrophic losses from extreme events such as hurricanes, tornadoes, wildfires, earthquakes, and flooding. Despite significant progress in disaster related science and technology, natural and technological disasters in the United States are responsible for an estimated $60 billion in costs in 2012 terms of lives lost, disruption of commercial and financial networks, properties destroyed, as well as the cost of mobilizing emergency response personnel and equipment.[7] In 2012, the U.S. experienced 11 disasters each costing over a billion dollars in losses. Two major events - Hurricane Sandy and the year-long drought - were the biggest cost drivers, the economic effects of which are still being calculated. Metrics, tools, and standards are needed to ensure community-level resilience and to enable communities to minimize the impact of such disasters and to recover rapidly from them.

NIST has significant statutory responsibilities in this area, including the National Earthquake Hazards Reduction Program Reauthorization Act of 2004 (PL 108-360); the National Construction Safety Team Act (PL 107-231); the National Windstorm Impact Reduction Act of 2004 (PL 108-360); and the Federal Fire Prevention and Control Act of 1974 (PL 93-498).

The requested initiative will fund the development of a public-private partnership program strategy that will work with stakeholder interests in all hazard areas to develop and adopt a national resilience framework and associated resilience models, standards, and policies.

National Strategy for Trusted Identities in Cyberspace (+8 million)

The Budget provides an increase of $8 million to the National Strategy for Trusted Identities in Cyberspace (NSTIC) which builds upon FY 2012 funding of $16.5 million. The initiative envisions an online environment—the "Identity Ecosystem"—that improves on the use of passwords and usernames, and allows individuals and organizations to better trust one another, with minimized disclosure of personal information. The Identity Ecosystem is a user-centric online environment, a set of technologies, policies, and agreed upon standards, that securely support transactions ranging from anonymous to fully authenticated and from low to high value. It would include a vibrant marketplace that allows people to choose among multiple identity providers—both private and public—that would issue trusted credentials that prove identity. Key attributes of the Identity Ecosystem include privacy, convenience, efficiency, ease-of-use, security, confidence, innovation, and choice. Creating this Identity Ecosystem will require input from the private sector, advocacy groups, public sector agencies and others. The request continues and expands existing efforts to coordinate federal activities needed to implement NSTIC.

Specifically, the FY 2014 request funds competitively selected pilot project grants that will enable the private sector to work with state, local, and regional governments to improve

[7] http://www.ncdc.noaa.gov/oa/reports/billionz.html

acceptance of Identity Ecosystem components. The selected NSTIC pilot programs will demonstrate innovative frameworks that can provide a foundation for more trusted online transactions and tackle barriers that have, to date, impeded the Identity Ecosystem from being fully realized. This initiative is expected to lead to the emergence of privacy-enhancing, trusted authentication solutions that lead to better protections against cybercrime; improved privacy and protection of data; improved security and interoperability of credentials; improve the resilience of data breach recovery; and a self-sustaining, private-sector-led Identity Ecosystem by 2015. It will also support the Steering Group to bring together all stakeholders—the private sector, advocacy groups, and public-sector agencies—to address authentication challenges and allow continued expansion of the nation's online economy.

National Initiative for Cybersecurity Education (+1 million)

The $1 million request supports the continued work under the National Initiative for Cybersecurity Education (NICE). Cybersecurity is much more than technological solutions to technical problems; it is also highly dependent on educated users who are aware of and routinely employ sound practices when dealing with cyberspace. NIST will continue to work with federal, state, local, and regional governments for improving cybersecurity education. NIST will ensure coordination, cooperation, focus, public engagement, technology transfer, and sustainability of NICE. NIST will continue to support DHS and other Federal Agencies in the implementation of the cybersecurity education framework that addresses: national cybersecurity awareness; formal cybersecurity education; Federal cybersecurity workforce structure; and cybersecurity workforce training and professional development.

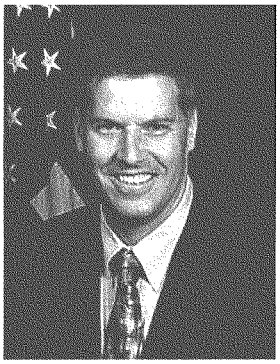
Summary

The FY 2014 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 on moving the Nation forward by laying the foundation for long-term job creation and prosperity.

More than half of the proposed increased funding in the NIST budget is focused on advanced manufacturing research at NIST laboratories and through new industry-led consortia programs. NIST will continue its mission to work with the private sector to ensure 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 2013 resources total $755.4 million from the Consolidated and Further Continuing Appropriations Act of 2013 (P.L. 113-6), 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, CO.

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 White House National Science and Technology Council.

Chairman MASSIE. I thank the witness for his testimony. Thank you, Dr. Gallagher.

Reminding Members that the Committee rules limit questioning to five minutes, the Chair will at this point open the round of questions. And I will recognize myself for five minutes.

So in your testimony you mentioned that there is $1 billion in a mandatory fund to be provided for the manufacturing initiatives. This is more than the annual budget for NIST, and so my question is where—how will these programs occur if the billion dollars is not provided and will this come from NIST, the DOE, the DOD? Where will this billion dollars come from?

Dr. GALLAGHER. So thank you for the question. So the NNMI proposal is designed to provide a one-time investment, not a continuous investment, to create basically a research infrastructure for the country. The research infrastructure is designed actually to attract private sector, in other words, industry's R&D funding. We are trying to create a condition where a group of companies acting together can do something that they would not be willing to do on their own.

The President's proposal would base the program at NIST. The reason for that is we have a very broad vision and set the context for NIST managing the program would be to enhance the competitiveness of the country to look at all of the different possible sectors as we ran the program. And as I envision it, the funding would be available, you know, for some finite period of time. It would go out as a set of grants to support the formation of these institutes.

If that—that would require legislation, and I think this Committee would likely play a key role in developing that legislation. And your question is if that legislation does not occur, where does the funding come from? And I think what would happen, given the fact that these institutes seem to be filling a key need, is we would have to leverage existing programs to make that happen. And in fact, the Administration both last year using DOD funding, combined with some funding from other agencies—and the President announced his intent to do three more institutes this year—you are going to be leveraging existing programs at other agencies, and that is why the Defense Department and DOE have been identified.

Chairman MASSIE. So—okay. I understand that the DOE and the DOD may provide some fund if the billion dollars is not provided for by Congress, but my follow-up question would be, will NIST contribute any discretionary funding in Fiscal Year 2014 to those institutes?

Dr. GALLAGHER. Well, I think it would seem natural that at some level we would, but again, without a specific program, it would have to be in the context of our existing programs. And so NIST participation in that context would probably have one of two flavors. It could be supporting the industrial R&D in measurement science, a core part of the NIST mission. That would be very attractive because this is designed to be the industry's concentration of R&D. I can't imagine who else NIST would want to work with.

The other area, of course, is in the small and mid-sized business. So the NIST MEP program is designed to provide that outreach to small and mid-sized manufacturers, any institutes will play prob-

ably a magnet store role. And when you have that concentration of capability and large companies want to be located near that, supply chains will be located near those big companies. And I think there is a very natural role for the NIST MEP program to play a supporting role.

So we think there would be a good match for NIST to participate with the centers.

Chairman MASSIE. Okay. Thank you. I have another minute here. I would briefly like to ask you about the Smart Grid Interoperability Panel that was created in 2009. This is of particular interest to me. I am interested in energy and the efficient use of energy because for all the talk about alternative energy, it is a lot cheaper to save energy than it is to try and create it with alternate means.

So I understand that the leadership of the Smart Grid Interoperability Panel has recently been handed over from NIST to a nonprofit organization driven by the private sector. Can you please explain in the brief time remaining what NIST's role is in the continued development of the so-called Smart Grid, and is NIST directly funding any Smart Grid activities in Fiscal Year 2014?

Dr. GALLAGHER. So the quick answer, of course, is that NIST will remain very involved with the private sector-led effort. In the United States almost all standards efforts are led by the private sector. And the mandate given to NIST is twofold. One is to support those efforts and the other is to act as the go-between between the standards bodies and Federal needs so between the Energy Department, the energy regulators, and so forth. So we would need to be—remain involved. Our role will increasingly be technical, supplying the technical underpinnings of those standards, whether they are data communication standards or tested measurement standards. And we do anticipate continuing to provide support to that effort in '14 and beyond.

Chairman MASSIE. Just quickly if you could answer quickly, how much money do you think will be spent in 2014 on the Smart Grid from NIST?

Dr. GALLAGHER. Well, the amount that we have reallocated mostly from internal reprioritization is between $3 to $4 million a year in both technical and coordination.

Chairman MASSIE. Okay. Thank you very much. My time is expired.

And I now recognize Ms. Wilson for five minutes.

Ms. WILSON. Thank you, Mr. Chair.

Dr. Gallagher, as you know, over the past several years our Nation has experienced historic and devastating natural disasters and numerous communities across America are still recovering and rebuilding. Hurricane Sandy was the Nation's costliest storm since Katrina, killing hundreds of people in its path and causing billions of dollars in damage. I am pleased to see that the budget request includes an additional $5 million to support NIST's work in the area of disaster resilience. Can you please describe this initiative and the activities NIST intends to undertake to improve the performance of buildings and infrastructure in the face of a disaster?

Dr. GALLAGHER. Thank you. I believe you know this is a critical area, as you know, because of the potential impact it has on so

many. The NIST role actually ties to the answer I just gave the Chairman, which is to support the standards setting. And in this case, for resiliency, what we are often talking about are standards that are written in a way that they become model codes. In the United States building structures, houses are regulated or managed if you will at the local level. Local building codes determine the standard of performance that we expect in our built infrastructure.

And the way we ensure the built infrastructure is protected is twofold. One, we support, technically, a set of standards that can be adopted by local jurisdictions. They are called model codes. And two, we try to learn from experience. Unfortunately, in the case of disasters, we learn when something terrible has happened. And the NIST program is designed to work with local communities, to understand why certain types of damage was experienced in the face of a natural disaster, whether it is earthquake, wind, fire, and to basically reflect that new understanding by improving the building code standards.

And this has become critically important, and the NIST effort is designed to approach this from a multi-hazard perspective so that we can quickly identify lessons learned, come to an understanding about how do we improve our built infrastructure, and then work with the buildings and code communities to make those improvements.

Ms. WILSON. Thank you. One other question. I have a little bit of time. I understand that the budget includes a $25 million increase to create Manufacturing Technology Acceleration Centers, MTACs, as part of the Manufacturing Extension Partnership, MEP program. As you know, small businesses are the top job creators and the lifeblood of our economy.

In your testimony, you described how this new program would provide technology transition services to small manufacturers. Please elaborate on this new program. Specifically, how will these centers and their focus areas be selected? Also, how does this program build upon or relate to the existing supply chain and technology acceleration services being provided by the MEP centers?

Dr. GALLAGHER. Thank you. So the Manufacturing Technology Acceleration Centers are a concept that is based on your observation, which is the small and mid-sized companies are where most of the employment growth and job growth occur, including manufacturing. It is also increasingly where the innovation is occurring. You know, new technologies and processes are being developed by small and mid-sized manufacturers, and large companies don't support those manufacturers in the way they did in the past. The relationship between the big OEM manufacturers in the supply chain has certainly changed over time, and that has resulted in changes for MEP.

So what we are trying to do is, through a grant program, issue a grant to an organization or center that would develop services that are technical in nature and would be addressing a particular supply chain. And this would—this—whatever—these services, these—let's—let me give you an example. Let's say we wanted to support advanced aerospace companies that want to be suppliers into the aerospace industry. Well, if you want to be a supplier to

aerospace, you are going to have to learn how to work in their environment, what their expectations are to meet their certification requirements and have the tools and quality assurance that you need to be an effective supplier in aerospace.

What we would like to do is work with experts in the aerospace industry to develop services that small—that can be offered to small and mid-sized manufacturers that have this interest. So the MTAC centers would develop this content and it can be deployed through the entire national network of existing MEP centers. That is the idea behind MTAC. It is a supply chain focus, a technology focus for the MEP network.

Ms. WILSON. Okay. Thank you.

Chairman MASSIE. Thank you very much. The Chair now recognizes Mr. Schweikert from Arizona for five minutes.

Mr. SCHWEIKERT. Thank you, Mr. Chairman.

Doctor, what you get to do is fascinating and some of the things you oversee, but I have always had first one global question. Think of everything you oversee, everything that is done at NIST. Can you walk me through some of the activities that could be found nowhere else, no university, no tech center, nowhere else that solely, solely exist at NIST?

Dr. GALLAGHER. I sure can. And I thank you for the appreciation of the work. The most unique thing that you would find it NIST that you would find nowhere else are those activities that have been given to NIST and no one else. And they actually go to our core mission, and that is we define the basis of measurement for the United States——

Mr. SCHWEIKERT. Mr. Chairman, Doctor—okay. And that is almost the constitutional carve-out.

Dr. GALLAGHER. That is correct.

Mr. SCHWEIKERT. But many of those measurements are actually, you know, MIT or those—will help build the standards but NIST will refine them and publish them?

Dr. GALLAGHER. Well, in the case of the actual measurement standards, it is the research even underneath that is probably unique to NIST. And so if you look at areas where NIST is—leads the world in its scientific capability, it tends to be in the areas where we have to be at the forefront because the basis of a measurement—let's say the definition of time—has to be more accurate than any application of that measurement. And so we tend to be at the forefront in those particular areas.

Mr. SCHWEIKERT. Okay. Mr. Chairman—Doctor, so—okay. The measurement standards, what else?

Dr. GALLAGHER. The other areas would be ones that have resulted from the standards coordination function. And they tend to be in these system areas, so cybersecurity. The nature of the cybersecurity research at NIST, because of the interface between both the Government needs and industry tend to be quite different than something you would find anywhere else.

Mr. SCHWEIKERT. And Doctor, you are telling me I could not find that anywhere else in the Nation or in America?

Dr. GALLAGHER. Well, it is always dangerous to say that because you are going to find cybersecurity research all over the world in

fact, but the composition of the research program at NIST would look different. So it depends what you mean by overlap.

Mr. SCHWEIKERT. And one of the natures of my question is so often we sort of have I guess the pop culture term is mission creep of NIST, you know, its core function of being, you know, the czar of time and measurements and it is almost a constitutional requirement. And yet we often ask you to do so many other things and reach into other activities. And I am—the more I am, you know, here in Congress, starting to wonder should we actually be pushing you the other direction and focus on your core competence and stay out of some of the other affiliated activities?

Dr. GALLAGHER. Well, I don't know if you would have to push us much because we try to stay close to our core competency as well. I have always believed that as an agency, mission focus is one of the most important things you maintain. Mission creep——

Mr. SCHWEIKERT. But even some of the discussion we were just having with the supply chain, I can take you to a dozen universities around the country that literally have a mission statement that sounded exactly like you just described.

Dr. GALLAGHER. But they don't have a mission to provide—in fact, a lot of their capability in fact is working with NIST, so——

Mr. SCHWEIKERT. But they maintain some of the—but their mission statement, they are almost duplicative. Being from Arizona where you think about our level of aerospace——

Dr. GALLAGHER. Right.

Mr. SCHWEIKERT. —and technology and the some of the—at our engineering school at ASU and others where they are also helping with some of the supply chain technology and being able to, you know, become a provider—preferred providers and mechanics. It was amusing only because of the irony of, I think, I was hearing this on Tuesday from some folks from the engineering school saying almost the exact same language you just spoke.

Dr. GALLAGHER. But in the case of the MTAC program it is not so much technical activity at the agency. It is a grant program that would in fact—maybe it would fund work in Arizona to provide—what we are providing is just the connection with all these—the hundreds of thousands of manufacturers through——

Mr. SCHWEIKERT. And Mr. Chairman—Doctor, you don't believe those relationships, those contacts happen in dozens of other functions whether it be associations, that thing called the Internet?

Dr. GALLAGHER. Well, I certainly believe that there is many—I do believe there are many ways of providing that and one of them is the NIST program to provide that outreach by partnering with the States.

Mr. SCHWEIKERT. Okay.

Dr. GALLAGHER. You are right, that is not unique.

Mr. SCHWEIKERT. And I know it is always uncomfortable having actually run a government agency at one time where we are getting pulled because we, you know, our available talent and getting pulled away from our core mission, and particularly in a world with budget restraint and lots of talent and the ability to share it and communicate it, it is something I am going to continue to try to understand better in NIST, and you may see me being a very aggressive advocate of support and making sure you have the re-

sources on your core and being very concerned about moving away from that.

And with that, Mr. Chairman, I yield back.

Chairman MASSIE. Now, we are in the second round of questioning and to start again I will yield myself five minutes.

Dr. Gallagher, one of the more interesting things that I witnessed at—during my trip to NIST were the user facilities, or the user centers, where outside researchers or even commercial institutions could come and use your facilities, and some of them are very unique such as the nuclear reactor that provides a stream of neutrons to bombard things to give us visibility into the invisible and also the micromachining tools that use ion beams. These tools are very expensive and hard for other people to acquire, and so I sort of like the library—type model that you have there where outside parties can come and use those.

Of course, one measurement of whether those tools are the right tools to provide is whether the usage level of those. And I was encouraged to hear that you are somewhat oversubscribed for those tools. So my question is in trying to offset the cost for those, there are fees charged to commercial entities. And how close do those fees come to providing for the cost of those tools and how could you get closer to break-even? I am almost certain it doesn't break-even, but how could you come closer to breakeven? Could you—should you maybe raise the price on those if they are oversubscribed? Thank you.

Dr. GALLAGHER. So in the case of national user facilities in the United States, there are two types of cost recovery that can be done. One is federal—supporting federally funded research. And both of the facilities you identified predominantly are used by researchers that are funded by other Federal agencies doing the work. And the long-standing U.S. position there has been rather than charge one agency to pay for the services at another through a user fee to basically—it is the steward-partner model. The stewarding agency that runs the facility operates the cost and provides the beam time on purely a merit basis, on the quality of the proposal without charging a fee. And it has been found over a long period of time that that results in the decisions being based on the best science for this limited capability rather than the capacity to pay.

In the case of company use, when a company is going to use a unique capability like this for their own purposes and capture the data and not publish it—in other words, there is no public benefit—we charge full cost recovery, including the amortization of the facility. And I think the break-even or not just depends on, you know, the fraction of work that is being done proprietary, which tends not to be exceedingly high in these cases. And part of that is by design. These cutting-edge tools tend to be used most often in the precompetitive realm. So——

Chairman MASSIE. So maybe you could price them at their value instead of at their cost and use some of the—if there is a differential, use some of the extra money to offset the research costs.

Dr. GALLAGHER. Well, the cost recovery rules are in OMB's Circular A–130. I am going to get that wrong, but in one of the OMB circulars. And there are in fact two ways to recover cost. One is by

cost recovery, full cost, and the other is by market value. The problem you run into with these unique facilities is how do you determine the market value?

Chairman MASSIE. Right. Well, if it is oversubscribed, then maybe it is underpriced. But I hear your point that some of the subscriptions are from other research labs, not from commercial entities.

Dr. GALLAGHER. Well, again, from a pure science perspective, we like oversubscription because it means that the selection committees are discriminating and really selecting the best of the best. You actually—most grant programs like to see that. So happy to talk to you more——

Chairman MASSIE. Okay.

Dr. GALLAGHER. —about that if——

Chairman MASSIE. Thank you. Thank you very much. That is very sufficient.

So in the first round of questions we talked about the Manufacturing Technology Acceleration Centers and how that is going to work through the Manufacturing Extension Partnership program. So my question would be there is $25 million in the budget to do this new manufacturing program. If that $25 million is not provided, do you anticipate using funds from the MEP program to work with the MTAC program?

Dr. GALLAGHER. So let me try to clarify. The MTAC program is part of MEP. It is a name we gave to basically grants that are developing content for the MEP rather than the grants that go to the centers that are delivering services. So it is designed to augment what MEP does by giving it technology services that have been developed by that sector. So it is really part of the same program.

Chairman MASSIE. I hate to be a pessimist but if the funding for the MEP program is the same this year as it was last year, will you be able to fund the expansion of its role into the MTAC program using existing MEP funds at all?

Dr. GALLAGHER. Not very much. So the—most of the funding for the MEP goes to the existing centers, so the capacity to develop new content would be quite limited. Obviously, we try to do whatever we could working with private sector developers to come up with content, but it would be limited.

Chairman MASSIE. Thank you. Thank you very much.

And now I yield five minutes to the Ranking Member, Ms. Wilson. Ms. Wilson yields her time to Mr. Peters from California.

Mr. PETERS. Thank you very much, Mr. Chairman.

And I had a question about the health IT, information technology. There was a $3 million initiative that you refer to, and as I understand, this would expand on the existing efforts in health IT at NIST and would advance work to develop standards and testing for the meaningful use of electronic health records. And I know meaningful use is a term from the ACA with some meaning. You are ultimately going to want to require interoperability between different systems, and I wanted to sort of see if you could maybe elaborate on the current efforts in interoperability and how the new initiative would help the healthcare professionals and hospitals as they are preparing to answer a lot of the open questions about how to implement the ACA.

Dr. GALLAGHER. That is a great question and the NIST role has been to support the functioning of health information technology. And in the early phases, a lot of what our work was promoting the testing tools and validation tools that demonstrated meaningful use. And the idea was to drive the performance of these systems by making sure that they were put into practice by doctors and physicians. So showing that it could, you know, pull up prescription information and be disseminated back to the pharmacy and so forth.

Increasingly, now, you are going from sort of stand-alone information technology to a very broad and diffuse system. So as the health IT program matures, interoperability across platforms is going to become a major driver, and that is the next phase of the health IT program. The request is to support the NIST effort to develop compliance tools and validation tools to test the code and function that industry is developing. It is actually not an augmentation of program. The NIST program to date has not received any base funding. It was actually fully supported by one-time Recovery Act funding that in fact expires the end of this year and a limited amount of reprogramming we were able to do from within the agency.

Mr. PETERS. So—and just to follow up and to clarify, one of the things that is exciting and happening a lot in San Diego is the development of wireless health, digital health. The opportunity say, for instance, to monitor a person's cardiac performance or their glucose levels from a remote location that might save money on things like office visits or emergency ambulance rides or emergency room stays. One of the things we are going to have to think about is how to make those systems mesh with these records systems. And I want to know kind of is that part of your effort or is that something you anticipate getting involved in?

Dr. GALLAGHER. That is very much part of the effort both from the functionality and from the security and privacy aspects that are going to come with that kind of technology.

Mr. PETERS. Right. Well, I wish you the best. It is a lot of opportunity. I believe you can only cut doctors' pay so much and raise taxes so much. A lot of what innovation can provide is new and cheaper ways to accomplish the goals that really will reduce the healthcare costs and that will depend a lot, as you know, on the ability of NIST to set standards that everyone can work off of as they innovate. So I appreciate your being here today. Thank you.

Dr. GALLAGHER. Thank you.

Chairman MASSIE. I am now honored to recognize for five minutes the Chairman of the full Committee, Chairman Smith.

Chairman SMITH. Thank you, Mr. Chairman.

Dr. Gallagher, first of all, thank you for your commitment to public service, which has extended over many years. That is rare, but admirable.

I have a couple questions. The first is in Fiscal Year 2013 and in Fiscal Year 2014 how much money do you anticipate will be spent by NIST in implementing the Administration's February Executive Order on cybersecurity?

Dr. GALLAGHER. So that is—we haven't scraped up a separate budget account to track that closely——

Chairman SMITH. Actually, that was my next question. What accounts is it going to come from?

Dr. GALLAGHER. It is going to come—it is largely leveraging our work in our cybersecurity division.

Chairman SMITH. If you don't know 2014, what about 2013?

Dr. GALLAGHER. Roughly for this year——

Chairman SMITH. Yes.

Dr. GALLAGHER. —which is sort of the primary scope of the Executive Order, it is about $3 million that we anticipate. That sounds amazingly small given the tasking that was in the Executive Order, but the magic sauce is that we really want industry to develop this framework. And so most of those costs are supporting the coordination and sort of pulling together all of the material coming in from all of these sectors and managing the discussions that will help pull the framework together.

Chairman SMITH. So you are going to try to leverage that $3 million and increase it exponentially through the private sector?

Dr. GALLAGHER. As far as we can.

Chairman SMITH. Okay. Gosh, you are right. That seems an awfully small amount. What about 2014, about the same, more? What would you expect?

Dr. GALLAGHER. So I think that looking in the out-years I envision the framework that is being developed. It cannot be a one-time develop-and-stop. The technology we are talking about is too dynamic. What I really hope happens is something akin to Smart Grid where the—this—as we pull this together the first time, the private sector begins to continuously manage and fine-tune this framework. That will actually drive the NIST technical programs because that will result in questions about, you know, how do we address identity management or roots of trust or better cryptography or other forms of technical solutions that that industry will need.

And that is actually reflected in our '14 request that $8 million of R&D base is designed to support what is becoming a very stretched out technical capability at NIST.

Chairman SMITH. Okay. Thank you.

Next question, different subject. In regard to these new manufacturing centers, what metrics would you recommend that we use to evaluate these programs?

Dr. GALLAGHER. Well, the ultimate goal is a long-term one. It should increase the rate of innovation by the participating companies. This is about creating the modern equivalent of Bell Labs. You are trying to get a group of companies collaborating and sharing and leveraging each other to do what used to be done by large, vertically integrated monopolies. And you should see the same kind of innovation. In the short-term, what I hope you see is this incentivizes an increase in private sector investment in R&D. It pulls their investments upstream.

Chairman SMITH. But both regarding current programs and, as you said, the proposed augmented programs, how do you evaluate them? Are there any specific metrics, any specific data we ought to be looking for to gauge their success?

Dr. GALLAGHER. Well, I mean so, you know, measuring technology's success is always a tricky thing. We have economists who

try to study that because the ideas diffuse into different products. You can certainly look at rates of IP generation and patent filings. You can look at new company startups that are going to happen as a result of this. In some cases, one of the problems is that some of the most exciting things a company pulls in and they don't tell us about—in fact, sometimes we know the most exciting work is when they stop telling us about it—and in some cases you don't see the payoff until quite a bit later as you see new products and services going in.

So I think from a measurement perspective, how do we measure success, it is going to have be a layered set of things: some early indicators that indicate that this is starting to be pulled together and then we are going to have to continue to monitor this for a long time to see some of the economic payoffs in markets and new products and services and so forth.

Chairman SMITH. Okay. Thank you, Dr. Gallagher.

Thank you, Mr. Chairman.

Chairman MASSIE. Thank you, Mr. Chairman.

I now yield five minutes to Ranking Member, Ms. Wilson.

Ms. WILSON. Thank you, Mr. Chair.

Dr. Gallagher, in your testimony you mentioned the need to support the manufacture of emerging technologies, including biomanufacturing. Specifically, you discussed efforts that could help create new manufacturing paradigms for using cells as factories for fuel, pharmaceuticals and specialty chemicals. These efforts align with the White House's report, the National Bioeconomy Blueprint, a strategic plan to help the Nation realize the potential of the economic activity fueled by research and innovation in the bioeconomy.

Would you please describe your efforts in biomanufacturing and how these activities will help the Nation attain the benefits of the bioeconomy?

Dr. GALLAGHER. Thank you. I would be happy to. Of course, you know, the explosion of understanding in bioscience is probably the most dramatic scientific development in my career. It has been a game-changer. The NIST role is very simple. It is our core mission. It is to advance the measurement science in biotechnology and particularly the measurement science that controls our—the adoption of this technology. And what I think it means and what the focus of our request is really in two areas. One is the production using biology to produce things is becoming mainstream. It is becoming a manufacturing process. And we do not have the process measurement tools to control and reproducibly, repeatedly, reliably produce high-quality materials. If we can't do that, these things will never achieve the scale and the cost reduction of market to make it a viable production technology.

And the second area where measurements are playing a major role is in supporting the demonstration of safety and efficacy. And you see this no more clearly in the pharmaceutical area where the pace of technological development, our ability to, let's say, make a new vaccine is much, much faster now than our capacity to regulate it and demonstrate its safety and efficacy. And you see this increasing mismatch. And one of the things we talk about very closely with FDA and others is can we provide a rich measurement so

we can understand the biomolecule that we have produced in a way that would really facilitate a rapid and effective, you know, protection of the public as well.

So both in the regulation and the production we think our—the maturity of measurement science is one of the limiting steps, and that would be the area that NIST would focus in.

Ms. WILSON. That is fantastic. My other question, as part of the budget request, you are proposing $20 million for the creation of four NIST Centers of Excellence. The budget request describes these centers as "interdisciplinary environments where NIST academic and industry researchers will collaborate on basic and applied research focused on innovations and measurement science and new technology development." Certainly, the success of NIST current research collaborations with the University of Colorado and the University of Maryland is in some part due to the presence of NIST and its scientists in these geographic locations. How is NIST planning to ensure the active and full participation of its scientists in these proposed Centers of Excellence? And what research areas do you envision these centers focusing on? And do you plan to put one in Miami?

Dr. GALLAGHER. We hope Miami submits a great proposal. So we would like to do this competitively, and the Centers of Excellence program is very simple. It is designed to facilitate a partnership to expand the effectiveness of NIST's mission. It is kind of a selfish initiative. This is about making NIST do its core mission better. The example you gave about JILA at the University of Colorado is a great example. For more than 50 years, we have been able to sustain with NIST staff working right alongside top academic researchers a state-of-the-art effort in research that is essential to our core mission: producing better clocks and understanding time and some of the quantum measurement. It has allowed us to be at the forefront.

And I don't think that example is unique. I think that there are many cases where rather than NIST simply going into its labs and doing it by itself, by working with others in partnership, we actually achieve our mission better.

There is a lot of competition for what the area—the best area can be and so we are going to both compete this internally to identify the areas of—that offer the most, and that is how we involve our scientists—offer the most engagement and benefit. It could be biosciences, which is a big growth area for NIST. It could be an environment where we are working much closer with industry. And then once we have identified the technical area where we think we get the most mission impact, we are going to do an open competition where universities and other stakeholders can propose and give us their ideas for how a partnership would be most effective. And so we certainly hope Miami is going to be a participant or any other area be a participant in that competitive process.

Ms. WILSON. Thank you. That is exciting.

Chairman MASSIE. Thank you very much.

I now yield five minutes to Mr. Hultgren from Illinois.

Mr. HULTGREN. Thank you, Mr. Chairman.

Thank you so much for being here. A couple questions.

First, in the Fiscal Year 2014 NIST budget request, more than half of the proposed increase in funding would be focused on advanced manufacturing efforts. While recognizing manufacturing is very important to our Nation and economy, a lot of this new funding is focused in areas of technology and knowledge transfer. I am concerned that the core long-term research that supports manufacturing is going to be left behind as the Institute advances initiatives that provide more short-term band aids. When the infusion of cash has gone out the door, are you confident we will have not lost focus on longer-term needs in manufacturing?

Dr. GALLAGHER. So I may not understand the concern because the majority of the NIST funding is in fact in long-term areas. It is core research in measurement science that is related to the highest growth, in other words, the newest technology areas in advanced manufacturing. So it is enhancing our capacity to support the metrology or measurement science needed for nano—production of nano materials or biomaterials or for some of the standards support we are going to have to do for some of the advanced system integration and smart manufacturing and smart—so, you know, it looks like a big refocus for NIST into manufacturing, but remember, NIST, since 1901, has sort of been industry's national lab. We—the truth of the matter is almost all of NIST has been related to manufacturing in one way or another for its entire history.

And so this program is really focused on developing the core capacity in our laboratory program where very much part of our core mission so that we can support what is the fastest-moving areas of industry.

Mr. HULTGREN. Yes, my—I am a broken record here. Fighting for research and fighting for what only we can do and what other—private sector can't do, the free market can't do and where I feel like when we have got extra resources, I think it is great to get more into the application and into the applying. My focus is to make sure that we are not taking money away that should go to research when that money is so limited.

Let me go on to another question. How does NIST balance short-term, low-risk, low-reward research projects versus long-term, high-risk, high-reward research projects when making funding decisions? And just kind of a follow-up on that—or a couple of follow-ups—how does NIST determine the proportion of basic research versus applied research projects when allocating funding? And I wonder is there a balance that, as Director, you look to maintain across your activities between the more fundamental versus the more applied type of work that NIST funds?

Dr. GALLAGHER. So the lens I always use for those decisions is our mission effectiveness. And that tends to mean that a large proportion of our work is actually in very basic areas. And that actually touches on the point you raised, which is uniqueness. That is the role that we can play that others will not play. Industry is taken to very short-cycle research. So it would not make sense for NIST to be heavily involved in very applied research or development.

The mix I think comes from relevance. It wouldn't do any good for NIST to have this beautiful academic research that was irrelevant to application and industry, and so the balance tends to come

exclusively from making sure we have the capacity to do that cutting-edge research, to stay ahead of the measurement science or this very core NIST mission, but also have an understanding of how that measurement science is applied in real world technology so that the translation is effective.

Mr. HULTGREN. My encouragement in that is just to—I know that is an always-changing balance, but especially when resources are tight to have it focused on that basic research and research again that no one else can do. And then the applied research is always an option when there is additional resources, but we have got to make sure that we have got that core mission in place.

Let me move on still. My time is limited. But wondering what NIST is doing to measure and evaluate the economic impact of its programs.

Dr. GALLAGHER. So we have a program that does—in fact has developed sort of one of the leading methodologies for looking at economic impact of its work. As you—as I was pointing out earlier, that is a complicated business, but we will routinely take several of our programs a year and then do a retrospective economic analysis to ascertain the economic payoff, the economic benefit. And of course with such a diverse agency, these tend to be rather diverse studies in terms of how we do that.

We are—the other way we do that is by industry validation. The Visiting Committee on Advanced Technology, our leading advisory committee, is made up predominantly of chief technology officers at that level from companies, and we routinely ask them to make sure that our work is relevant to them. That is not economic study but it is a relevancy assessment if you will.

Mr. HULTGREN. Okay. I just have a few seconds left, but if I can, I got here a little bit late and just would love to get your thoughts. Brain science is something very interesting to me, very concerning to me of some of the diseases. How do we improve the understanding and treatment of autism, Alzheimer's, and other neurological disorders? And what role do you see NIST playing in standards and technology surrounding various drug compounds or other therapeutics that could help us improve people's lives in the long run?

Dr. GALLAGHER. Well, I appreciate the question. It—you know, and this is going to sound like a broken record, too. I think our role is actually in the measurement science piece of this. In fact, we are already getting a lot of demand from both universities, companies, and other Federal agencies to support some of the very difficult, very challenging measurements associated with neurological disease, understanding brain function, measuring brain function, measuring misfolded proteins, understanding—these are areas that—where the—our ability to measure, particularly measure in living beings and not under laboratory conditions is very immature. And so that is one of the areas—that is why biosciences has come up as an area where we have really got to come up to speed in supporting those advances in measurement science.

Mr. HULTGREN. I agree. Thank you.

Thank you, Mr. Chairman. I appreciate your indulgence. I yield back.

Chairman MASSIE. Thank you very much for your questions.

We are going to do at least a third round of questions and I will begin by yielding myself another five minutes.

My first question would be—and I want to ask a series of short questions and I don't require anything but short answers. When you talk about cybersecurity funding at NIST, what portion of that should be public domain and what portion of that should be classified? And is NIST really the right place to be doing cybersecurity research or should we be doing it in a more closed environment?

Dr. GALLAGHER. So NIST is the place where you would want to put the non-classified work. You know, you have got to have capability to develop—the capability to protect in commercial technology. So if all the research is classified, then the translation to practice and putting it into industry when it is global markets is actually hampered. And so the NIST role is almost all unclassified.

Chairman MASSIE. Okay. That is a great lead-in to my next question, which is it seems like the rates of technology transfer are higher, and I am asking this question because this might be one of the metrics of success at an institution such as NIST. But it seems like the rates of technology transfer are higher at universities, particularly research universities like MIT or Caltech than they are at NIST. And what could you do to improve the rates of technology transfer at NIST?

Dr. GALLAGHER. So we are actually very actively trying to increase rates of technology transfer at NIST by targeting our SBIR program, making it more focused, by promoting tech transfer by our research staff and making sure that this is a valued activity. But I want to emphasize, you know, the role of NIST is to drive things into practice, but it will not look the same way that measuring entrepreneurial startups would look for a major university. We don't—you know, our role is not to have Federal employees go off and start companies and then come back and do some of those activities.

So what we are trying to do is work with all the—in fact, all of the Federal agencies to broaden and develop a more nuanced understanding of tech transfer means. And so NIST has been working with OMB and other Federal agencies to—and we would like to actually work with you on that as well.

Chairman MASSIE. So you keep leading me to my next question. You must be reading my mind or you have a camera up here. My next question concerns SBIRs and I have some experience in my private background of working with SBIRs. And my question to you would be, as Congress here, we sort of dictate how much extramural and intramural spending that you can do, and as far as the SBIR program goes, I would like your personal opinion on would you rather see more funding toward SBIRs and less on your, for instance, intramural programs? Or would you rather see it the other way around? Or have we, as Congressmen, achieved the perfect balance in giving you that money and dictating how much is intramural and extramural?

Dr. GALLAGHER. That is one of those eye-of-the-beholder questions. It depends. So clearly, we like the—and NIST is predominantly intramural, and our SBIR program is consequently quite small. I think we are fairly close to the right answer. I haven't had a major desire to see it move one way or the other. I am of the be-

lief, though, that we can do much more to make sure that the SBIR funds that are allocated are much more effective. And that has been the big improvement we have been focused on is you need to step back and strategically look at that investment. It is quite unique. It is one of the only investments we make into innovative, small, startup companies. And I would like to see it punch its weight more.

Chairman MASSIE. And my final question in this series is NIST has impressive rates of employee and staff retention. It seems like when people go to NIST, they like it and they don't leave. And that allows you to do long-term projects that would be harder to do with a lot of turnover. On the other hand, university—the university model is that you kick them out of the nest and you don't want too much retention because then you kind of reach this stasis. So how do you avoid getting into a rut at NIST when you have such great employee and staff retention?

Dr. GALLAGHER. Yes, you are exactly right. For an agency that has to have long-term research roots, the stability is in fact very desirable. It is actually quite competitive, and so any other science—you also want churn. You want this lifeblood of new, young people coming right out of school with fresh ideas. And so it has been very important for us to have a very aggressive postdoc program, to have guest researcher programs, and to have this fluidity of new ideas and engagement while having a core cadre of senior scientists that in fact are there. That is a perpetual management challenge that we manage all the time but it is very important.

Chairman MASSIE. Thank you, Dr. Gallagher.

And I yield five minutes to Ranking Member, Ms. Wilson.

Ms. WILSON. Thank you, Chair Massie.

Dr. Gallagher, one of my colleagues expressed concern about "mission creep" at NIST. However, as I recall the mission of NIST, it is to promote U.S. innovation and industrial competitiveness by advancing measurement science standards and technology in ways that enhance economic security and improve our quality of life. I believe that this is a broad mission and I don't believe the budget request is pushing NIST outside of its core competencies. Would you agree with that? And do you believe the budget request reflects the mission of NIST?

Dr. GALLAGHER. Yes, I would in the strongest possible terms agree. I think NIST has been true to its mission. Its mission is broad. It includes not only core basic research and measurement science, but supports the small to mid-sized manufacturers, includes the primary responsibility for tech transfer regulation in the United States. I think—and we hold true to that. The challenge we always face is given that broad mission with limited resources, how do you set effective priorities? But I believe wholeheartedly that one of the secrets of success to NIST, you know, now well over 110 years old, is this: it has been true to its mission from the beginning.

Ms. WILSON. Okay. Just another question. The release of the National Research Council's Forensic Science Report in 2009, which concluded that forensic system—science system in this country has serious problems served as a wakeup call and has prompted discus-

sions throughout the Federal Government and the stakeholder community about how best to improve forensic science research and practice. I am pleased that the budget request highlights your efforts in forensic science. Can you tell us more about what activities NIST intends to undertake related to forensic science in Fiscal Year 2014 and how NIST is partnering with the Department of Justice to improve forensic science?

Dr. GALLAGHER. Thank you. I—you know, NIST—it is interesting. NIST has actually been involved with forensic science for most of its history. NIST scientists actually predated the establishment of the FBI crime lab and helped work to establish it. NIST worked on the Lindenberg case. So we have actually had a long record here, and the role in fact is our core mission. It is to provide the measurement science underpinnings for forensic measurement.

The best example today is DNA, which was held up by the Academy as one of the very effective types of forensic measurement. The NIST staff work—you know, had worked with the community to define the core measurement methodology and sort of the protocols and standards that are used by DNA crime labs, the—and make that technique so reliable.

So realizing that that was a model, the announcement we have just had, the working arrangement between NIST and the Department of Justice to strengthen that. And basically, it will be formalized through a joint commission that will be co-chaired by the Justice Department and NIST. It will bring together a broad community of practice from scientists and laboratory officials to criminal prosecutors, defense attorneys and judges. And the goal is twofold. At NIST, our responsibility is to look at areas where the measurement science underpinnings of a forensic technique are not well established. And those tend to be what you might consider a low-tech measurement. How do you compare—what is the reliability of comparing a tire imprint left at a crime scene with a tire and how unique is that measurement and how degraded before you can't say anything about it? It could be in blood serum, it could be in chemical measurements and so forth.

So our job will be to do the measurement science and then work with the community of practice to turn that into the types of protocols, standards for laboratories, maybe certification requirements for the expertise of the personnel that do those measurements. And those can be adopted at the state and local level and then the Justice Department will decide whether they will be applicable for Federal crime labs under their jurisdiction.

Ms. WILSON. Just let me—I just need to make a comment. Every second, this is so exciting. And I know that the people who work with you and collaborate with you and the people at NIST and—have the most exciting lives in all of this research. This is just amazing. And thank you so much for all that you do for this Nation. Thank you.

Chairman MASSIE. Thank you, Ms. Wilson.

I would like to thank Dr. Gallagher for his valuable testimony today and for having so much stamina undergoing three rounds of questioning being the only witness here before us. I thought your answers were excellent. And I also want to thank you and your staff for hosting our visit to NIST a couple weeks ago.

I would like to thank the Members for their questions and remind them that the record will remain open for two weeks for additional comments and written questions from Members.

Dr. Gallagher is excused and this hearing is adjourned. Thank you.

[Whereupon, at 11:10 a.m., the Subcommittee was adjourned.]

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