

**NIST STRUCTURE AND AUTHORITIES, ITS ROLE
IN STANDARDS, AND FEDERAL AGENCY
COORDINATION ON TECHNICAL STANDARDS**

HEARING
BEFORE THE
SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION
COMMITTEE ON SCIENCE AND
TECHNOLOGY
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CONTENTS

March 23, 2010

	Page
Hearing Charter	2
Opening Statements	
Statement by Representative Bart Gordon, Acting Chairman, Subcommittee on Technology and Innovation, Committee on Science and Technology, U.S. House of Representatives	5
Written Statement	5
Statement by Representative Adrian Smith, Ranking Minority Member, Sub- committee on Technology and Innovation, Committee on Science and Tech- nology, U.S. House of Representatives	6
Written Statement	6
Witnesses:	
Hon. Patrick D. Gallagher, Ph.D. Director, National Institute of Standards and Technology	
Oral Statement	7
Written Statement	9
Biography	14
Dr. James Serum, President, Scitek Ventures, LLC, and Past Chair, NIST Visiting Committee on Advanced Technology	
Oral Statement	14
Written Statement	16
Biography	20
Mr. Craig Shank, General Manager, Interoperability at Microsoft	
Oral Statement	21
Written Statement	23
Biography	26
Mr. Philip Wennblom, Director of Standards, Intel Corporation	
Oral Statement	26
Written Statement	27
Biography	29
Mr. Andrew Updegrove, Partner, Gesmer Updegrove, LLP	
Oral Statement	29
Written Statement	31
Biography	34
Appendix 1: Answers to Post-Hearing Questions	
Mr. Andrew Updegrove, Partner, Gesmer Updegrove, LLP	48
Appendix 2: Additional Material for the Record	
Statement of Vinton G. Cerf, Ph.D., Vice President and Chief Internet Evan- gelist, Google	52

**NIST STRUCTURE AND AUTHORITIES, ITS
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CY COORDINATION ON TECHNICAL STAND-
ARDS**

TUESDAY, MARCH 23, 2010

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

The Subcommittee met, pursuant to call, at 10:07 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Acting Chairman of the Subcommittee] presiding.

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY
SUBCOMMITTEE ON TECHNOLOGY AND INNOVATION**

**NIST Structure and Authorities, Its Role in
Standards, and Federal Agency Coordination on
Technical Standards**

TUESDAY, MARCH 23, 2010
10:00 A.M.

2318 RAYBURN HOUSE OFFICE BUILDING

1. Purpose

On Tuesday, March 23, 2010, the Subcommittee on Technology and Innovation will hold a hearing to review the proposed re-alignment of operational units at the National Institute of Standards and Technology (NIST), examine the current role that NIST plays in technical standards, and examine the need for Federal agencies and departments' coordination on technical standards.

2. Witnesses

- **The Honorable Patrick Gallagher** is the Director of the National Institute of Standards and Technology.
- **Dr. James Serum** is the President of Scitek Ventures LLC, and the past Chairman of the NIST Visiting Committee on Advanced Technology.
- **Mr. Craig Shank** is the General Manager for Interoperability at Microsoft.
- **Mr. Andy Updegrove** is a partner at Gesmer Updegrove LLC.
- **Mr. Phil Wennblom** is the Director of Standards at Intel Corporation.

3. Brief Overview

The Omnibus Trade and Competitiveness Act of 1988 provided the basis by which the NIST technical program is currently organized into ten operational units. The NIST Director has proposed reorganizing the operational units and different offices within NIST to strengthen the ties of the organization to better reflect existing and future technologies and their multi-disciplinary nature.

Standards play a critical role in enabling commerce, trade, innovation and competition. With the reduction in tariff-based barriers through negotiations in bodies such as the World Trade Organization, countries and regions are increasingly using standards as potential technical barriers to trade. Staff from various Federal agencies and departments participate in private sector led standards development activities. In 2007, more than 3,300 Federal staff from 26 Federal departments, agencies, and commissions participated in almost 300 private sector standards developing organizations.

4. Background

The importance of standards was recognized by the founding fathers, who in Article 1, Section 8 of the U.S. Constitution noted that "The Congress shall have power to . . . coin money, regulate the value thereof, and of foreign coins, and fix the standards of weights and measures." NIST's traditional 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. Thus, NIST is the only technical Federal agency with a constitutional mandate.

The National Bureau of Standards (NBS), the predecessor to current-day NIST, was established in 1901. The Omnibus Trade and Competitiveness Act of 1988 changed the National Bureau of Standards to the National Institute of Standards and Technology of today and established the basis for the current laboratory structure. While this laboratory structure has worked well for the past 20 years,

globalization is presenting unique challenges to U.S. industry and manufacturing. The NIST laboratory re-alignment is an attempt to better position NIST to meet U.S. industry and government's needs in measurement science, standards and technology, and promote U.S. innovation and industrial competitiveness. The proposed reorganization will reduce the number of technical operating units from ten to six, and will create three new positions of associate directors, with responsibility for Laboratory Programs, Innovation and Industry, and Management Resources.

NIST has a unique role in standards and conformity assessment activities. Together with developing and disseminating various physical and chemical standards, NIST staff develop tools that enable U.S. interests to keep their physical standards (e.g. time, length, mass, etc.) comparable to international standards through a chain of traceability. Every day examples of this include the time signals on cell phones, the precise operation of GPS units in cars, assurance of accuracy of the annual laboratory test for cholesterol, and the confidence in the quantity and quality of gasoline at gas stations. In 2008, Over 400 NIST staff participated in over 1,000 technical (documentary) standards related activities in over 100 standards developing organizations. This technical standards development work covers numerous sectors, and ranges from standards defining the security of our financial transactions at ATMs to standards improving the fire resistance of building construction materials.

Agencies' participation in technical standards development activities is consistent with their mission, statutory authority, and where applicable, with their regulatory authority. The varied nature of the standards system means that agencies participate in standards developing organizations in very different ways. In numerous private sector standards development activities, agencies participate independently, while in some standards developing fora such as the International Organization for Standardization (ISO), they participate through the American National Standards Institute (ANSI) as an organization. In treaty based organizations developing standards they participate through the State Department. Coordination and communication among Federal agencies and with the private sector is critical to ensure that technical standards issues that can impact U.S. innovation and competitiveness are identified early on and that the agencies with expertise are appropriately engaged.

To better understand the current situation about the effectiveness of the public-private sector cooperation model in standards development and issues confronting U.S. industry, the Chairman of the House Committee on Science and Technology sent a letter to over 200 companies asking for feedback on four different aspects of the U.S. government's interaction in the standards system. The responses highlighted the success of the public-private partnership that is the basis for the U.S. standards system. A number of respondents also pointed to the issue of Federal agency coordination on standards related matters, and responded to questions about a potential NIST role in coordinating Federal agencies on standards related issues. This hearing explores those issues further.

Coordination among Federal agencies and departments on technical standards issues is critical, as it directly impacts the ability of the U.S. government to respond to technical standards issues that potentially impact U.S. competitiveness and innovation ability. On issues such as the Chinese promulgation of a China unique standard for encryption of wireless communication (Wireless Local Area Network (WLAN) Authentication Privacy Infrastructure (WAPI)) and biofuels standardization issues with Brazil and Europe, questions were raised by the U.S. private sector about U.S. government positions on the underlying technical standards and coordination of different agencies and departments in developing such positions.

5. Hearing Issues:

How will NIST operational units and offices be realigned and how will the proposed new NIST structure better position NIST to adequately support the needs of U.S. industry and government?

What role should NIST play in technical standards within the Federal Government? What are the issues relating to Federal agencies and departments' coordination in international technical standards?

The recently concluded Cyberspace Policy Review¹ identified a coordinated approach between Federal agencies and recommended a strengthened and integrated interagency processes to formulate and coordinate international cybersecurity related positions.

Questions of particular interest are:

¹http://www.whitehouse.gov/assets/documents/Cyberspace_Policy_Review_final.pdf

- Why is Federal agency coordination and information sharing and exchange important on issues relating to international technical standards?
- How well are current efforts by Federal agencies and departments to coordinate and share information on technical standards working?
- What are the potential barriers to improved Federal agency coordination and information sharing on international technical standards issues?
- What would be the impact of improved Federal agency coordination and information sharing on international technical standards issues?

Mr. GORDON. [Presiding] This hearing will come to order. As I told our witnesses a little bit earlier, the scarcity of Members here is not a lack of interest in this very, very important issue, but there is a signing ceremony going on at the White House, and the Republican Conference has got various things going on, and so we are going in different places, but the important thing is that you are here, that we have had a period of time for minority and majority staff to talk with you. We have gotten your written information. We are glad to hear from you today.

Today's hearing is about the role of NIST [National Institute of Standards and Technology] in supporting innovation in the 21st century. As the only Federal technical agency with a Constitutional mandate measurement and also the oldest Federal technical agency with a statutory charter, NIST has proven its worth to taxpayer investment for more than 100 years, and as technologies have evolved, so has NIST, from developing the thread standards for the fire hoses to the measurement of electricity and now the digitalization of fingerprints, the list continues to grow.

However, the current lab structure dates from 1988, and the technologies of today are much more multi-disciplinary and integrated in scope and function. Dr. Patrick Gallagher has announced his intention to restructure NIST to reflect the trends of the past 20 years, to accommodate the trends of the next 20. I agree that NIST structure needs to better reflect the needs of the private sector communities it serves, and we intend to make this a component of the America COMPETES legislation.

NIST also has an important role beyond the measurement; from its creation, the word, "standards" has always been a key element of both its name and function.

As technologies have changed since 1903, so have standards issues. Until the '80s, standards were considered to be a purely domestic issue. With the growth of international trade and technological corporations or international corporations in new technology sectors, this began to change. Our understanding of the importance of international impact of standards has accelerated over the past 20 years with the globalization of technological innovation. Today technical standards are a key part of the innovation puzzle.

The focus of today's hearing is to ask what NIST's role should be in coordinating Federal Government standards policy development. I want to make it clear that this Committee has no interest in telling private sector standards developers how to do their jobs. This Committee has always been Congress's strongest proponent for the public-private sector partnership that defines the U.S. standards development system, and today's hearing is addressing issues that we hope will streamline Federal Government participation in the private-sector-led standard system.

I would like to thank our witnesses for taking the time from their busy schedules to appear before the Committee today, and now I recognize Mr. Smith for his opening statement.

[The prepared statement of Acting Chairman Gordon follows:]

PREPARED STATEMENT OF ACTING CHAIRMAN BART GORDON

Today's hearing is about the role of NIST in supporting innovation in the 21st century. As the only Federal technical agency with a constitutional mandate—measurement—and also the oldest Federal technical agency with a statutory charter,

NIST has proved its worth to taxpayer investment for more than one hundred years. And as technologies have evolved, so has NIST. From developing thread standards for fire hoses, to the measurement of electricity, and now to digitizing fingerprints, the list continues to grow.

However, the current lab structure dates from 1988, and the technologies of today are much more multidisciplinary and integrated in scope and function. Dr. Patrick Gallagher has announced his intent to restructure NIST to reflect the trends of the past twenty years and to accommodate the trends to the next twenty. Subcommittee Chairman Wu and I are in complete agreement that the NIST structure needs to better reflect the needs of the private sector communities it serves and we intend to make this a component of the America COMPETES legislation.

NIST also has an important role beyond measurement: from its creation, the word “standards” has always been a key element of both its name and function.

As technologies have changed since 1903, so have standards issues. Until the eighties, standards were considered to be purely a domestic issue. With the growth of international trade and international corporations in new technology sectors, this began to change. Our understanding of the importance of international impact of standards has accelerated over the past twenty years with the globalization of technology innovation. Today technical standards are a key part of the innovation puzzle.

The focus of today’s hearing is to ask what NIST’s role should be in coordinating Federal Government standards policy development. I want to make it clear that this committee has no interest in telling private sector standards developers how to do their jobs. This committee has always been Congress’s strongest proponent of the public-private sector partnership that defines the U.S. standards development system. Today’s hearing is addressing issues that we hope will streamline Federal Government’s participation in the private-sector-led standards system.

I would like to thank our witnesses for taking the time from their busy schedules to appear before the subcommittee today.

Mr. SMITH. Thank you, Mr. Chairman, Chairman Gordon. I thank you for calling this hearing today on the structure and authorities of NIST, the National Institute of Standards and Technology.

Article 1, Section 8 of the Constitution enumerates the power of Congress to, “fix the standard of weights and measures.” For over 100 years since its initial founding as the National Bureau of Standards, NIST has been congressionally authorized to fulfill this mission and is trusted domestically and internationally as an unbiased arbiter of scientific measurement. As we are continually reminded, scientific innovation is never ending, and the infrastructure needed to ensure continued advancement evolves likewise.

In light of this from time to time NIST has seen fit to reorganize itself to better meet the needs of the scientific and commercial communities. This evolution is entirely appropriate, so long as NIST remains within its authorization and is better able to meet its mission.

I am looking forward to hearing from our witnesses on how this reauthorization fits those parameters. With that said, in the interest of hearing from our witnesses, I simply say thank you to the panel for going a ways out of your way to join us here today and share your expertise, and I yield back the balance of my time.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF REPRESENTATIVE ADRIAN SMITH

Thank you, Chairman Wu, for calling today’s hearing on the structure and authorities of the National Institute of Standards and Technology.

Article one, section eight of the United States Constitution enumerates the power of Congress to “fix the Standard of Weights and Measures.” For over one-hundred years, since its initial founding as the National Bureau of Standards, NIST has been congressionally authorized to fulfill this mission, and is trusted domestically and internationally as an unbiased arbiter of scientific measurement.

As we are continually reminded, scientific innovation is never-ending, and the infrastructure needed to ensure continued advancement evolves likewise. In light of this, from time to time, NIST has seen fit to reorganize itself to better meet the needs of the scientific and commercial communities.

This evolution is entirely appropriate, so long as NIST remains within its authorization and is better able to meet its mission. I am looking forward to hearing from our witnesses on how this reauthorization fits those parameters.

With that said, in the interest of hearing from our witnesses, I will simply say thank you to our distinguished panelists and yield back the balance of my time.

Mr. GORDON. Thank you, Mr. Smith, and those Members that aren't here today will have an opportunity to submit opening statements for the record.

It is now my pleasure to introduce our witnesses. First, the Honorable Patrick Gallagher is the Director of the National Institute of Standards and Technology. Dr. James Serum is the President of Scitek Ventures, LLC, and the Past Chair of the NIST Visiting Committee on Advanced Technology. Dr. Craig Shank is the General Manager of Interoperability at Microsoft. Dr. Philip Wennblom is the Director of Standards at Intel Corporation, and our final witness is Mr. Updegrove, who is a Partner of Gesmer Updegrove, and I am sure I have garbaged all your names and your businesses, but you are welcome to correct the record as we go forward. And as you know, you will have five minutes for your spoken testimony or anything within that reason. Your written testimony will be included in the record for the hearing, and when you complete your statements we will begin some questions here.

So Dr. Gallagher, please begin.

STATEMENT OF HON. PATRICK D. GALLAGHER, PH.D. DIRECTOR, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Dr. GALLAGHER. Thank you, Mr. Chairman, Ranking Member Smith, I would like to thank you for the opportunity to be here today. Since my written testimony has been submitted, what I would like to do this morning is to briefly and rather informally highlight some of the major points in that and I look forward to questions.

There were two fundamental topics in today's hearing, and for me they both deal with how NIST can most effectively carry out its mission. So, first let me discuss the reorganization.

The reorganization that I have proposed for NIST actually has two components to it. The first is the organization reporting directly to the Director's office, if you will. The current structure has 17 line organizations that all report to the Director or Deputy Director of the agency. I have proposed that this is an unyielding and unstable structure because of significant turnover in those positions, and the new structure proposes to organize NIST by eliminating the current Deputy Director position and replacing it with three Associate Directors, each with responsibility over major program elements of the agency. So, one for the laboratory programs, an Associate Director for our external programs, which includes Baldrige, MEP [Manufacturing Extension Partnership], and the Technology Innovation Program, and one for management resources, which covers the administrative and support functions of the agency.

This proposed reorganization has been approved by the Department and by the Administration and is currently being evaluated by our Appropriations Subcommittees.

The other reorganization that I have announced that I am considering, and I have also initiated internal planning for, is a realignment of the laboratory structure at NIST. As you pointed out, Mr. Chairman, this structure has been in place since the late 1980s, and I have been working in a very unorthodox fashion here. Normally our reorganizations are proposed and approved and not announced until they have gone through this process. I wanted to seek broad input, and so I have worked closely with the NIST Leadership Team, with the Visiting Committee on Advanced Technology, with key stakeholder organizations, with our own Department of Commerce, and with your staff from this Committee as well.

After reviewing input from all of them, my initial assessment is that it is time to realign the laboratories, and what I have proposed is creating a structure that is based on organizations that are organized by mission. This would create vertically-integrated structure where a single laboratory would be responsible not only for the basic R&D activities but also for the measurement services that help carry out the mission of the agency. This would make organizations much more customer-focused and responsive.

A realignment of the type I am proposing will not change the focus of the NIST programs. This does not set aside a new direction. It is designed to make the agency more effective. Nor does it result in any reductions in force.

I am working closely with all of our stakeholders to develop a proposal that would go to the Department and the Administration for approval, after which it would be sent, of course, and shared with Congress for consideration.

On the standards issue, the National Technology Transfer and Advancement Act and its implementation under OMB [Office of Management and Budget] Circular A-119 defines NIST's role and tells Federal agencies that they are to, when possible, prefer to use standards developed by the private sector through a voluntary consensus process. This piece of legislation, which this Committee played a key role on, has been remarkably successful in having agencies replace government-written standards with those developed in the private sector.

However, today the pace of technology is changing with greater speed, the technology itself is becoming more complex, and our solutions to major policy issues are dependent on technology itself. So there are two major questions that we are facing. One is how do we work more effectively with industry and the private sector on developing standards, and how do we work more effectively across agencies to coordinate our work.

And so in my written testimony I have discussed some of our experience on Smart Grid. I think Smart Grid has broken new ground as a public-private partnership that can be very effective. It includes committed leadership by all the participants, it is an effective partnership model with an active governance, there is strong coordination among the participating Federal agencies, and it brings outstanding technical capability to bear.

We are also working to improve the interagency coordination, and to that end I am working very closely with the Executive Office of the President, especially OSTP [Office of Science and Technology Policy] and OMB, to develop a more strategically-focused inter-agency process where we can address specific standards-related issues and policy topics.

So, Mr. Chairman, I want to thank you again for this hearing, and I look forward to our question-and-answer session where I can address any other issues.

[The prepared statement of Dr. Gallagher follows:]

PREPARED STATEMENT OF PATRICK D. GALLAGHER

Introduction

Chairman Wu, Ranking Member Smith, and members of the Subcommittee, I want to thank you for this opportunity to discuss NIST's pending reorganization, as well as our broader role in standards development. With the growing importance of NIST's mission to the economy—and with the Subcommittee's work to reauthorize the *America COMPETES Act* (P.L. 110-69)—this is an opportune time to consider how to make the agency most effective.

The first question I'd like to address today is: what do these two topics have in common with each other? I believe the answer is that they both fundamentally deal with how NIST can most effectively carry out its mission. As you know, NIST has many critical roles assigned to it. NIST's Laboratories ensure U.S. leadership in measurement science, documentary, and artifact standards. NIST supports other Federal agencies in meeting U.S. Government needs for voluntary consensus standards, and continually advances measurement science through cutting-edge research.

Notwithstanding our continued success on these fronts, NIST finds itself at a critical time in its history. In the current economic environment, it is more important than ever that NIST be effective and efficient in supporting the industrial competitiveness and economic prosperity of the United States. This is the main reason why I have proposed a reorganization of the Director's Office, and am considering a realignment of our laboratory programs. It is also why we are embarking on an initiative to strengthen and better coordinate Federal deployment of documentary standards.

Because these two topics—realigning NIST and strengthening our standards coordination—are so important, I also have sought advice on them from our Visiting Committee on Advanced Technology (VCAT). Over this past year, the VCAT has been enormously helpful in providing input on both of these issues, and I am very pleased that they have joined me today in providing testimony to this Subcommittee.

Realignment of NIST Organizational Structure

Motivation

Why do I believe that the agency needs to be realigned? The answer is simple: The proposed reorganization of NIST's management is designed to allow me to effectively improve accountability by streamlining how the responsibility to carry out our mission is delegated through the organization.

Management Reorganization

Mr. Chairman, as you know, I have been honored to be a NIST employee for over 16 years, and during my tenure the organizational structure of NIST has remained relatively unchanged. In fact, the current organizational structure of the agency originates from the late 1980s, shortly after the enactment of Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-418), when the National Bureau of Standards became NIST and Congress added several new programs to our mission. Since that time, NIST has been organized into a relatively flat organization with a Presidentially appointed Director, a career Deputy Director, and a collection of line organizations covering all of the various laboratory activities plus the Hollings Manufacturing Extension Partnership, the Baldrige National Quality Program, and the Technology Innovation Program (TIP was created in the *America COMPETES Act* (P.L. 110-69) in 2007, and the Advanced Technology Program—its predecessor—was repealed), plus all of the support organizations. At the time I became Director, there

were 17 of these major line organizations, all reporting to the Director through the Deputy Director position.

I believe this overall structure is unstable for two reasons. First, the Director's Office (comprised of Director and Deputy Director) is too small to effectively manage and integrate the diverse programs that carry out the mission of the agency. In other words, the agency didn't "come together" until it got up to the Director's office. This structure tends to drive the management of any activity that crosses line organizations up to the Director's office. This is an unwieldy approach. Second, NIST has experienced substantial turnover in both the Director and Deputy Director positions since the early 1990s. These frequent departures result in changes in management focus and direction for the many activities managed at this level. This has negatively impacted those activities requiring an agency-wide management approach, including strategic program planning, program evaluation, and an integrated safety management approach. These weaknesses have been areas of concern for both the VCAT and for this Subcommittee, and I believe that they must be addressed as an urgent priority.

The proposed reorganization of the Director's Office will better distribute the operational responsibilities for NIST. I have proposed to eliminate the current Deputy Director position and establish three Associate Directors (AD): the AD for Laboratory Programs, which will have responsibility for the scientific and technical laboratories and services, as well as have the functions of a Deputy Director for purposes of succession; the AD for Innovation and Industrial Services, which will have responsibility for our external programs, including the Baldrige National Quality Program, the Hollings Manufacturing Extension Partnership, and the Technology Innovation Program; and the AD for Management Resources, which will have responsibility for NIST's administrative and operational support activities.

Since the line organizations currently report to me through the Deputy Director position, this change does not add a new layer of management. It does, however, provide a core management team for the agency with executives directly responsible for the major program elements. I also believe that this structure will make NIST more stable when there are changes in any of these AD positions, or in the Director position. The proposed reorganization of the Director's Office has already been approved by the Department of Commerce and by the Office of Management and Budget (OMB), and is awaiting evaluation by the Appropriations Committees.

Laboratory Realignment

On a separate track, NIST is working with its stakeholders, including the VCAT, on ways our laboratory programs might be realigned by mission to improve *service delivery*. The NIST Laboratory Program is currently organized into ten laboratory or center line organizations (these are the same line positions that would report to the Associate Director for Laboratory Programs). There are two user facilities (the NIST Center for Neutron Research, and the Center for Nanoscale Science and Technology) and eight laboratories, seven of which are organized by discipline area (Physics, Chemical Sciences and Technology, Electronics and Electrical Engineering, Materials Science and Engineering, Manufacturing Engineering, Building and Fire Research, and Information Technology) and one for measurement services (Technology Services).

Increasingly, the technological and scientific challenges tackled by NIST are multidisciplinary. Examples of our multidisciplinary work include initiatives on Smart Grid, advanced photovoltaics, climate change, and bioscience and health. Currently all major multidisciplinary NIST programs involve more than one laboratory, and several programs involve as many as seven. Coordination of these major programmatic responsibilities increases the "friction in the system," making it more difficult to address these challenges efficiently and effectively.

In addition, by organizing by disciplinary area of research, the current structure emphasizes the role of these organizations in managing their research portfolios, not the dissemination of this research into our mission-based activities. Currently a laboratory that conducts research leading to a new or improved measurement capability or service is often not directly responsible for delivering the resulting product or service to government or industry, which divides a single mission across operational boundaries. This diminishes the responsibility of the laboratory management over these services. This is a major concern for me because it can make us less customer focused, since many of our industry stakeholders interact with NIST through these measurement, standards, and technology activities.

Therefore, in November I asked my senior leadership to undertake an assessment of the NIST organizational structure with a goal of answering three important questions:

1. Is NIST's current organizational structure aligned to best accomplish the important missions that the Congress and the Administration continue to entrust to us and which distinguish NIST from other scientific research laboratories?
2. Can we improve the integration of operational responsibilities into NIST's laboratory programs, with clear roles and responsibilities defined?
3. Can we improve the efficiency and effectiveness of the Institute?

As part of their assessment, the NIST leadership considered multiple approaches and principles under which a national scientific laboratory program might best be aligned. In February they provided me with an analysis of these options, outlining the pros and cons of each alternative. At the same time, I asked the NIST Visiting Committee on Advanced Technology for input on these proposed changes. This was the major focus of the February VCAT meeting. Additionally, I held a Town Hall meeting with NIST staff in December and announced my intention to review the agency's structure and seek input from NIST employees on the organization. I have received, and continue to receive, very thoughtful input from the NIST staff on the potential realignment, with their suggestions of what would be most effective for the agency. I am continuing to work closely with senior Department officials, other organizations and key stakeholders on this process.

After carefully reviewing this input, my initial assessment is that alignment by mission would be the most effective way to structure the laboratories. The benefits of such realignment should outweigh any disruption that it would inevitably entail. A mission-based alignment would enhance our ability to accomplish NIST's missions, improve the integration of operational responsibilities into the laboratory programs, and enhance our efficiency and effectiveness both now and in the future. Aligning the Institute along mission lines would create a vertically integrated structure in which a single laboratory will be responsible for everything from delivery of products and measurement services to customers all the way to the basic and applied research and development upon which these services depend.

In a mission-based organization the realigned measurement laboratories would be responsible not only for fundamental measurements and advancing the state-of-the-art for measurement science, but also for the dissemination of measurements into industry. This means that they include measurement services and programs, such as calibrations, Standard Reference Materials and data, legal metrology, metric program, etc. The technology laboratories would assume responsibility for our sector-specific programs in technology and technology infrastructure, including NIST mission activities in: cybersecurity, health IT, voting technology, building and fire research, and manufacturing process and automation technology, as well as specific responsibilities given NIST by legislation such as the Federal Information Security Act of 2002 (P.L. 107-347), the Help America Vote Act of 2002 (P.L. 107-252), the National Construction Safety Team Act of 2002 (P.L. 107-231), and the National Earthquake Hazard Reduction Program (P.L. 108-360).

Impact and Status

A realignment of this type would not change the focus of NIST programs. Rather, it would make NIST more effective in delivering its products and services to its customers. Critical functions performed by the current laboratories would continue under a mission-based structure. For example, the President's FY 2011 budget request for NIST includes about \$70 million in increased funding for manufacturing related research and support services. In a mission-based alignment manufacturing would be a central mission focus of all our laboratories.

NIST is also in the fortunate position of being able to realign at a time of growth for the agency. This means we are able to avoid any adverse impacts on existing staff—in particular, there would be no Reductions in Force (RIFs).

Where are we now? Compared to the Director's Office reorganization, a change in laboratory structure is more complex and requires careful planning. NIST is now working with all its stakeholders to develop a proposal for Departmental and Administration review. I hope to continue working closely with this Subcommittee to ensure that any changes to NIST result in a more effective agency that can meet its mission responsibilities. In terms of process, we are following procedure which would be to provide a proposal to the Congress after the Department and the Administration have received and approved it.

NIST's Historical Role in Standards

Mr. Chairman, I would like to turn to the larger picture.

NIST scientists and engineers have played an important government role in standards development and use for most of its 109 year history. NIST staff support the development of documentary standards through their technical participation in standards development organizations—ensuring standards that are based on sound science and supported by effective measurements and testing that promotes conformity to and acceptance of the standards. Last year over 400 technical experts from NIST participated in almost 1100 standards related activities, in more than 100 standards development organizations. NIST brings to the table a breadth and depth of technical expertise, a reputation as an unbiased and neutral party, and a long history of working collaboratively with the private sector. NIST values that collaborative relationship and looks to its continued success. This is one of our primary roles under the National Technology Transfer and Advancement Act or NTTAA (P.L. 104–113).

The NTTAA, and its implementation under OMB Circular A–119, guide Federal agencies on the use of standards and conformity assessment practices. This seminal piece of legislation aimed to reduce the development of government-centric standards and promote the adoption and use of consensus based private sector standards to meet government needs, and was principally focused on the use of standards by Federal agencies in procurement and regulation. The Act also charged NIST with the role of coordinating Federal, state and local technical standards and conformity assessment activities and coordinating these activities with the private sector.

In terms of reducing the use of government specific standards in procurement, the NTTAA has been remarkably successful. Since 1997, over 3000 government-specific standards have been replaced with private sector standards. In addition, NIST has identified over 9,000 citations of standards incorporated by reference in regulatory documents and a similar number used in procurement actions. These citations are available in an interactive database which illustrates the extensive use of private sector standards by the U.S. Government.

New Models for Engagement

Nevertheless, today there is increased urgency in discussions about how we can strengthen the coordination and engagement of Federal agencies on the use of private sector standards as called for by the NTTAA.

Why is this the case? I believe it is because the technical standards needed today cover more complex technologies and are playing an increasingly important role beyond procurement by individual agencies. Whether as a basis for Federal regulations, or as a requirement for recipients of Federal assistance, agencies increasingly want to look towards effective private sector standards to meet policy goals. In addition, the needed standards often deal with complex system-level performance, such as interoperability or security, rather than component level performance or specification. This can greatly increase the complexity of the needed standards. For example, our Smart Grid efforts have focused on the development of a model framework of private sector standards to support a secure and interoperable electrical infrastructure, one of the most complex systems in use today. Larger efforts like the Smart Grid often involve multiple Federal agencies and can involve hundreds of different private sector standards.

These changes are driving two urgent goals:

- (1) How do we work more effectively with industry and private sector standards developers on the development of timely and effective standards, and;
- (2) How do we work more effectively across agencies to make sure that Federal efforts to work with the private sector are effectively planned and coordinated?

I'd like to follow up and discuss how we are working on these two issues.

NIST's Smart Grid related work could be looked at as a model for future standards development activities in areas of significant government interest and national need. The Smart Grid effort was characterized by a stronger Federal leadership role in convening the appropriate government stakeholders, and private-sector players to coordinate their activities, define objectives and reference architectures, and establish priorities for work towards mutually acceptable goals on an accelerated timescale.

The Smart Grid program has broken new ground, marshalling a massive public/private sector effort to create standards for the transformation of one of the largest and most complex infrastructures ever built—the electric grid. In less than a year's time, building upon the foundational work of the Department of Energy and its National Lab partners, this effort has created a "Release 1.0" standards framework for the Smart Grid that is providing a roadmap to align the efforts of over 3100 electric

utilities and thousands of suppliers. Our experience in leading the development of interoperability standards for the Smart Grid over the last year has demonstrated a number of principles and best practices that can be applied in leading the development of standards for other major national initiatives where the government has a well defined interest. Key elements for success include:

- Committed leadership from the top. Standards activities are usually driven bottom up—rarely from the top down. In the case of a national infrastructure, top down leadership is essential. The President led this effort with a meeting at the White House, chaired by two Cabinet Secretaries and involving nearly 70 industry CEOs and senior executives. This high-level engagement and leadership is continuing, and is essential to keep the efforts of the hundreds of companies and organizations involved aligned and the momentum going.
- A broad partnership that involves all the critical players—For example the Smart Grid Interoperability Panel, now numbers more than 550 companies and organizations and 1700 individual participants, which represents a novel organizational model for public/private collaboration on standards.
- Strong coordination among Federal agencies—well defined roles and responsibilities has been critical to the success of the ongoing Smart Grid efforts. Strengthening NIST's role as a convener and coordinator of Federal standards activities will be critical for future success.
- Strong technical capability.

NIST, with its broad technical capabilities and infrastructure for conformity assessment, close ties to the standards development community and industry, and reputation as a neutral and honest third party positioned it well to catalyze and improve the efficiency of the U.S. government's engagement on Smart Grid. I believe that this is a model approach for other similar standards efforts. The government has a wide spectrum of standards needs, so it should have a wide variety of approaches to working with the private sector. Traditionally, this has meant either limited government involvement in private sector led efforts, or government written standards. I think the approach taken with Smart Grid offers a middle approach of strategic and focused engagement of the private sector community to put in place an effective standards framework to address public need.

Improved Interagency Coordination

More effective Federal engagement in standards development, use, and standards promotion will require more effective interagency coordination as well. This is a role specifically called out for NIST under the NTTAA. Interagency coordination on standards related issues is also a primary function of the Executive Office of the President, especially the Office of Science and Technology Policy (OSTP), the Office of Management and Budget (OMB) and The United States Trade Representative (USTR.) OMB Circular A-119 specifically addresses interagency coordination on the development and use of standards by Federal agencies, and OMB and NIST have a long track record of working closely on this topic. A more strategically focused interagency process to tackle specific standards related issues or to address emerging standards related policy topics would require a more robust interagency coordination process. I am currently working closely with OSTP and OMB to explore specific mechanisms that would allow the coordination to be strengthened in specific ways: to provide leadership level coordination and decision making regarding policy or agency or Department participation; to provide a working-level coordination process that is tasked by the leadership group on specific topics and which can monitor and report on standards related activities, including implementation of the NTTAA; and a collection of issue-specific working groups to develop and implement plans for engaging on specific standards needs, or for developing possible policy positions for consideration by the leadership group. I am very aware of the strong interest in standards related topics by this Subcommittee and the full Committee. I would like to continue to work closely with you on this topic so that we can ensure that government-needed standards are in place when needed, and are effective in carrying out their intended purpose.

Chairman Wu, Ranking member Smith and members of the Subcommittee, I have approached the reorganization of NIST with extreme care, and I believe there is a unique opportunity to strengthen and improve NIST. I also believe that our efforts in standards related to Smart Grid and Health IT can serve as a model for future standards challenges to address critical national needs. I look forward to working with you closely and I am happy to answer any questions that you might have.

BIOGRAPHY FOR PATRICK D. GALLAGHER



Dr. Patrick Gallagher was confirmed as the 14th Director of the U.S. Department of Commerce's National Institute of Standards and Technology (NIST) on Nov. 5, 2009. Gallagher provides high-level oversight and direction for NIST. The agency promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology. NIST's FY 2009 resources total \$1.6 billion and the agency employs about 2,900 scientists, engineers, technicians, support staff and administrative personnel at two main locations in Gaithersburg, Md., and Boulder, Colo. in addition to \$819 million in FY 09 appropriations and \$125 million from other agencies, the American Recovery and Reinvestment Act of 2009 provides a total of \$610 million to NIST for building critically needed research facilities, expanding fellowships and research—grants, and addressing important national priorities critical to the nation's future.

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

Mr. GORDON. Dr. Serum is recognized.

STATEMENT OF DR. JAMES SERUM, PRESIDENT, SCITEK VENTURES, LLC, AND PAST CHAIR, NIST VISITING COMMITTEE ON ADVANCED TECHNOLOGY

Dr. SERUM. Thank you, Chairman Gordon and Ranking Member Smith, for the opportunity to testify today on matters related to the organizational realignment and the future role of NIST in coordinating Federal agencies in standards. My name is James Serum, and I am President of Scitek Ventures, a science and technology consulting firm. I have been engaged in developing and commercializing measurement technologies for about 40 years, having spent most of my career with Hewlett Packard.

I have associated with NIST for about 12 years, having first served as a member of the NRC [National Research Council] Assessment Panel and in 2004, I was appointed to NIST's Visiting Committee on Advanced Technology [VCAT], and for the last two years have served as its chairman.

In most cases the comments expressed in this testimony are my own, but in some cases, especially related to NIST's role in standards, I also reflect the opinions of the VCAT as represented in the recently-submitted annual report.

I will begin by addressing the topic of the proposed NIST organizational realignment. The first question that must be asked is why do a realignment. NIST is a broad-based, diverse organization involving fundamental research technology, standards development, and managing programs for research funding and quality management. These activities have evolved over the years, but the underlying NIST organizational structure that supports them has not seen major change in, as you have said, about 20 years.

Much of the organization is discipline-focused, for example, in physics and in chemistry, yet many of the current goals and priorities are application or mission-focused. An effective, efficient organization must have clearly-defined responsibilities, single ownership of goals, and accountability for achieving results. Key priority programs must have visibility in all levels of the organization. The head of the organization needs to clearly understand the business priorities, desired outcomes, and capabilities both in people and other assets and then optimize the organizational structure to best meet its goals. I believe that Dr. Gallagher well understands these criteria, and his proposed realignment reflects this understanding.

Dr. Gallagher has proposed a reorganization that I believe will result in a more effective operation and accountability for all departments. Laboratories will report to one Associate Director, and within the laboratories a mission-based structure will bring all elements of the mission together, including technology development, standards, calibration services, and reference data. High-priority industry-focused programs and cross-cutting programs would gain top-level visibility and coordination through a program office under the Associate Director for Laboratory. I am fully supportive of Dr. Gallagher's proposed restructuring.

I was also asked to address the question of my support for the Director of NIST to also hold the rank of Under Secretary, similar to the structure at NOAA [National Oceanic and Atmospheric Administration]. In general I think this is a very positive change both for the NIST organization and for the Director in that it brings parity with his peers in the Commerce Department and allows the Director to participate in all the activities afforded to an Under Secretary.

I would only be concerned if the Director receives significant additional responsibilities with a new title that diverted his attention from the very important challenges that NIST faces in the coming years.

Finally, I would like to express a high degree of confidence in the NIST Director and his ability to structure the organization to meet its goals and objectives. Dr. Gallagher has a deep understanding of emerging technologies, the organization's strengths and weaknesses, and a clear plan to meet the challenges that NIST faces in the coming years. VCAT also has affirmed their confidence in support of Dr. Gallagher in their annual report.

In consideration of the role of NIST in coordinating Federal agency activities, it seems natural that they would play a major role.

The development and maintenance of standards is not only a core competency at NIST, it is a major element of their mission statement. Together with their competency in measurement technology, NIST drives and coordinates standard practices and processes throughout much of the U.S. industries.

For example, documentary standards are recognized as a critical element in the successful implementation of the Energy Smart Grid, Healthcare Information Technology, and the Cybersecurity Programs. NIST is already deeply engaged in coordinating standards activities in these industrial segments, and the VCAT has described these activities and its recommendations in its 2009 annual report.

The VCAT believes that the coordination role taken on by NIST in the area of Smart Grid should be used as a model and applied to other areas of national priority where standards development is required. It is clear from my examples in my written testimony that NIST technical expertise, its reputation as an unbiased and neutral party, and its extensive participation in standards and conformity assessment activities strongly positions NIST to address the standards-related challenges of the 21st century in helping the U.S. maintain a competitive advantage.

Thank you.

[The prepared statement of Dr. Serum follows:]

PREPARED STATEMENT OF JAMES W. SERUM

Thank you Chairman Wu and members of the House Subcommittee on Technology and Innovation for the opportunity to testify before you today on matters related to the NIST Organizational Realignment and a future role for NIST in coordinating Federal agencies in international technical standards.

My name is James W. Serum and I am the President of Scitek Ventures, a science and technology consulting firm focused on helping young companies commercialize innovative ideas and early stage technology. I have been engaged in developing and commercializing measurement technologies and applications for over 40 years, having spent most of my career with Hewlett Packard Company. Upon retirement in 1999, I founded an information technology business, Viaken Systems Inc. and a technology consulting firm, Scitek Ventures LLC, both focused on measurement systems. I have been associated with NIST for the past 12 years, having served first as a member of the National Research Council Assessment Panel for the Chemical Science and Technology Laboratory (CSTL) and in 2004 I was appointed to NIST's Visiting Committee on Advanced Technology (VCAT). In 2008 I was elected to chair that organization.

The two subjects being addressed today are very diverse so I will treat them as independent topics.

In most cases, the comments expressed in this testimony are my own but in some cases, especially related to NIST's role in standards; I also reflect the opinions of the VCAT as represented in the recently submitted Annual Report.

NIST ORGANIZATIONAL REALIGNMENT

I will begin by addressing the topic of the proposed NIST Organizational Realignment. The first question which must be asked is "Why do a realignment?" NIST is a broad-based, diverse organization with activities that include; the development of pioneering technologies executed both within their own laboratories and with external collaborators; the creation of national and international standards, and the management of external research funding and quality recognition programs. These activities have evolved over the years but the underlying NIST organizational structure that supports them has not seen major change for about twenty years. Much of the organization is discipline focused, (for example, Physics, Chemistry, etc.) yet many of the current goals and priorities are application or mission focused.

Based on my long experience in industry, I would say that there is no single organizational structure that can ideally meet all of the diverse NIST goals and priorities. In general, the head of an organization needs to clearly understand his/her

business priorities, desired outcomes, and capabilities both in people and other assets and then optimize the organizational structure to best meet its goals. I believe that Dr. Gallagher well understands these criteria and his proposed realignment reflects this understanding. Any organization must have clearly defined responsibilities, single ownership of goals and tasks, and accountability for achieving results. Key priority programs must have visibility in all levels of the organization. Every department must understand its priorities, goals, deliverables and measures of success. These are the factors upon which I judge the effectiveness of a NIST organizational realignment with regard to being able to accomplish its goals and objectives. It is common for an organization that has highly diverse goals to implement a "matrix" structure. Although this type of structure typically provides more visibility for each program, it often suffers from confusing ownership of tasks and insufficient accountability.

In an effort to respond to the various chartered NIST activities, Dr. Gallagher has initially proposed a top level reorganization of NIST's management structure. This reorganization would replace the current structure which has each Operating Unit reporting directly to the NIST Director, with a streamlined executive management team consisting of three Associate Directorships. This new management structure will streamline the management and planning within the agency and put in place the decision making structure necessary for more effective operations and accountability for all aspects of the individual departments. It means that all laboratories will report into one Associate Director and within the laboratories, Dr. Gallagher is proposing a structure that brings all elements of a mission together including technology development, standards, calibration services, and reference data. He has proposed a structure that includes four laboratories including Physical Measurements, Materials Measurement, Engineering, and Information Technology, as well as two Centers for Nanoscale Science and Technology and Neutron Research. I am fully supportive of this initial top level management restructuring.

I believe that bringing together both technology development and standards programs into a single laboratory will significantly improve organizational effectiveness. It is also important to consider how high priority, industry focused programs such as Smart Grid would be managed in the proposed realignment. It is imperative that these critical programs receive sufficient management visibility throughout the organization and that trade-off decisions are made at a level where the entire organizational resources and expertise is taken into account. Under the proposed realignment, the healthcare activities would be structured as programs, for example, for quantitative diagnostic imaging in the Physical Measurement lab, the biologics and lab testing program in the Materials Measurement Lab, and Health IT in the Information Technology Lab. Dr. Gallagher also proposes a program office with the Associate Director for Laboratory Programs that will provide for high level management visibility and coordination for crosscutting research programs (e.g. Quantum-based measurements) or for the development of new application areas that have program activities in multiple programs.

The ability for an organization to respond to cross-cutting technologies, technologies with rapid development cycles, and technologies which have been developed in non-traditional countries, depends mostly on assigning clear ownership, accountability and measures of success. It needs visibility at the highest level and a nimble decision making process. I have already described how cross-cutting programs would logically fit into the new organization and I believe that the NIST has often demonstrated its nimbleness in responding to urgent needs such as the World Trade Center disaster and assisting the Election Assistance Commission with the development of voluntary voting system guidelines under the Help America Vote Act of 2002 (HAVA).

There appears to be a good understanding within NIST for balancing the needs of program management with internal people development and external constituencies. As such, the realignment evaluation process is being designed to take into account the views of various stakeholders inside and outside of NIST including, of course the researchers in the laboratories. Although the VCAT did not formally review a specific proposal for organizational realignment, we strongly supported the process that the Director has used to develop his proposal including getting involvement and input from a broad spectrum of the organization.

I was asked to address the question of my support for a NIST structure that would make the Director of NIST both a Director and an Undersecretary with responsibility for standards and technology, similar to the structure at NOAA, where the NOAA Administrator is also an Undersecretary. In general, I think that this is a very positive change both for the NIST organization and for the Director in that it brings parity with his peers in the Commerce Department and allows the Director to participate in all of the activities afforded to an Undersecretary. I would only be

concerned if the Director received additional responsibilities with the new title that significantly diverted his attention from the very important challenges that NIST faces in the coming years.

Finally, I would like to express a high degree of confidence in the NIST Director and his ability to structure the organization to meet its goals and objectives. Dr. Gallagher has a deep understanding of the emerging technologies, the organization's strengths and weaknesses, and a clear plan to meet the challenges that NIST faces in the coming years. The VCAT has also affirmed their confidence and support of Dr. Gallagher in their Annual Report.

FUTURE ROLE FOR NIST IN COORDINATING FEDERAL AGENCIES IN INTERNATIONAL STANDARDS:

In consideration of *The Future Role for NIST in Coordinating Federal Agencies in International Standards*, it seems natural that they would play a major role. The development and maintenance of Standards is not only a core competency at NIST, it is a major element of their Mission Statement. Together with their competency in measurement technologies, NIST drives and coordinates standards practices and processes throughout most of our U.S. Industries. I can think of few industrial segments or emerging technology areas that do not require standardization processes or standardized materials of some type to achieve success. For example, "documentary standards" are recognized as a critical element in the successful implementation of the Energy Smart Grid, development of Healthcare Information Technology and Cybersecurity advanced technologies. The NIST team is already deeply engaged in coordinating standards activities in these industrial segments. During the past year, the VCAT focused much of its attention to examining NIST's activities in the coordinated development of documentary standards for these critical national priorities. The VCAT has described these activities and its recommendations in its 2009 Annual Report and I will simply highlight a few relevant points in this testimony.

A couple of examples of the unique role in which NIST is already engaged related to coordinating documentary standards activities within the Federal Government include, The National Technology Transfer and Advancement Act (NTTAA) which charges NIST with the role of coordinating "*Federal, State, and Local technical standards activities and conformity assessment activities, with private sector technical standards activities, and conformity assessment activities, with the goal of eliminating unnecessary duplication and complexity in the development and promulgation of conformity assessment requirements and measures.*"

Furthermore, in support of this act, the Office of Management and Budget (OMB) Circular A-119 on "*Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities*" assigns NIST the responsibility of chairing the Interagency Committee on Standards Policy (ICSP), an inter-agency group of Standards Executives from Federal Agencies and Commissions. Thus, both statute and supporting policy, charge NIST with significant responsibility for coordination of standard's interests among Federal agencies and the private sector. In FY 2009, under the Energy Independence and Security Act of 2007, NIST was assigned "*primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems.*"

NIST is also playing a significant role in supporting the Department of Health and Human Services (HHS) in development and deployment of standards and conformance systems in Healthcare IT, a major administration priority. The Federal Information Systems Management Act (FISMA) charges NIST with the responsibility for developing standards and guidelines for all Federal, non-national security, information systems. Other examples of NIST leadership and coordination of Federal Government agencies in standards and conformity assessment includes assisting the Election Assistance Commission with the development of voluntary voting system guidelines under the Help America Vote Act of 2002 (HAVA). Based on NIST's investigations of the collapse of the World Trade Center structures on Sept. 11, 2001, NIST has proposed various changes to model building codes, some of which have been adopted in recent revisions to the building codes, and other are still being discussed.

It is clear from these examples, among numerous others, that NIST's technical expertise, its reputation as an unbiased and neutral party, and its extensive participation in standards and conformity assessment activities, strongly positions NIST to address the standards related challenges of the 21st century, and helping the U.S. maintain a competitive edge.

The VCAT has recommended that NIST seek executive branch authority to serve as the principal inter-agency convener for documentary standards affecting national, international and/or inter-agency interests of the U.S. Government. The VCAT

strongly urges that the Department of Commerce sanction and endorse such a role for NIST. It is noted that as convener, NIST may not always carry out all tasks associated with the development of documentary standards but would serve to coordinate the development of actions plans and assure that overall architectural integrity of the standard is preserved. NIST would coordinate the application of expertise across relevant agencies in pursuit of the highest quality and timeliness of the documentary standard in question.

To cite one example in greater detail, I'll reference the NIST role in Smart Grid Interoperability Standards. Smart Grid interoperability is a major priority for the administration, and one where standards development is critical. It illustrates the important leadership and active coordination role that NIST can play in standards development. The development and deployment of a Smart Grid presents a major interoperability challenge as the Nation must work within an electrical grid that consists of more than 3100 power utilities using 9200 power generation plants that are connected to more than 300,000 miles of transmission lines supplying electricity to residential and business consumers all over the country to say nothing of the millions of business, industry and residential devices that have to interwork with each other and power generation and distribution systems. The introduction of distributed renewable energy sources such as solar panels, wind turbines, and fuel cells bring additional challenges in integrating these systems seamlessly into the grid, through the use of smart meters. It is also important to comprehend the impact of plug-in vehicles on the grid. Clearly defined interoperability requirements, and standards to support such implementations will be critical not only in the creation of a Smart Grid, but also in engendering innovation and competition amongst the suppliers, supplying components to the systems thereby reducing costs of implementation, and providing a greater choice to consumers.

NIST has taken a number of steps to fulfill its role as defined under the *Energy Independence and Security Act (EISA) of 2007*, which gives NIST the "primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of Smart Grid devices and systems . . ." KIST has made significant progress according to the three-phase plan outlined by Dr. Gallagher and the Smart Grid team at NIST and I'll refer you to the VCAT Annual Report for greater detail on the progress that they have made.

From my perspective, this is also an outstanding example of a public/private sector working together for a successful standards foundation upon which to implement the Smart Grid. The SGIP (Smart Grid Interoperability Panel) is composed of over 550 member organizations, most of whom are private companies. The governing Board is chaired by an executive from General Electric and all stakeholder elements are represented.

The NIST staff also undertook to assure the creation of a reference model of the Smart Grid system that will serve as the basis for standards architecture development and articulation. The importance of this initiative would be hard to overestimate. The absence of a comprehensive reference model would disable the development of a coherent architecture for the Smart Grid system. The reference model itself emerges out of the broad spectrum of use cases contributed by the participants in the Smart Grid Interoperability Panel!

The successful efforts thus far reflect well on NIST and the EEEL Laboratory through which the Smart Grid Interoperability Panel activity is managed. The importance of this work is underscored by the planned use of the SGIP technical guidelines in the Smart Grid funds-granting plans of the Department of Energy.

The VCAT observes that the broad spectrum of smart appliances expected to enter the consumer market in consequence of the Smart Grid program will inevitably highlight consumer demand for easy to install and use equipment taking advantage of "plug and play" features that can only arise in the presence of a strong interoperability standards framework. This same avalanche of new consumer equipment will also awaken interest in and concern for consumer safety, leading to the need for the Consumer Product Protection Agency to engage in standards development and conformance testing capabilities.

The VCAT believes that the coordination role taken on by NIST in the area of Smart Grid should be used as a model and applied to other areas of National priority where standards development is required. The VCAT would like to emphasize that NIST's Smart Grid Program encompasses more than coordinating the interoperability standards framework for Smart Grid devices and systems. The capabilities of the NIST laboratories in measurement science, modeling, and conformance assessment provide unique resources that contribute to Smart Grid standards development. The technical outputs of the NIST laboratories can help accelerate the implementation and improve the effectiveness and security of the Smart Grid espe-

cially in the key areas of power system monitoring, power meters and sensors, electromagnetic interference, conformity assessment programs, and cybersecurity. Continued increased support for NIST's research programs in measurement characterization of electrical systems, data networking, cybersecurity, building energy management, and industrial control systems will be critical for future success. The VCAT strongly urges Congress and the Administration to support increased funding for these activities.

Given the core competencies at NIST for standards and advanced measurement technology, their industrial credibility and proven track record for coordinating standards both within the Federal Government and with the private sector, I strongly support the consideration for broadening NIST's responsibility for Federal agency standard's coordination.

BIOGRAPHY FOR JAMES W. SERUM

Dr. Serum received a B.A. in Chemistry from Hope College and was awarded a Ph.D. degree in Organic Chemistry in 1969 from the University of Colorado. His doctorate research was directed toward studies in Mass Spectrometry. Following his graduate studies, he taught and did research at the University of Ghent, Belgium. He spent a year at Rice University as a Welch Fellow, and then joined the staff at Cornell University as Director of the National Institutes of Health High Resolution Mass Spectrometry Facility.

Dr. Serum joined the Hewlett-Packard Company in 1973 as Applications Chemist for Mass Spectrometry. Since then he has held a number of management positions, including Technical Support Manager for Mass Spectrometry in Europe (Paris, France); Marketing Manager for Mass Spectrometry and Spectroscopy at the Scientific Instruments Division; R&D Manager at the same division; and R&D Manager for the Avondale Division (Laboratory Automation and Chromatography Instrumentation). Since 1984 he has held business unit level positions as Operations Manager for Laboratory Automation Systems, Automated Chemical Systems Operation and Analytical Group Research and Development Manager. In 1992 Dr. Serum was named General Manager for Mass Spectrometry, Infrared, and Protein Chemical Systems. He was the founder of HP's Bioscience Products business. He has served as chairman of HP's Bioscience Council, co-chairman of the Hewlett-Packard R&D Council and the Pharmaceutical Business Council. He retired from Hewlett Packard in August 1999 to co-found Viaken Systems Inc, where he was a Director and served as Executive Vice President and Chief Operating Officer. Dr. Serum has been a Venture Partner with Flagship Ventures and currently serves as President of Scitek Ventures, a science and technology consulting firm that he founded in 2002. In 2002 he was elected as a lifetime National Associate of the National Academy of Sciences and in 2004 he was elected to serve on the Visiting Committee for Advanced Technology of NIST. In 2005, Dr. Serum was named to the President's Advisory Board for Advanced Technology at the Research Corporation. In 2008 he was elected Chairman of NIST's Visiting Committee on Advanced Technology. Dr. Serum has served or currently serves as a member of the Board of Directors for a number of emerging technology based companies.

OTHER PROFESSIONAL ACTIVITIES

- Member of National Academy of Sciences task force on the Future of Analytical Chemistry in the U.S.(1986)
- Member of National Science Foundation task force to Review Policy for Science Education in the U.S. (1987)
- Invited speaker at numerous educational meetings and conferences on Science Education
- Past member of Hewlett-Packard Education Relations Board
- Review Panel for Hewlett-Packard Grants Program for Analytical Chemistry (1989–1992)
- Member of Science & Technology Board, College of Letters and Science, James Madison University (1988–93)
- Member of Board of Directors, Biotechnology Research and Development Corporation (1988–94)
- Member of the National Institute of Standards and Technology (NIST) technology assessment panel (1990–1992)
- Counselor (alt), Analytical Chemistry Division, American Chemical Society (1992–95)

- Member of the Board, Center for Photochemical Sciences, Bowling Green State University (1994–Present)
- Member of ACS subcommittee for improvement of chemistry curriculum (1994–95)
- Member of National Research Council, Committee on Undergraduate Science Education (1996–2001)
- Member of National Research Council, Committee on A National Digital Library (1997)
- Chairperson, NRC Review committee on National Math Standards (1999)
- Member & Vice Chairman of Board of Assessment for Chemical Science and Technology Laboratory, NIST ('97-'01)
- Chairman of Board of Assessment for CSTL, National Institute of Standards and Technology ('01-'03)
- Member National Research Council Committee on Undergraduate Science Education (02–03)
- National Associate (life), National Academy of Sciences (2002)
- Member of Visiting Committee for Advanced Technology, NIST (2004–09, Vice Chair 2007–08, Chair 2008–10)
- President's Advisory Board for Advanced Technology, Research Corporation (2005–09)
- Chairman, Visiting Committee for Advanced Technology, NIST (2008–10)

Mr. GORDON. Thank you, Dr. Serum, and now we will hear from Mr. Shank.

**STATEMENT OF MR. CRAIG SHANK, GENERAL MANAGER,
INTEROPERABILITY AT MICROSOFT**

Mr. SHANK. Thank you, Chairman Gordon. Chairman Gordon, Ranking Member Smith, my name is Craig Shank. I am the General Manager of the Interoperability Group at Microsoft.

As a global innovator with over two decades of experience in the development and implementation of technical standards, Microsoft appreciates the opportunity to participate in this important hearing.

Effective technical standards can help promote innovation, fuel market growth, and drive corresponding job development. The information and communication technology, ICT, marketplace changes rapidly. New and competing standards that are responsive to the marketplace needs enable deployment of new solutions and encourage development of innovative products and services.

Microsoft plays a dual role in standardization activities. We actively contribute innovative technology to standardization in many technology areas. As an example, we have recently contributed a Microsoft technology called User Interface Automation that helps developers build products like screen readers and voice recognition that provide essential accessibility to computers and the internet to those with significant vision, hearing, or other learning needs.

In addition, we sit on the other side of the table as our products from Windows to X-box and beyond implement thousands of standards that are formulated by a broad diversity of standards bodies. This balance, sitting on both sides of the standards fence, frames our perspective. A diverse standards ecosystem that supports multiple technologies is good for U.S. and global economic growth.

It is also worth noting that the computing experience itself is undergoing a powerful transformation as consumers, governments, and businesses are harnessing computing power in what is called the cloud, with new innovative products and services and broad-

based communications. New businesses will form because any small group of developers at this stage can create content or software and have it available instantaneously in the global marketplace.

With this new opportunity comes corresponding new responsibility, including the need to protect privacy of users, the security of their data, and to enable interoperability between systems; all areas where standards can play an important role.

NIST has already provided engineering taxonomies that have been important in helping support cloud standardization efforts. We see NIST as a key player in the standards ecosystem. Its expertise and involvement are highly valued by the private sector.

With regard to NIST, the Subcommittee posed two related questions for this hearing. The Subcommittee's first question seeks perspectives on the proposed NIST realignment. NIST will be placing standards professionals within each of its labs so they will be linked to the relevant technology experts. We also understand that NIST will create a coordination team among these standards professionals. NIST is also proposing broadly a more effective executive management structure.

We believe that the proposed reorganization of NIST will enhance NIST's overall effectiveness in meeting its mission and objectives, including in the standards system.

The Subcommittee's second question asks what role NIST should play in technical standards within the Federal Government. As background, President Obama's Administration has identified a number of very complex technology policy areas such as Smart Grid, Healthcare IT [Information Technology], and Cybersecurity that impact many different stakeholder groups. All of those are areas where standards can play an important supporting role.

The current voluntary market-driven standard system has the tools it needs to create standards to help accomplish these policy objectives. At the same time, in these key policy areas there is a role for an active convener of the key stakeholders, so together they can assess standards-related needs, and frame solutions to address these challenges. We believe that NIST, based on its standards expertise and its reputation as a neutral, science-based organization, can serve as this convener.

As a convener seeking to develop a standards framework to support U.S. Government technology objectives, NIST should define the problems using specific use cases and scenarios, identify and bring together relevant stakeholders to build consensus on frameworks and outcomes, and then report back to those stakeholders. NIST's work in developing its framework and roadmap for Smart Grid Interoperability Standards exemplifies this approach.

NIST can also serve in a separate convener role to facilitate the exchange of information and collaboration among Federal agencies on domestic and international standards policy issues and on Federal agency engagement in international technical standards development efforts. It would be helpful for the U.S. Government to articulate a unified position or be mindful of differing viewpoints, especially when engaging in international standards bodies.

In closing, I would like to thank you for giving us the opportunity to testify today. Microsoft appreciates NIST's valuable contribu-

tions to standardization, and certainly we at Microsoft look forward to working with you and the broader standards community, including my colleagues here at this table, to preserve and promote a vibrant, collaborative, and effective standards ecosystem.

Thank you.

[The prepared statement of Mr. Shank follows:]

PREPARED STATEMENT OF CRAIG SHANK

Chairman Wu, Ranking Member Smith, and Members of the Subcommittee, my name is Craig Shank and I am the General Manager of the Interoperability Group at Microsoft. In this capacity, I have executive responsibility for Microsoft's corporate standards activity on a global basis. Microsoft believes strongly that the best standards emerge from voluntary processes and public-private partnerships that allow for dynamic, market-led innovation.

As a global innovator with over two decades of experience in the development and implementation of technical standards, Microsoft appreciates the opportunity to participate in this important hearing on the structure of the National Institute for Standards and Technology (NIST) and its future role in technical standardization.

At their most fundamental, technical standards are tools that promote efficiency and innovation by making it easier to create products and services that work together—or “interoperate”—better. This is equally true in the information and communications technology (“ICT”) environment. With an increasingly diverse and competitive ICT marketplace, and new ICT solutions, services and vendors appearing in the market almost daily, interoperability has become a market imperative. The development and implementation of standards is one of the ways in which the technology industry is able to meet consumer demand for interoperability.¹

By helping to enhance interoperability among products or services within a market, and being responsive to real marketplace needs, standards can help promote innovation, fuel market growth, and protect investments in new technologies. The ICT marketplace changes rapidly. As a result, ICT standards must be able to change in response. New standards must be permitted to compete in order to respond to these needs, further additional competition, and encourage the development of innovative solutions.²

Microsoft plays a dual role in standardization activities. First, we actively contribute innovative technology to standardization related to computing hardware, software and associated devices, the Internet and its infrastructure, consumer electronics devices, and telecommunications systems. Second, we are an active implementer of standards. Microsoft supports a very large number of standards in our products that are formulated by a broad diversity of standards bodies. Ultimately, both of these roles are deeply informed by the market, and in particular feedback on the way customers use ICT products and services in their day-to-day lives.

Because of this dual role as contributor and implementer, Microsoft takes a balanced approach to standards development and policy. We understand the particular needs and concerns of those contributing time, resources and technologies to the development of standards, but we are equally sensitive to the needs of those who are implementing the resulting standards into their products and services. Our involvement on both sides of the standards fence frames our perspective that a diverse standards ecosystem that supports multiple technologies is good for the U.S. and global economies.

The computing experience itself is undergoing a powerful transformation that demonstrates the velocity of change in the ICT marketplace and related technical standards. Increasingly consumers and businesses alike are harnessing computing power in the cloud. People are running applications and storing documents on powerful servers located in massive data centers. They are using more powerful client devices. And they are creating, accessing, and sharing more of their personal information more frequently and with more people than ever before. This new frontier

¹Microsoft's commitment to standardization to help further interoperability is reflected in our Interoperability Principles, available at <http://www.microsoft.com/interop/Principles/default.aspx> Additional information about Microsoft's standards policies and activities can be found at: <http://www.microsoft.com/standards/>.

²Given the dynamic nature of innovation and ICT standards development, government should be cautious about mandating adherence to any particular standard without demonstrating sufficient need and without support from the impacted industry and relevant stakeholders. Mandated standards can divert normal marketplace outcomes, lock the industry into a less-than-optimal solution, and reduce incentives to innovate in that technology area.

opens up a whole new horizon of possibilities, including new software investments that will create new business models and opportunities to form and grow new businesses. For instance, these technologies already enable any small group of creators to develop content or software and to have it available instantaneously in the marketplace around the globe. And with this new opportunity comes corresponding new responsibility. This includes the need to protect the privacy of users and security of their data and to enable interoperability between systems—all areas where standards may play an important role.

Cloud computing is a technology area with broad applicability for the U.S. Government, not only to increase efficiency and reduce cost, but also for communication between agencies and as a continuation of efforts to increase citizen participation. As such, cloud technology represents an ideal opportunity for beneficial participation by NIST. Indeed NIST has already made an important contribution to the advancement of cloud standards, essentially providing the engineering taxonomies that help the industry discuss the various aspects of cloud technology and deployment. NIST is a key player in the standards ecosystem, and its expertise and involvement is highly valued by the private sector.³

Questions Posed by the Committee

In connection with today's hearing, the Committee has posed three inter related questions regarding NIST:

- Why is coordination amongst Federal agencies and departments on technical standards issues important? How can it be improved?

The current Administration has identified a number of technology policy areas of focus (such as smart grid, healthcare IT and cybersecurity) where there is a need to understand what positive role standards can play. We believe that NIST can undertake a convener role, and thereby promote collaboration among both public and private sector stakeholders aimed at developing an appropriate standards framework to address U.S. Government objectives. This is important in connection with certain technology policy objectives where the standards-related needs involve several standards elements and cut across many different technologies and stakeholder groups.

From an industry perspective, in this context we value effective problem definition, particularly through scenarios and use cases. We believe NIST is uniquely positioned to help bridge the gap between complex U.S. Government objectives and the voluntary consensus-based standards system by taking a proactive role in convening a wide breadth of key stakeholders tasked with undertaking that problem definition work.

- What could a future NIST role in standards be? How can NIST foster Federal agency collaboration on international technical standards issues?

NIST can also serve in a separate convener role whereby it could facilitate the exchange of information and collaboration among Federal agencies on domestic and international standards policy issues and on Federal agency engagement in international technical standards development activities as appropriate. Typically, these types of standards issues are of interest to more than one agency, and it would be helpful for the U.S. Government to articulate a unified position or be mindful of differing viewpoints, especially when engaging in international standards bodies.

Further, the President's National Cyberspace Policy Review released in May 2009 (see http://www.whitehouse.gov/assets/documents/Cyberspace_Policy_Review_final.pdf), stated that "the sheer number, variety, and differing focuses of these venues strain the capacity of many governments, including the United States, to engage adequately." The President also articulated the need "to enhance the identification, tracking, and prioritization of international venues, negotiations, and discussions where cybersecurity-related agreements, standards, activities, and policies are being developed." NIST is uniquely positioned to play a central role in facilitating coordination among the Federal agencies on international technical standards issues.

³Among other contributions, NIST's measurement standards underpin many key technology standards, including those relating to optical fibers and to a range of electronic devices. NIST also provides key standards-related services, including the "Notify U.S." program, and participates in various standards development organizations (SDOs). Equally important is NIST's role under the National Transfer and Technology Advancement Act ("NTTAA") and OMB Circular A-119 to help coordinate U.S. Government's interests in coordinating U.S. Government interests in standards and conformity assessment systems.

- Please share any perspectives on the proposed NIST alignment.

NIST appears to have taken a very thoughtful approach to its re-organization that, among other things:

- Seeks to ensure that the development of standards-related strategies for a given technology is done in close collaboration with the NIST staff and other stakeholders with the appropriate subject matter expertise relating to the technology area at issue.
- Seeks to capture and address the different perspectives of all internal stakeholders when developing and refining positions or approaches.
- Establishes what is likely to be a more effective executive management structure. We would like to elaborate further on these responses below.

Discussion

We believe that the U.S. Government should leverage NIST’s expertise on standards, the standardization ecosystem and technology issues, as well as its well-deserved reputation as a neutral, science-based organization that serves as an “honest broker”, in helping to enable further coordination among Federal agencies on issues relating to technical standards.

This coordination is becoming increasingly important. While the Federal agencies have all been assessing the use of private sector standards (and participating in their development) whenever possible under the NTTAA, many of these agencies are now considering standards to address broader technology policy initiatives that cut across agency missions and responsibilities.⁴ In addition, to the extent that standards-related policy or technical issues arise that may have both national and international implications impacting competition, trade and innovation, Federal agencies should seek to share information and collaborate to the extent possible on developing a unified U.S. Government position.

We believe that this approach will support the U.S. Government in accomplishing its objectives. U.S. competitiveness is best served in an environment where private and public stakeholders from around the world can work to develop standards that meet the needs of the global marketplace and foster global competition that in turn fuels further innovation and new market development.

As a convener seeking to develop a standards framework to support a U.S. Government technology objective, NIST should:

- *Define the problem.* Questions that must be answered include: What is the specific policy goal to be addressed? What is the range of technologies that support this goal? What standards already exist? How effective are existing standards at solving the problem at hand? Accurately framing the answers to these and other questions is essential for several reasons. It helps to identify the full range of stakeholders who will be relevant to the standardization effort; to establish the parameters necessary for any effort involving different industry players (particularly players with divergent agendas); and to ensure that the outcome of the standardization effort is focused, pragmatic, and is likely to be endorsed by key stakeholders.
- *Identify and bring together relevant stakeholders.* Effective standardization framing requires input from multiple stakeholders from the very beginning, particularly in complex standards areas. Absent broad participation and open consultation, there is the risk that some interests, including government agencies and smaller companies who have invested heavily in their own innovative products and systems, will be shut out of the relevant market or otherwise disadvantaged.
- *Report progress to stakeholders* and to other interested or affected U.S. agencies.

In our experience focusing on interoperability, effective multi-party engagement requires high-quality problem definition. For us, the key element of this is a plain-language description of how a technology or system might be used (sometimes called the “scenario”, or “use case”) that needs to be defined for a given standard or specification. Fundamentally, these scenarios are the foundation for efficient, effective

⁴ If NIST is tasked with these roles, one of the key challenges it will face will be to determine the factors that should trigger the initiation of a “NIST-coordinated” standards planning process. These processes can consume large amounts of public and private sector resources, and they may not always be the best response to a given technology policy challenge—so NIST will want to initiate them strategically.

specification development and engineering work across multiple parties. They tend to create a solid set of objectives that different players—even players with somewhat differing agendas—can work well with, creating solid, pragmatic results. Both of these elements, in addition to a very effective public-private partnership, have been a core part of the Smart Grid effort at NIST, and we believe they are reflected in the positive response to the NIST Framework and Roadmap for Smart Grid Interoperability Standards.

We also see the need and value of NIST holding a convener role with regard to U.S. Government interests in connection with national and international standards-related technology and policy issues. Stating the obvious, the ICT sector is becoming increasingly global. This trend will only be heightened as we move toward next-generation computing and communications technologies, which are often built to transcend national boundaries. In a convener role, NIST could help facilitate information exchange and seek to coordinate U.S. positions on standards-related issues across the Federal Government as appropriate.⁵

Finally, with regard to NIST's proposed re-organization, it appears that NIST will place standards professionals within each of its labs, enabling NIST to better coordinate the needs of the lab and the needs of standards body participants in the relevant technology areas. We also understand that NIST will create a coordination team to facilitate cooperation between the standards professionals in each of the labs; this should help to ensure that the efforts of one lab do not inadvertently disadvantage the interests or objectives of other labs.

We believe that the proposed reorganization will enhance NIST's overall effectiveness in meeting its mission and objectives.

In closing, I would like to thank you again for giving us the opportunity to testify today. As I hope my testimony has demonstrated, Microsoft believes strongly that the best standards emerge from voluntary processes and public-private partnerships that allow for dynamic, market-led innovation. We appreciate NIST's valuable contributions to standardization and we support NIST undertaking a more defined convener role to further enable Federal agency coordination on issues relating to technical standards. We look forward to working with you and the broader standards community to preserve and promote a vibrant, collaborative and effective standards ecosystem.

BIOGRAPHY FOR CRAIG SHANK

Craig Shank is the General Manager for Microsoft's Interoperability Group, with executive responsibility across the company for standards and interoperability from a business, technical, policy and legal perspective. Microsoft's Interoperability Group is responsible for corporate direction on interoperability and standards, as well as the company's global team of standards officers.

Before joining Microsoft in 2003, Mr. Shank was an engineering and business development executive at Linen, a venture-backed Linux developer, with responsibility for teams in Japan, France, Australia, the U.S. and Canada. Before he joined Lineo, Mr. Shank was an executive with both business development and legal roles at NetManage and Wall Data, both NASDAQ-listed software companies enabling cross-platform interoperability for enterprise systems and connecting users and applications on Windows, IBM mainframe and Unix systems. Mr. Shank also was a partner in the technology law practice at the law firm of Perkins Coie.

Mr. Shank graduated from Harvard College (1982) and Georgetown University Law Center (1986).

Mr. GORDON. Mr. Wennblom.

STATEMENT OF MR. PHILIP WENNBLOM, DIRECTOR OF STANDARDS, INTEL CORPORATION

Mr. WENNBLOM. Thank you, Mr. Chairman. I appreciate the opportunity to testify today. I am Philip Wennblom, and I manage the Corporate Standards Office at Intel Corporation.

⁵ We recognize that each Federal agency has its own mission and responsibilities, and we are not suggesting that NIST take on the role of a mediator, arbiter or final decision maker on these types of issues. In addition, we also see the need for the private sector to be able to communicate directly on relevant issues with individual agencies and to provide subject matter expertise.

Standards are important to Intel's business and to the information and communication technology industry overall, and as a result Intel has a strong interest in the health of the standardization system in the United States and globally. Intel and our industry are primarily interested in global standards, standards that are developed to address global requirements and which are ultimately adopted around the world.

The National Institutes of Standards and Technology has very important roles in the standard system. NIST is an active and expert participant in developing standards through involvement by 400 or so of its employees, and the participation of those employees is highly valued.

NIST has a role in public and private coordination on priority areas of standardization, for example, the current work on Smart Grid, and I would emphasize that these types of efforts to convene the public and private sectors to coordinate require a large amount of effort and should be considered exceptional. They should represent areas where policy priorities for the government, areas where NIST has strong expertise, and where there is a need for public and private coordination.

NIST also has an important role to coordinate among Federal agencies on standardization development on policy topics, a role that has been described in the NTTAA [National Technology Transfer and Advancement Act]. I support Dr. Gallagher's plans for reorganizing NIST, and I believe these changes will strengthen the important roles that NIST plays in standardization. The changes should improve management stability and customer orientation, and the Director's examination of strengthening the interagency coordination role is also well considered.

I would like to thank the Subcommittee for the opportunity to be here, and of course, I will be happy to take questions when we get there.

[The prepared statement of Mr. Wennblom follows:]

PREPARED STATEMENT OF PHILIP WENNBLOM

Mr. Chairman, Ranking Member Smith, members of the Subcommittee, my name is Philip Wennblom and I am Director of Standards for Intel Corporation. In this capacity, I manage Intel's Corporate Standards Office, that has responsibility for coordinating standards development activity across the company, for setting Intel's standardization policy positions, and for representing Intel in strategic standards development organizations around the world. I am also a member of the Board of Governors of the IEEE Standards Association, a member of the Executive Board of INCITS and chair of the Information Technology Industry Council Standardization Policy Committee. I am honored to appear before this Subcommittee today on behalf of Intel Corporation.

Standards are critical to Intel and Intel has played a leading role in standards development for many years. The importance of standards to Intel can be illustrated by considering four areas of benefit. Intel has found that standards can help create ecosystems of companies that grow new markets—the Universal Serial Bus (USB) is an example. USB allows many types of products, from cameras to cell phones to printers, to connect easily to computers. Intel designs and manufactures complex semiconductor products. By implementing standards in the design of those products, Intel makes them easier for system manufacturers to use—the PCI Express bus is an example. The PCI Express bus is a high performance interface for connecting subsystems, such as graphics, in a broad range of computers. Many standards in the Information Technology industry enable interoperability among products, which is of great value to consumers and businesses. IEEE 802.11, also called WiFi, is a good example of such a standard. A laptop with IEEE 802.11/WiFi can be counted on to work with wireless access points to gain Internet access all over the world.

Standards enable access to global markets. Intel's products require large investments to develop and the economics of semiconductor manufacturing favors producing them in large volumes. When standards supported by those products are accepted globally, it provides for the most attractive market opportunity.

From an industry perspective, NIST is a very important contributor to standards development in at least three principal ways. First, NIST provides substantial expertise to standards development through the involvement of its experts—some 400 people involved in 100 standards development organizations. I've seen firsthand the contributions that some of those experts make in the international standards area—technical contributions and leadership that benefit the U.S. government and U.S. industry. NIST has been a reliable partner, developing standards in collaboration with industry for many years.

Second, NIST has proven to be a very capable convener on standards development challenges that are of priority concern to government policy makers and that present a unique need for coordination of public and private sector interests. In those situations, NIST is in a position to facilitate private and public sector collaboration to identify relevant standards, technologies, and operational parameters that support achievement of the government's policy goals and industry and consumer goals of innovation, competition, and interoperability.

The ongoing work at NIST on Smart Grid is a good example of this process at work. Under the Energy Independence and Security Act of 2007, NIST has been assigned the "primary responsibility to coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of Smart Grid devices and systems" to accelerate national Smart Grid deployments. In this role, NIST has developed a structure (including web portal, organized groups and conferences) that brings together a diverse group of private and public sector technical, standards and market experts in developing the Smart Grid roadmap/framework. I applaud NIST's efforts to partner with other stakeholders in helping to determine the technology and direction of this effort. I expect that NIST will continue to play an important role in facilitating the discussions and ensure the roadmap reflects consensus and supports evolving market innovations for standards and interoperability. Health Care IT and cybersecurity present similar challenges where NIST can play this valuable role.

Third is the role that NIST can and does perform in coordinating discussions on standards within the various agencies of the U.S. government. NIST can be very effective in convening the public sector interests in a priority area, and greater Federal coordination can enhance the public-private partnership that is essential to the U.S. standards system. Working with NIST in its role as the enquiry point for World Trade Organization Technical Barriers to Trade Agreement notifications, I have seen the benefit of NIST involvement in sharing information among Federal agencies and in coordinating responses on standards issues that impact global trade.

With regard to the proposed realignment of NIST, the changes that Director Gallagher has outlined should make NIST even more efficient and effective. The creation of Associate Director positions should improve the efficiency and stability of the organization, and the directions that Director Gallagher has described for having laboratory programs aligned by mission should make NIST more customer oriented and ultimately more successful. The plans to examine NIST's role in coordination of standards development and policy topics among Federal agencies are well considered.

The standardization process in the U.S. relies on a partnership between the stakeholders. This is especially true in areas of collaboration between the government and the private sector. The key guidance for the partnership is found in the National Technology Transfer and Advancement Act of 1995 and implementing regulations contained in OMB Circular A-119. For international standardization, the private sector, through the American National Standards Institute takes the lead in representing the United States in the International Organization for Standardization and International Electrotechnical Commission. NIST, other Federal agencies and the private sector have historically participated cooperatively in the process of developing United States positions and in representing those positions. In my view, that process has worked well and is a key strength of the U.S. system of standardization. It is not in need of major reforms.

In sum, Mr. Chairman, I strongly support the work of NIST and recognize its contributions in the standards arena. I favor Director Gallagher's proposed realignment strategies and believe they would strengthen our standards development process.

BIOGRAPHY FOR PHILIP WENNBLOM

Phil Wennblom is Director of Standards for Intel Corporation. As head of Intel's Corporate Standards Office, part of the Global Public Policy organization, he has worldwide responsibility for direction and coordination of Intel's standardization efforts. Phil is responsible for company-wide standardization policy, training and coordination. His team leads Intel representation in strategic standards setting organizations world-wide.

Phil serves on the IEEE Standards Association Corporate Advisory Group, on the IEEE Standards Association Board of Governors, and on the INCITS Executive Board. He is chair of the Standardization Policy Committee of the Information Technology Industry Council (ITT).

From 1989 to 2001, Phil held a number of positions in Intel's Mobile Platforms Group, including engineering manager, director of strategic planning and director of mobile technology development. Phil joined Intel in 1984 as a design engineer in Technology Development where he developed SRAM, EPROM and E²PROM products.

Mr. GORDON. Thank you, and finally, Mr. Updegrove.

**STATEMENT OF MR. ANDREW UPDEGROVE, PARTNER,
GESMER UPDEGROVE, LLP**

Mr. UPDEGROVE. Chairman Gordon, Ranking Member Smith, and Subcommittee Members, thank you for the opportunity to testify on this important topic. My name is Andrew Updegrove, and I am a Partner in the Boston Law Firm of Gesmer Updegrove. I am also on the Board of Directors of the American National Standards Institute, but the opinions I will express today are mine alone. Those opinions are primarily informed by my experience in representing almost 100 non-profit membership organizations that develop and/or promote standards over the last 22 years. I will seek to frame my testimony today in the context of three important areas where standards play a crucial role; achievement of policy goals, maintaining national competitiveness, and ensuring the efficient use of taxpayer dollars.

Let me begin by addressing the standards-related dependencies of public policy today. Over the last 100 years our bottom-up, private sector-led standards development structure has served this Nation well. This approach was wisely affirmed as we all know and strengthened by Congress in 1995, when it passed the Technology Transfer and Advancement Act.

But today the world is changing in ways that I believe require us to optimize this bottom-up partnership to ensure that it continues to be as effective as it has been in the past. As we become evermore dependent on technology in general and the internet in particular, thousands of new standards have been required to simply make things work. Major policy initiatives such as the Smart Grid and lowering the costs of healthcare through the adoption of electronic health records are reached depending on the availability of scores and often even hundreds of standards, many of which did not exist when these initiatives were launched.

Unfortunately, while the private sector is capable of developing individual standards quickly for specific purposes within a single sector, it lacks the will to tackle complex, cross-sectoral challenges rapidly or at least as rapidly as we need them to accomplish it today. This is important due to what you would expect would be difficulties resolving competing economic interests which will not

always be closely aligned on every standard that needs to be created.

While that cross-collateral, cross-sectoral solutions can and usually do evolve over time, the urgent challenges such as cybersecurity and the rising costs of healthcare do not permit us the luxury to allow normal market forces to provide solutions. As a result, when the national interest demands the rapid deployment of a wide cross-sectoral range of coordinated standards, I believe a catalyzing force is needed. I note this as well. Challenges such as the Smart Grid and electronic health records are but the advanced party of a host of similarly cross-sectoral, complex standards dependent challenges the policymakers will face in the future.

To whom can Congress turn when it determines that multiple industry sectors must be motivated to provide the standards tools needed to address ambitious policy goals? In the examples noted above, the answer has been clear. To NIST.

Let me turn to national competitiveness. The development and deployment of standards is essential to creating new technologies and new product markets and therefore, to jobs creation and maintaining a healthy balance of trade as well. This lesson has not been lost on governments abroad. In particular, policymakers in the European Union and China have integrally woven standards development adoption into their national strategies.

Indeed, in 2005, a U.S. Aerospace Industry working group concluded, "Without a clear strategy and support from industry and government space agencies, the U.S. is in the process of ceding the development of standards for the commercial space industry to venues outside of our influence."

The Chinese government has observed this process and today is sponsoring the creation of more and more homegrown standards for the benefit of its domestic industries. This is especially worrisome because standards are essential to every emerging area of potential managing growth, job growth on the horizon today.

But how are we to achieve such sophistication without abandoning our bottom-up model? The answer, I believe, is to charge a single agency or department with the role of tracking emerging needs for public-private coordination with marshalling facts and data for lawmakers and the Administration to support the development and deployment of standards-aware international trade policy and with providing a coordinating function between the public and private sectors.

Again, I would submit that NIST is the right tool for this job.

Lastly, let me highlight the relevance of standards to the efficient use of resources. There is no argument that widely-adopted standards create competition, increase product choices, and drive costs down. Hence, supporting the development of standards can have a very material impact in lowering government costs directly in procurement, especially where any agency can buy products from a single vendor list. This same support can also lower costs indirectly because government-side standards adoption allows information to be entered once and then exchanged widely, securely, and rapidly across departments and agencies.

Because of the immense soft power of government purchasing, government can also provide incentives to industry to move rapidly

in directions that are beneficial to society in general, such as towards greater cybersecurity and towards greater accessibility for those with disabilities.

Turning very briefly to the questions posed, why is coordination among Federal agencies important? Achieving goals such as protecting homeland security and making government more open can only be achieved through standards. I can expand upon that if necessary, but suffice it to say that without standards these goals simply cannot be achieved.

What could the future role of NIST be? Quite clearly, NIST can be capable of running policies such as the Smart Grid, and I think if I were to leave you with one message today, the role of NIST is essential in meeting these complex challenges such as the Smart Grid, and I believe that it is important that that be institutionalized in cooperation with private industry.

In conclusion, I would like to thank the Chairman and the Subcommittee Members for inviting me to speak to you today, and I look forward to the progress that you will make in these areas. Thank you.

[The prepared statement of Mr. Updegrove follows:]

PREPARED STATEMENT OF ANDREW UPDEGROVE

Introduction

Chairman Wu, Ranking Member Smith, and Subcommittee Members. Thank you for the opportunity to testify on this important topic.

I ask that my written testimony be accepted into the record.

My name is Andrew Updegrove, and I am a partner in the Boston law firm of Gesmer Updegrove LLP. I am also on the Board of Directors of the American National Standards Institute (ANSI), but the opinions I will express today are mine alone. Those opinions are primarily informed by my experience in representing almost 100 non-profit membership organizations that develop and/or promote standards over the past 22 years.

I will seek to frame my testimony today in the context of three important areas where standards play a crucial role: achievement of policy goals, maintaining national competitiveness, and ensuring the efficient use of taxpayer dollars.

Achievement of Policy Goals

Over the last hundred years, our “bottom up,” private sector-led standards development structure has served this nation well. This approach was wisely affirmed and strengthened by Congress in 1995 when it passed the Technology Transfer and Advancement Act (TTAA). But today, the world is changing in ways that I believe require us to optimize this “bottom up” partnership.¹

As we have become ever more dependent on technology in general and the Internet in particular, thousands of new standards have been required to simply make things work. Major policy initiatives such as the SmartGrid and lowering healthcare costs through national adoption of Electronic Health Records (EHRs) are each dependent on the availability of scores—and even hundreds—of standards, many of which did not exist when these initiatives were launched.

Unfortunately, while the private sector is capable of developing individual standards quickly for specific purposes within a single sector, it lacks the will to tackle complex, cross-sectoral challenges rapidly, in part due to the inherent difficulties of resolving competing economic interests. While adequate cross-sectoral solutions can, and usually do, evolve over time, urgent challenges such as cybersecurity and the rising costs of healthcare do not permit us the luxury to allow normal market forces to provide solutions.

¹I have written at greater length on the need to upgrade our “bottom up” system in, *Behind the Curve: Addressing the Policy Dependencies of a “Bottom Up” Standards Infrastructure, Standards Today*, Vol. VIII, No. 4 (October–November, 2008), at: <http://www.consortiuminfo.org/bulletins/oct08.php#feature>

As a result, when the national interest demands the rapid development of a wide, cross-sectoral range of coordinated standards, a catalyzing force is needed. And note this well: challenges such as the SmartGrid and EHRs are but the advance party of a host of similarly cross-sectoral, complex, standards-dependent challenges that policy makers will face in the future.

To whom can Congress turn when it determines that multiple industry sectors must be motivated to provide the standards tools needed to address ambitious policy goals? In the examples noted above, the answer has been clear: to NIST.

National Competitiveness

The development and deployment of standards is essential to creating new technologies and new product markets—and therefore to jobs creation and maintaining a healthy balance of trade as well. This lesson has not been lost on many governments abroad. In particular, policy makers in the European Union and China have integrally woven standards development and adoption into their national strategies.

Indeed, in 2005, a U.S. aerospace industry working group concluded:

- Without a clear strategy and support from industry and government space agencies, the U.S. is in the process of ceding the development of standards for the commercial space industry to venues outside of our influence.²

The Chinese government has observed this process, and today is sponsoring the creation of more and more “homegrown” standards for the benefit of its domestic industries. This is especially worrisome, because standards are essential to every emerging area of potential manufacturing job growth on the horizon today.

But how are we to achieve such sophistication without abandoning our “bottom up” model? The answer, I believe, is to charge a single agency or department with the role of tracking emerging needs for public-private coordination, with marshalling facts and data for lawmakers and the administration to support the development and deployment of standards-aware international trade policy, and with providing a coordinating function between the public and private sectors.³

Who could provide such a function better than NIST, which is not only the governmental domain expert in the area of standardization, and has acted in this capacity in the past with respect to multiple individual initiatives, but a part of the Department of Commerce as well?

Efficient Use of Resources

There is no argument that Widely adopted standards create competition, increase product choices and drive costs down. Hence, supporting the development of standards can have a very material impact in lowering government costs directly in procurement, especially where any agency can buy products from a single approved list. The same support can lower costs indirectly, because government-side standards adoption allows information to be entered once, and then exchanged widely, securely and rapidly across departments and agencies.

Because of the immense “soft power” of government purchasing, government can also provide incentives to industry to move rapidly in directions that are beneficial to society in general, such as towards greater cybersecurity, and towards greater accessibility for those with disabilities.

Questions Posed

With these observations as background, let me turn to the three questions posed to me in your invitation.

1. *Why is coordination amongst Federal agencies and departments on technical standards issues important? How can it be improved?*

Achieving goals such as protecting Homeland Security and making government more open, interactive and transparent requires the ability to seamlessly and securely exchange data among agencies, and in a consistent fashion with citizens, first responders and others externally. In order to meet that goal, I believe that it will be necessary to charge a single agency or department with the responsibility of facilitating the exchange of information and the coordination of action across agency

²See, Hitchcock, Laura et al., *The Future of Aerospace Standardization*, AIA (January 2005). http://www.aia-aerospace.org/assets/aerospace_standardization010S.pdf.

³This is not to suggest that NIST will always be the appropriate entity to act as the principal point of contact with private industry on a given initiative. But it can act as the central clearing-house, developer of best practices, and resource assisting other agencies and departments in establishing industry partnerships with appropriate industry segments on specific initiatives.

and departmental boundaries. That body should also be required to report back to Congress on compliance with the program.

Given NIST's competence in the standards area, as well as its experience in compiling and reporting Agency compliance data under the TTAA, it appears to be the obvious candidate for this task.

2. *What could a future NIST role in technical standards be? How can NISI foster Federal agency collaboration on international technical standards issues?*

I believe that there are three ways in which our "bottom up" process needs to be optimized. In each case, NIST would be the logical choice to act on behalf of government:

- Most crucially, I believe that the role that NIST has played in initiatives such as the SmartGrid and EHRs should be institutionalized and optimized over time. The private sector simply does not have the will to self-organize and drive large, cross-sector, standards-based initiatives through to a rapid conclusion without the support and, frankly, the prodding of the government.⁴
- In contrast to most other nations, there is no government-appointed spokesperson for the United States in all but one of the major formal international standards bodies,⁵ or in the hundreds of "informal," but often more influential, SSOs generally referred to as "consortia." ANSI is internationally recognized as the United States representative in several of the formal organizations, but it lacks an explicit Congressional appointment to serve in that capacity. In fact, NIST and ANSI have worked together productively on many initiatives in the past, and I believe that this relationship should be formalized as the principal conduit between government and private industry, thereby ensuring an ongoing and efficient flow of information. Among other benefits, NIST and ANSI could facilitate formulating joint positions between government agencies and relevant industry sectors on international issues when such unanimity would be useful.
- With the convergence of technologies and the rising importance of systemic concerns such as global warming, the need to develop positions relating to standards will regularly cross agency and departmental boundaries.⁶ NIST can act as a clearinghouse for communication between agencies to help them understand their respective needs and priorities. Similarly, NIST can coordinate their participation in SSOs to minimize cost, and maximize government input into the standards development process.

3. *Please share any perspectives on the proposed NIST realignment.*

For historical reasons, NIST has become the custodian of a variety of missions, each of which must compete for necessarily limited resources. To the extent that realignment will help NIST support the goals that I have highlighted above, I think that it is crucial for Congress to support that realignment.

Conclusion

For decades, the United States has been a global leader in standardization, led in large part by private industry. The leadership of the private sector remains necessary, but it is no longer sufficient. The U.S. needs a more empowered, more activist NIST to bring our historical public-private partnership in the standards arena up to the demands of the present and the future, and to assist the Federal agencies

⁴While the private sector has not typically had the will to undertake complex, cross-sector Initiatives rapidly, it does have the means to do so. ANSI has formed "panels" around a number of complex areas, including biofuels, homeland security, identity prevention and management and healthcare information technology standards. Several of these panels have operated in collaboration with Federal bodies such as NIST and the Department of Homeland Security. Where this pairing has existed, these panels have been particularly successful. A list of ANSI panels can be found here: http://www.ansi.org/standards_activities/standards_boards_panels/overview.aspx?menuid=3.

⁵The exception is the International Telecommunication Union (ITU). Unlike the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), where ANSI represents U.S. interests, the ITU is a treaty organization.

⁶For example, both wireless and geospatial standards are important to agriculture, Homeland Security, the environment, the military, health monitoring, distanced learning—the list goes on and on.

and departments in efficiently managing the jobs that they have been asked to perform.⁷

Mr. Chairman, ranking member Smith, and Subcommittee members, I would like to thank you for committing your time to these important matters, and for the opportunity to testify before you today.

BIOGRAPHY FOR ANDREW UPDEGROVE

Andrew Updegrove is a founding partner of Gesmer Updegrove LLP, a Boston-based technology law firm. He has a broad range of experience in representing both mature and emerging high technology companies of all types in all aspects of their legal affairs. Since 1988, he has also represented and helped structure more than 100 worldwide standard setting, open source, promotional and advocacy consortia, including some of the largest standard setting organizations in the world. He spends a significant part of his time giving strategic advice to clients of the firm.

His leadership in standards related matters is widely recognized. In 2005 he was elected to the Boards of Directors of the *American National Standards Institute*. (ANSI) and in 2005 to the Free Standards Group (FSG), and in 2007 to the Board of Directors of the *Linux Foundation*. He is also a member of the Board of Advisors of *HL7*, an ANSI accredited developer of electronic health standards for clinical and administrative data. In 2004, he was the sole representative of the consortium community to be appointed as a member of the United States National Standards Strategy Committee.

He has been retained by many of the largest corporations in the world to assist them in setting up international standard setting and technology promotional organizations, and by both multinational companies as well as government agencies to advise them in setting their standards-related policies and goals. He has also provided testimony to the Department of Justice and Federal Trade Commission on standard setting and intellectual property rights, and written and filed pro bona "friend of the court" briefs in major standards-related litigation before the Federal Circuit Court, the Supreme Court, and the Federal Trade Commission.

In May of 2002, he conceived and launched *ConsortiumInfo.org*, an extensive Web site intended to provide the most comprehensive and detailed source of news and information on the Internet on standard-setting, open source software project development, and forming and maintaining consortia. The site serves up to a million page views a month to a global audience, including up to 50,000 visitors a month from China. In December of 2002, he conceived and launched the *Consortium Standards Bulletin* (now *Standards Today*), a bi-monthly eJournal of news, ideas and analysis on standard setting. *Standards Today* is sent to a large and rapidly growing list of standards professionals and other subscribers at major corporations, government agencies and universities throughout the world. Other sections of the site include the *Standards MetaLibrary*, with over 1,800 categorized and abstracted articles, and the *Standards Blog*, which attracts up to 100,000 visitors a month. Besides his efforts at the *ConsortiumInfo.org* Web site, he writes and speaks frequently both domestically and internationally on topics involving standards, open source software and consortia. In 2005 he was selected to receive the ANSI President's Award for Journalism for his work at *ConsortiumInfo.org* and *Standards Today*.

Mr. Updegrove is a graduate of Yale University and the Cornell University Law School. He is a certified mediator, and a member of the Panel of Mediators of the Massachusetts -Technology Leadership Council.

Mr. GORDON. Thank you, and now we will begin the questions, and the Chairman recognizes himself.

I think that Mr. Smith and I would hardly concur that there ought not be a Federal office of winners and losers, and that it seems to me that you are all saying that there does need to be some coordination and that NIST is a good place for that, and the word, convener, has been used.

Now, what I want to be able to understand is sort of this chicken and the egg, you know, should NIST say, well, folks, we need to convene, so you all come on over here, or does the private sector

⁷For a full list of my standards-related recommendations to the current administration, see *10 Standards Recommendations for the Obama Administration*, Standards Today, Vol. VIII, No 4 (October–November 2008) at <http://www.consortiuminfo.org/bulletins/oct08.php#feature>

go up and say, we are having some problems. NIST, will you help us convene? How do we say that it looks like some other countries are trying to get ahead of us in setting international standards? So how should we, you know, let us convene and take a lead in that.

So, you know, what is the chicken and the egg? Mr. Shank, why don't we start with you?

Mr. SHANK. Sure. Thank you, Chairman Gordon. It is tempting to answer between those two. The answer is yes. Deciding which things that NIST may play an active role is actually one of—the convener's role in is actually one of the real challenges. That is determining where one acts. I do think that in anticipating how we may go about this, how NIST may play a role, one of the key aspects of playing the convener across stakeholders may be conducting periodic landscape reviews, because I know that one of the things that is—that people are focused on here is not just having a backward-looking approach to the things, the problems that NIST may be able to help fix but a forward-looking role in the areas where convening these stakeholders can proactively help to initiate things.

I believe that—my slightly tongue-in-cheek answer yes really actually does need to be the case, and that is that with the ongoing capability to run landscape review comes engagement with stakeholders where stakeholders may identify key areas. We may also see NIST identifying or Congress identifying key areas. An aspect that is important from Mr. Wennblom's testimony is that these do take up significant public and private resources, so we need to be thoughtful about the specific areas that are—that we do engage in, that NIST engages in because they can be very expensive. I think those need to be largely exception-based, but there are areas that are important enough to merit that.

Mr. GORDON. Well, why don't we let Dr. Gallagher—we will get out of the hypothetical and why don't you tell us what you—where is this chicken and egg, and then maybe the industry folks could react to that.

Dr. GALLAGHER. Great. Thank you. Actually I think there are two distinct cases. I think the question about when a government takes a stronger role in convening or coordinating on a standards effort actually touches on what is the purpose of the standard, and I think in many cases where we are looking at are standards that are needed for achieving government goals.

In the case of Smart Grid, I think NIST took a proactive lead in initiating the convening role because to address our energy needs we had to stimulate and have a standard structure in place that would be viable for, let us say, regulation or for conditions under Federal grants and assistance and so forth.

Mr. GORDON. And the same with health IT?

Dr. GALLAGHER. The same with health IT, the same with cybersecurity. So I think there are many cases where the government's need for technology is going to be manifested in terms of needing to have a certain structure of standards in place, and that is the case where we are going to want to be more proactive.

I think there are also cases where industry is going to drive this and be requesting of us a greater participation because of an impasse or because of an international issue and those types of sce-

narios play out as well. So I think we can be both initiated by industry and initiated by government need.

Mr. GORDON. Anyone else want to comment on this?

Mr. UPDEGROVE. If I may, please. I think that an important thing to be realized is that the standard-setting infrastructure is about 100 years old, and for most of that time it was created to basically solve problems within silos. It is currently faced now with the reality where silo solutions don't work anymore, and private industry in my opinion has not really figured out ways to do things that cross many different sectors. It is getting better. It is coming up with a mechanism of setting profiles, and you are increasingly seeing new consortiums set up, not to set standards but to create profiles of standards to address use cases. And if that sounds like the Smart Grid, it should because it is basically the same type of exercise.

The problem is is that private industry is good at coming up with those to handle still fairly discrete problems. It takes an enormous amount of impetuous and an enormous amount of organization and an enormous amount of sometimes motivating dollars to pull together something in the magnitude of the Smart Grid. So I think that that is the first main area where government realizes that without government it is just not going to happen.

The second thing is I think that there will be standards that are of special interest to government and maybe a good example would be open government. I have spoken at times about comparing standards to civil rights legislation, that if you are disabled and you can't log onto a Web site, the more government saves money by transitioning to a web-based interface with the citizenry, you can effectively be disenfranchised if you can't operate the technology to interoperate with government. And that might be a second category where the involvement of government might be appropriate.

Mr. GORDON. Let me—before I run out of time here, let me get to the threshold question. Really, we posed two questions to you, and one was as Dr. Gallagher I think said, and I agree, in a transparent way he is telling you upfront where he is seeing this thing going, and so that is one question, you know, having viewed that, would the panel, industry panel members raise your hand if you think that this is the right direction.

Okay. So the record will show they all do, and then the second one is do you think that the NIST Director should be elevated to an Under Secretary position and raise your hand.

Once again we have a concurrence.

So I have some more areas of interest but—

Mr. SMITH. Go ahead.

Mr. GORDON. Okay. I will get to one more.

One area that is a real theme, I think, in this Committee has been competitiveness, and we recognize that we have a global economy now. How do we compete in that area? And we recognize that innovation, in this case sometimes, standards lead to new technologies, and that leads to jobs.

We are seeing that governments abroad and policymakers abroad, particularly in the EU and China, often integrate their standards with their national strategies. I think that can be dan-

gerous sometimes, you know, in that if you think that the government knows everything and they take the wrong course, then that is a problem. But it also can get their assets together well and make them, you know, be able to pull together all their assets.

So let me ask you from your experiences in a global market, what are you seeing the disadvantages and advantages of—well, first of all, I guess we should say is—do you see EU and China doing these things, and if so, what are the advantages and disadvantages and what are the lessons that we should learn?

Whoever would like to start. Yes, sir.

Mr. WENNBLOM. It is a very important topic, and I would agree with your characterization of the approach that we see in Europe and China. It is more government-directed and government-driven, and I suppose a benefit of that approach is when the government would like to see a standard put in place, there is a very direct way to make that happen.

However, if you step back and look at the results, I believe that the system we enjoy in the U.S. has been quite successful and continues to be successful despite this different approach that we see taken in other places. As I mentioned, our industry in information and communication technology really relies on standards to be globally adopted. So it is not enough to have a standard implemented in one country. We need to see standards that nearly all countries will adopt.

And the market-driven system in the U.S. where we have, you know, industry and government standards, research, the market-driven-oriented system has been very, very successful in taking standards which have become popular in the U.S. and having them adopted globally, and I don't believe it is under imminent threat from more government-directed systems.

Mr. GORDON. I assume that a lot of that in the past has been because we have been a dominant market, so if we are not such a dominant market in the future, can we still rely in that way?

Mr. WENNBLOM. We may not be as dominant a consumption market but still industries which are based in the U.S. are often very global companies that are participating in markets around the world, and when those companies are participating in a standards process that is market driven, I see impact globally on aligning around technologies. And if a single country wants to pursue its own agenda, it is difficult for that to be successfully adopted globally.

Mr. GORDON. Okay. Does anyone—yes, sir. Go ahead.

Mr. UPDEGROVE. I would take a slightly different approach, but I agree that I think the private-sector system is working extremely well in the standards area. So I think that there are two discreet areas where optimization would be required.

In the first place I think you made a very good point about the size of the American market. To date the United States has had a very disproportionate impact on the setting of standards in areas such as information communications technology. There are in existence today something north of 500 standards consortia, not counting the traditional standards bodies that have been created to set standards in this area.

I have helped set up about 100 of them, and I would say that out of that 100 two have been primarily led by foreign companies, and every last single one of the rest of them, the leadership came from major international corporations headquartered in the United States.

I think we sometimes forget the enormous benefit that American industry has had from having those standards efforts launched to serve at the outset the strategic interests and goals of American industry. People abroad are starting to become aware that other people can play that game. China in particular, with, you know, 1.3 billion people, has very much realized that all the patents are owned in the west, and they are tired of paying patent royalties to build products to sell to their own people while they make 10 cents on a DVD player and ship it off to the west where somebody makes \$5 on the patent royalties plus a markup on the device.

This is going to change, and when you have that many consumers, the game is very clear to learn how to play. I saw in the U.S. IT Report just last week three new standards consortiums were formed in China. Last year there might have been three in the entire year. So I think one of the things that we might not realize until it is gone is when other people start playing the same game, and when American companies that used to start consortia here are looking at that big a market, they won't have any choice but to play the Chinese game the same way.

Mr. GORDON. Well, I see that problem, so my question is what are the answers?

Mr. UPDEGROVE. I think here is where we need to have better communication between private industry and government so that private industry can alert and frankly, I think, recruit government to assist it in trying to stay ahead on the trade policy ways, particularly I would say through enforcing our rights under the WTO [World Trade Organization] and the Technical Barriers to Trade Act, that these things don't get ahead of us and get to the point where they were with the WAPI [Wireless local area network Authentication and Privacy Infrastructure] and Wi-Fi where we have to bring out the big guns to help get us back to the centerline.

Mr. GORDON. Okay. Well, let us just complete this thought. Anybody else want to weigh in here?

Mr. SHANK. I think I would echo Mr. Updegrave's comments about thinking about both the trade attribute and the standardization attribute as related but not necessarily the same thing going on.

In the trade side we do have the WTO as a vehicle. We would like to make sure that we are alert, looking forward, looking into those things proactively so that we don't end up too late in the game.

On the standardization side I think one of the things that is a theme that should run along with that is the effort to draw some of these nations into the global standard system where there is an opportunity to compete effectively using the global competitive environment as opposed to a single country environment. So that is where we see an opportunity to use the existing private standard system but use it on a global basis as a matter of global competitiveness.

Mr. GORDON. Yes, sir.

Dr. SERUM. Just quickly back to the question of the coordination of standards, very often once a technology comes into play, it is the question of how long does it take for companies, private sector and public bodies to come together to think in one fashion before you dominate the industry, and I think the very question of being nimble by coordinating standards, and again, I reference the Smart Grid. A few years ago it looked like an almost insurmountable problem to get everybody to agree on an architecture and a model of how we would go about it, and if we can use that as a model for other high-priority opportunities, I think that can make a dramatic difference in our competitiveness because we can be standardized in a much faster pace.

Mr. GORDON. Thank you, and Mr. Smith is recognized for as much time as he may consume.

Mr. SMITH. Thank you, Mr. Chairman, and thanks again to the panel. You know, it reminds me of certainly my objective of serving that is to create more opportunity or ensure opportunity, not get caught up with the outcome necessarily, and I see each and every one of you as having a vital role in that, and I would say certainly within the private sector represented here today you have probably given more opportunity to people, whether it is the young people in the audience or large companies, but I appreciate the prosperity that some have experienced as a result of more opportunities along the way.

And so I think that certainly I would say we have the existence of NIST as a way to not only ensure opportunity but to ensure competition and not only to make sure that competitors in the private sector compete because I think that we have a good bit of that, I also think that we want to ensure that we have a competitive industry domestically to compete in the world marketplace. And I think that we can have discussion not only today but in the future of how we can leverage that.

I do want to add that I am concerned that some of the pending policies, and I won't get into those today, but I am concerned that some pending policies that are out of the control of each of you but they might stifle innovation, they might stifle opportunity, and that concerns me a great deal, not only for the future of our country but for the future of every individual. So with that I might just touch on a few things.

Dr. Gallagher, how will the proposed Director's office reorganization support improving NIST's interaction with industry and academia to support competitiveness, and what do you have planned to help America compete, and will this reorganization make a difference to American competitiveness?

Dr. GALLAGHER. Thank you for the question. I believe that the reorganization will actually make a very substantial difference in how NIST is interacting with industry, which is its primary stakeholder, and the reason for that is simple. It has to do with accountability. The real difference in the organizational structure that I am proposing is not at the technical level. The NIST scientists and engineers will continue doing the world-class work that they have done, but the leadership now will be directly held responsible for carrying out a portion of our mission.

And since our mission is to work with industry, I think the major outcome of this is to make them very acutely focused on how their services, whether it is measurement services that they are providing out of one of our technical laboratories, or whether it is our technology services in promoting new technologies, developing standards, their job description now is really based on how well they carry that out.

And so what I think it does is it creates much stronger ties between the NIST leadership and industry leadership. That has been the relationship that I clearly wanted to strengthen. And I think that as you have heard a little bit just in the standards arena, I view the job of NIST as to allow the conditions for competitiveness an opportunity to take hold.

So in many cases, what we are talking about is an enabling infrastructure. In other words, it creates the business or technology conditions for companies to innovate and generate new products, to have global markets available to them, to have a supply chain that they can work with. It is about putting that trust into those relationships, and viewed that way this is about creating an environment where we can make and compete and still be the number one country in the world for developing new products and services. I think that translates to jobs and economic prosperity in a very direct way.

Mr. SMITH. Very good. Thank you. Now, just a point of clarification. It sounds like there would be a net increase of senior-level positions at your shop.

Dr. GALLAGHER. Actually, no. It is not even a new layer of management. Currently the existing organization has 17 line organizations that report to me through a Deputy Director. So while I am replacing a single Deputy Director with three Associate Directors, there are going to be fewer line organizations reporting in. So actually it is not an increase in the number of executive positions.

Mr. SMITH. Okay, or FTEs.

Dr. GALLAGHER. Not at all. There is no change.

Mr. SMITH. Okay. I appreciate that, and, again, I don't want to pretend to manager your shop there. I am not qualified, number one, but certainly that is not what I see my role to be, but budgetarily I just want to stay on top of things.

You did mention some interagency coordination process. If you wouldn't mind elaborating on that and especially if you might be able to share in your discussions with OSTP, OMB, and USTR [United States Trade Representative], just to use a few acronyms here today.

Dr. GALLAGHER. Thank you. So as I have looked at the standards coordination effort, as I have said, it really has two major components. One is having a more robust set of models for how we work with the private sector. I mean, to oversimplify, historically we had either a very hands-off, we will participate at a technical level, but it is really not managed at all, or we take over as a government, and we write down standards ourselves. I think the real attractiveness of the Smart Grid approach is that it represented a new type of model where you had a much more active engagement, and it really was a public-private partnership.

Is that going to be the right approach for every standards question? The answer is definitely not, but I think in cases where you need those attributes of being able to define your needs very clearly and have some influence over the architecture, for example, for security in the Smart Grid, over the timeliness of the development, it is a very appropriate model.

The other area has been how do you get—these technology systems that are becoming very complex, and there is almost always a large number of agencies who have a stake in the outcome, and so we have been looking very carefully at how to improve the inter-agency coordination. And I have reached the conclusion that it has two ingredients. One is it has to have an agency like NIST which has deep technical capabilities and understands the standards process. We in some way become the corporate memory for how to do standards-related activities.

The other part of interagency coordination, though, is actually being able to direct agencies to get together, to mediate discussions, and reach conclusions, and in my view that is very much a White House function, and so what I have been doing is trying to work very closely with OSTP and with OMB and the U.S. Trade Rep to come up with a form where we tie together the type of interagency process that we have had under the NTTAA, so there is a Standing Interagency Coordination Committee chaired by NIST, and couple it with a more strategic policy leadership-level-driven interagency process that would come out and be managed by the White House.

And I think by having NIST involved in both of those we tie these processes together. It should give us the ability to have the active leadership participation when we need it and not lose any of the very active working level interaction that we currently have with the agencies.

Mr. SMITH. Okay. Thank you, sir.

And a little bit outside the scope of the specific questions that you were asked to answer in your prepared testimony, if you wouldn't mind telling us what each of you, excuse me, might believe are NIST's strongest contributions to American competitiveness and any areas where you believe NIST could use improvement, and especially as we reauthorize American COMPETES, what recommendations would you make to strengthen NIST?

Maybe alphabetically. I don't know. Whoever wishes to—go ahead, Mr. Wennblom.

Mr. WENNBLOM. As I mentioned, Intel, and I believe industry, appreciates when NIST comes to the table because invariably the NIST representative is an expert and makes sound contributions to the standards process. The area for improvement that I hear discussed among my colleagues is we want more of that, that there are some places where we would like to have NIST participating in developing standards, and they are not there. So I don't know if it is a criticism, but, you know, if there is an opportunity to give NIST a bigger opportunity to participate in the standards process, I think that is something industry would appreciate, and it would ultimately make the U.S. more competitive.

Mr. SMITH. Okay. Dr. Serum.

Dr. SERUM. I will refer back to the proposed reorganization realignment in my comment. I think historically with a discipline

structure that has been in place NIST has done just, well, world-class research and three Nobel Prizes have come out of it as demonstration of that.

However, that research in the current structure is not as closely aligned to its deliverables with industry as it could be, and this is one of the reasons why I strongly support Dr. Gallagher's realignment proposal because all elements of its impact on industry, the pioneering measurement technology that gets developed together with the necessary standards that the industry needs to be competitive, all are accountable within one organization, and the decisions can be made by a small group of people, made much more rapidly, and made synergistically with the outcome, the desired outcome closely associated with the pioneering research.

So I think that is probably a significant advantage of the new proposed structure.

Mr. SMITH. Thank you. Mr. Shank.

Mr. SHANK. Thank you. It is daunting to try to select NIST's strengths, so rather than select specific strengths let me perhaps—I will outline some general areas. Dr. Serum has identified the existing body of basic research capabilities. Certainly Mr. Wennblom spoke to the importance of NIST's role in standards.

I think the way that many of these have developed is that NIST has an independence that drives a credibility that allows NIST to participate across different stakeholders. It is what we sometimes call an honest broker's role. We do value that very much across the different industry participants and the other stakeholders. So we think that that is a key attribute to being able to play this convener's role and to being able to pull stakeholders together.

As I look to areas that one might leverage out of NIST, certainly we have thought of rather than areas of improvement, the capacity to leverage that convener's role that is some of what we have spoken about here today. If I were looking to align resources at any organization on standards issues, one of the things that I would certainly think about is aligning the standards professionals very closely with the specific technology areas that are referenced, and it turns out that that is one of the things that the NIST realignment is designed to do. It will create that matrix of both close engagement with the specific missions on a technology basis and then a capacity to coordinate that across different groups at NIST.

Mr. SMITH. Okay. Thank you. Anyone else?

Mr. Updegrave.

Mr. UPDEGROVE. First, I think the biggest strength of NIST in the context of the discussion we are having today in one way is just that there is an enormous pool of people that get standards. That is not very common across other parts of government, and all of the sudden standards matter a lot more than they used to, and it is not the easiest thing to get up to speed.

So it is the major resource available to government today to educate government about what it needs to know to support modern policy in the technology area. That would be—it is unmatched everywhere else in government. There are islands of competence on particular areas but not this broad understanding.

I would couple that with one concern, which is that many engineers are familiar with the traditional infrastructure which is run

through national standards bodies, and much of the action today in the ICT sector is outside of that in the consortia that I mentioned earlier. And I think that not everyone in NIST is as conversant with that reality as they might be and might be worth their while to be a bit more nimble in understanding that area.

The last thing I would say is that it would ask NIST an awful lot to be the expert on every area of technology, so I guess I would sort of leave a hanging question whether government either needs to really empower NIST much more or at least realize there is only so much NIST can do to support government in an era where technology is as important as it is today and where something as relatively arcane as standards is important to know how to play the game very well in order to support the national interest.

I think it is absolutely the place to start. I am not sure I see the end of the solution in how to make sure we can do everything.

A final thought. When you look at Europe, Europe has spent 40 years trying to knit together an increasing number of countries. One of the first things they had to do was to break down the trade barriers between each individual country, and one of the ways they did that was by breaking down the standards barriers. So Europe had a huge problem that government had to solve by understanding the standards. You look at China. China very much understands it has a huge problem it needs to solve by understanding the standards. They are throwing billions of dollars and literally thousands of people at that.

We have been rather lucky in that we haven't had a big challenge that we needed to solve with standards. The Smart Grid is maybe the first example, electronic health records. I think that government should really use these as learning experiences to understand what government needs and how NIST can support it in understanding these, looking ahead, planning for them, and then solving them as effectively as possible.

Mr. SMITH. Thank you. I appreciate your comments and certainly we oftentimes forget about consumers both domestically and elsewhere, and I am glad that that is part of the discussion. We won't get into a whole bunch of trade policy here, but I know that competitiveness is a big issue because we want folks to flourish here at home as they might be able to provide a higher standard of living overseas and the stability that comes along with that.

So with that I thank you.

Mr. GORDON. Thank you, Mr. Smith. That is a very good line of questioning. As we mentioned earlier, competitiveness is a big theme of this Committee, and I think to be competitive and be successful we have to be worldwide competitive.

This Committee really works hard at trying to be a committee of consensus, and I have heard the word consensus in rulemaking there a lot, and I think, again, the minority, majority, our staff, we all have to work together at this, and we are, you know, reasonably successful.

But I think that both minority and majority both have honorable folks, a couple of them on each side, that sort of zig when everybody else zags, and you just can't always get them on the same page. So you are trying to develop these consensus standards and

for parochial interests or for whatever other reasons somebody just doesn't agree.

So how do you say tough luck and move on? Dr. Gallagher.

Dr. GALLAGHER. Well, I think in general the voluntary consensus process that is used doesn't take consensus to mean unanimity. In fact, it allows for a plurality of views. It is really designed to make sure that different viewpoints, different technologies, different solutions get to the table. In other words, making sure that the process doesn't drive exclusivity.

But, in fact, the process has shown itself to be very capable of making decisions that, in fact, don't make everybody happy, and otherwise I think you would resolve with the lowest common denominator in the standards, and that is not to our advantage either.

Mr. GORDON. Finally, another thing that we have talked about here a lot is as we invest in R&D, as we invest in workforce development, and we have innovation that comes out with new technologies and new products, how do we keep those here? And I know you didn't say that much in your oral statement but in the written statement you talked more about NIST's interests in the manufacturing sector and trying to coordinate it across.

Tell us what you are going to do to keep those dollars that we have invested in R&D here, how we are going to keep those products here also, or at least the manufacturing of those products here.

Dr. GALLAGHER. Yes. I agree. I believe that the innovation framework we all discuss is the basis for our deep investments in R&D ultimately depend on economic action at the other end, and so in my view I see that as culminating in manufacturing, making and developing new products and services. And I think, in fact, there is a relationship between our manufacturing ability and our research capacities, and it is very important to this country that we be very competitive in that arena.

I don't know that NIST will solve all of the problems there, my approach is basically to take every NIST authority and program I have and focus it on this issue. So I think, for example, in standards we can do everything we can to make sure that the conditions are right for companies to develop new technologies and that those standards are adopted as widely as possible on an international basis so those markets that they build products to are available globally.

I think we can work to make sure that the measurement infrastructure is in place so that companies can work with their supply chains, and we have trust in the system that components and things that are purchased, in fact, meet specification. I think we can work to drop barriers to technology transfer and make sure that ideas are getting out of the labs and into manufacturers and creating opportunities for them so that that can be a basis for growth.

Basically, making sure that the playing field is as fair as possible, as advantageous as possible, and I think Americans have shown when those are the conditions, we step up, and we do very well, and I have no reason to believe that won't be the case.

I really do view this as a broad spectrum approach at NIST. I would like to look at every program we have from our Manufacturing Extension Program to our measurement services to our Technology Innovation Program and make sure they are working in concert to try to maximize these opportunities for manufacturers.

Mr. GORDON. Let me just conclude somewhat on this theme. I think there is a strong Federal role for basic research that the private sector is not willing to invest or doesn't have the type of resources to invest in, particularly when you have quarterly returns and all these sort of things. That then is made available for the applied research where the private sector takes it and moves forward.

Any more thoughts on how we could make that better, how we can get this information to you, to the private sector, to be more productive? Or I guess maybe more particularly how NIST—any role they could play there? If there isn't, that is fine.

Dr. SERUM. That is a tough question, but it is an age-old question of who are the right people to do the fundamental research, but in my association with NIST for the past 12 years I see areas where—and I understand in coming from industry that many times it is just impossible to get the industry players together with a common cause that is bigger than themselves. And so by NIST playing that technology role in certain areas of driving new technologies that the other ones won't have or won't do, it can then get done. So I think it is a little bit of chicken, egg problem again, but there is definitely a role for pioneering technologies in the government.

Mr. GORDON. Yes, Dr. Gallagher.

Dr. GALLAGHER. Mr. Chairman, just one thought as the Committee works on reauthorizing America COMPETES. The one thought I would leave you with is that this process of translating the ingenuity coming out of our labs into economic output for me is characterized by participation. In other words, at the basic research side we have a pretty good idea of who does that work and who funds it, and at the commercial side where it is actually being manufactured we know that that is done in industry.

I don't think there is one answer in the middle, and I think this has been something people have focused on for many, many years, the whole notion of tech transfer and commercialization, and I think we will continue to look for a variety of solutions, and it may turn out that there is not one answer.

But the one thing I do know is that the magic seems to happen when we have mechanisms where there can be a mix of participation. So when government and university, national labs and industry can work together in a variety of ways, that is what is happening in the middle, and so as the Committee looks at the authorization language, one of the important issues that was in COMPETES was the role that the different agencies play and in particular, making sure that the vehicles are there where we can form those partnerships as appropriate to work together, because that is, I think, the key ingredient.

Mr. GORDON. Thank you.

Mr. Smith, do you have anything else?

Well, let me thank our witnesses for appearing here today. I think this was a very interesting hearing, and, again, thank you for your work for this and I am sure that we will be getting back with you as we try to put final touches on the COMPETES bill.

Other Members will have an additional two weeks to submit any type of questions and answers from you, and with that the witnesses are excused, and the hearing is adjourned.

Thank you.

[Whereupon, at 11:18 a.m., the Subcommittee was adjourned.]

Appendix 1:

ANSWERS TO POST-HEARING QUESTIONS

ANSWERS TO POST-HEARING QUESTIONS

Responses by Andrew Updegrove, Partner, Gesmer Updegrove, LLP

Questions submitted by Chairman David Wu

Q1. In your testimony, you note that lessons about the importance of development and deployment of standards being essential to creating new technologies and new product markets, and thus, to job creation has not been lost in many governments abroad, and that policy makers in the EU and China have integrated standards development and adoption into their national strategies. Has this helped innovation and competitiveness of the countries/regions which have adopted this approach? Is the U.S. at a disadvantage because we do not have such a formal integration of technical standards strategy into our national strategies on innovation and competition?

A1. The question has two separate parts, which I will address independently.

Q1a. Has the integration of standards development and adoption into the national strategies of countries/regions such as China and Europe helped innovation and competitiveness in those areas?

A1a. The motivations for incorporating standards development and adoption have varied, and therefore the impacts on innovation and competitiveness have differed as well. Europe and China provide instructive examples.

Europe: Prior to the creation of the European Union, many standards-based barriers to foreign competition existed within European countries, as they did (and do) elsewhere in the world. For example, if each country develops its own standard for a given product and justifies that standard for safety or interoperability reasons, and forces all vendors to not only conform to that standard, but to be tested for compliance, then domestic vendors that comply to that standard, and which perhaps have priority for conformance testing, will have a significant advantage.¹

For this reason, parties to the World Trade Organization are bound by the Agreement on Technical Barriers to Trade (ATBT),² which bars signatories from enforcing “home grown” standards and conformity assessment requirements unless there is a valid justification for diverging from an existing international standard. But not all nations are members of the World Trade Organization (or were members of its predecessor, GATT), and the ATBT is, in any event, of more recent vintage.

Consequently, before the European Union could achieve its goals, these existing standards-based barriers to trade had to be dismantled, which became a significant policy objective. Achieving that goal helped the EU become what it is today—one of the largest marketplaces in the world, and a much more formidable competitor.

In addition to breaking down these domestic barriers, European nations also created a number of important and influential regional standards organizations, such as the European Computer Manufacturers Association (ECMA), the European Committee on Electrotechnical Standardization (CENELEC), the European Association of Aerospace Industries (AECMA), and the European Telecommunications Standards Institute (ETSI), among others.³ While some of these organizations are now open to a global membership, they have helped European competitors work together to create standards that meet European priorities and strengths. These organizations are given deference by EU nations and EU agencies, and in some instances have been created in collaboration with EU authorities.

As noted in my testimony, in areas such as aerospace, U.S. manufacturers have expressed dismay at the impact on their own fortunes of the resulting passage of influence in standard setting from the U.S. to Europe. One need only look to the post-war rise of Airbus, which relies on widely distributed manufacturing across the EU of the components of aircraft—a totally standards dependent exercise—and the difficulties recently encountered by Boeing when it attempted the same manufacturing strategy in constructing its new 767 “Dreamliner” aircraft to see why this is of concern.

Europe’s sophistication in standards has also allowed it to out-innovate and outcompete with the U.S. in non-commercial but equally important areas, such as

¹Japan has been particularly guilty of this type of conduct to wail off its domestic markets from foreign competition.

²The Agreement on Technical Barriers to Trade can be downloaded at http://www.wto.org/english/docs_e/legal_e/17-tbt.pdf. The WTO maintains a *general resource page* with additional information and links at http://www.wto.org/english/tratop_e/tbt_e/tbt_e.htm

³A partial list can be found here: <http://www.consortiuminfo.org/links/linkscats.php?ID=35#E>

achieving transparency and interactivity in government. In that regard, the European Interoperability Framework for pan-European eGovernment Services (EIF), which seeks to achieve data interoperability across the EU as well as affordable, accessible access by its citizens to EU information, is especially instructive. That document has been evolving over more than a decade, and could well serve as a model for the U.S. to emulate.⁴

China: The motivations in China have been quite different. Notwithstanding its accession to the World Trade Organization, China has followed an aggressive campaign to develop “home grown” standards, in part because of the enormously larger number of patents owned by foreign companies in comparison to Chinese vendors. When standards are created that infringe upon patents, the owners of those patents sometimes require the payment of royalties for the privilege of conforming to the standard in question.

Since conformance with interoperability standards (in particular) represents a precondition to accessing global markets, such patents can therefore become very significant to trade. And where the majority of the patents of importance in a given industry are owned by a limited number of players, each of which has negotiated patent cross licenses with the others (which may reduce, or even eliminate, the payment of standard-related royalties among them), a nation like China can find itself at an extreme economic disadvantage.

The result is that in the case of, for example, DVD players, many millions of devices are made in China that are then rebranded and sold by western, patent-owning companies. The Chinese manufacturer may make only a few pennies on each sale to the foreign customer, while that company makes a handsome per-device profit at retail. Worse yet, since the same foreign companies have also filed patents in China, Chinese manufacturers may only be able to make pennies on sales within their own country, after paying significant royalties to foreign patent owners.⁵

Not surprisingly, Chinese companies, as well as the Chinese government, are very unhappy about this situation. In response, China is creating standards of its own in areas such as cellular phones, wireless devices, document formats and more. In each case, the standards are designed to avoid infringing foreign patents, while reliably infringing Chinese-owned, royalty-bearing patents. This practice has already resulted in trade disputes between the U.S. and China, and doubtless will do so again in the future, if China is not brought into the fold of international standardization.

China is using standards, therefore, to foster both competitiveness (to erect trade barriers) as well as innovation (to create incentives to innovate by opening up greater profit opportunities than would have existed if manufacturing was constrained by foreign origin, patent-restricted standards).

Q1b. Is the United States at a disadvantage because we do not have such a formal integration of technical standards strategy into our national strategies on innovation and competition?

A1b. Up until now, I would say that the answer (the aerospace industry aside) has largely been no. But I believe that this is now changing in important areas, due to several factors:

- *Complexity of challenges:* As developed at length in my main testimony, the Smart Grid and Electronic Health Records will not be the last areas in which the existing infrastructure is not up to the challenge of quickly creating complex frameworks of standards. Happily, the U.S. government has stepped in creatively, via NIST, to address these needs. But this was in part because a new administration acted forcefully and rapidly. Were it not for the fact that the Obama administration was motivated to solve budget problems and create jobs through supporting these programs, it might easily have stood aside. Had that been the case, each of these initiatives might have been pursued more effectively.

The result would have been that foreign vendors in a variety of industries would have had a significant advantage, as smart grids and EHRs were developed, tested and deployed abroad. By the time the United States inevitably faced up to the need of following in the same direction, foreign competitors

⁴The home page for the EIF can be found at: <http://ec.europa.eu/idabc/en/document/2319/5644>

⁵I explain this situation in much greater depth in Government Policy and “Standards-Based Ne-Colonialism,” Standards Today, Vol. VI No. 7 (August–September, 2007) at <http://www.consortiuminfo.org/bulletins/aug07.php#feature>

would already be well ahead of it in areas such as software, intelligent meters, and much more.

- *Protectionism*: As noted earlier, China is using “home grown” standards as a way to create greater opportunities for its own manufacturers to dominate in domestic markets. This has happened before, as was the case when China created its own wireless security standard, in contrast to the WiFi standards adopted elsewhere in the world. Only after a variety of semiconductor manufacturers, including U.S.-based Texas Instruments and Intel, announced that they would no longer sell wireless chips in China and took the matter to Washington was the matter (temporarily) resolved—through direct intervention by the Secretary of State Colin Powell.

If the U.S. government had been more engaged in the standards area, this situation might have been defused and resolved behind the scenes, rather than escalating (it continues to fester today). Moreover, the Chinese policy of creating home grown standards might not have continued to gain steam.

- *Opportunity*: It is universally acknowledged that standards create new markets for products and innovation. Technologies such as the Internet, Web, music media, telecommunications, Smart Grids, and much more simply would not exist without standards. By identifying new standards-dependent opportunities in areas such as clean technology and the Internet and then supporting the creation and uptake of the standards needed to make those technologies possible, the U.S. could help jump start jobs creation and sales in those areas by U.S. companies.

I hope that the above proves to be useful, and would be happy to answer further questions, either by phone or in writing.

Appendix 2:

ADDITIONAL MATERIAL FOR THE RECORD

STATEMENT OF VINTON G. CERF, PH.D.
VICE PRESIDENT AND CHIEF INTERNET EVANGELIST, GOOGLE

Thank you Chairman Wu, Ranking Member Adrian Smith and members of the subcommittee for the opportunity to testify before you, in writing, on the planned NIST Organizational Realignment and its effect, and the potential role NIST can play in the inter-agency coordination of national and international documentary standards development and adoption. I regret that my calendar commitments conflicted with your kind invitation to testify in person and I hope that you will accept my sincere offer to meet with staff and members at a time of mutual convenience if this will contribute to achieving your legislative and policy objectives.

My name is Vinton G. Cerf and I have served since October 2005 as Vice President and Chief Internet Evangelist of Google. With Robert Kahn, I am the co-inventor of the Internet's architecture and fundamental TCP/IP protocols. My career has centered on computers and communications including work at UCLA, IBM, Stanford University, MCI, the Corporation for National Research Initiatives, and the Defense Advanced Research Projects Agency. I was a founder of the Internet Society and its first president and served as chairman of the Internet Corporation for Assigned Names and Numbers (ICANN) for seven years. I served on the President's Information Technology Advisory Committee during the Clinton administration. I have been active in technology standards in the Internet Architecture Board (IAB), Internet Engineering Task Force (IETF) and the Internet Research Task Force (IRTF). For our Internet work, Robert Kahn and I have received many awards and citations including the U.S. National Medal of Technology and the U.S. Presidential Medal of Freedom. I began service on the Visiting Committee on Advanced Technology in 2007, served as its Vice Chair in 2008-09 and was elected Chairman in 2010.

I have had the benefit of reading a draft of the testimony of Dr. James Serum who has also been asked to testify before this subcommittee. In consequence of this, I will attempt in this written submission to avoid duplication and seek to amplify his remarks where this seems warranted and draw attention to additional points that seem of interest to the subcommittee. While these remarks should be understood to be personal, I intend to draw also upon the recently submitted 2009 Annual Report of the VCAT to the Secretary of Commerce.

Purpose and Effect of the NIST Realignment

Upon assuming the role of Deputy Director and Acting Director of NIST, Dr. Patrick Gallagher undertook to organize the top management of NIST so as to reduce the number of direct reports to the Director and to improve top management's attention to the needs of the operating units and programs undertaken by NIST. He was able to delegate responsibility, within the limits of his existing authority, for coordination of the laboratory programs, extramural programs and administrative and management programs to three top-level managers. In its most recent incarnation, the new structure would elevate each of the three to associate directorships, replacing the earlier single deputy director position. The VCAT strongly endorsed this aspect of reorganization. I was strongly persuaded of the value of this proposal on the grounds that this would increase management attention in each of the three areas, improving planning, execution and, importantly, integrated oversight of priorities across the organization.

Upon his nomination and confirmation as Director of NIST, an action very strongly endorsed by the full VCAT, Dr. Gallagher undertook to begin a deeper re-examination of the structure of the laboratory and center programs. This was no simple task as the demands on NIST are extraordinarily diverse. There are efforts mandated by the Congress, such as the role NIST plays in Cyber-Security and Smart Grid standards; there are requests from industry for development of standards to enhance commerce and interoperability; there are requests or proposals from the research world to collaborate on basic and applied efforts to enhance the NIST metrology capabilities; and there are programs initiated at NIST in anticipation of need. The consideration of biological effects of nano materials is a good example of this kind of foresighted initiative.

The VCAT has reviewed the process by which NIST management, including the laboratory and center leadership will evaluate alternative organizational structures. As is pointed out by my colleague and former VCAT chairman, Dr. James Serum, there are a variety of alternative organizational structures, each with strengths and weaknesses. It is to his credit that Dr. Gallagher did not simply dictate a choice, but, rather, put into place a wide-ranging discussion that reaches into and outside of the NIST organization for inputs and insights. I agree with Dr. Serum that combining the standards and technology development within each general laboratory

entity has strong benefits. The primary role of NIST is measurement and this often requires research and experimentation into new technology and even fundamental physics. Standards coordination and development may also hinge on laboratory-oriented work so making an organizational unit accountable for the science and technology needed for standards work creates incentive for mutual reinforcement.

It has become apparent that the needs expressed by NIST's constituencies, including the Congress, private sector and other U.S. Government agencies, manifest as requirements that cross laboratory boundaries. One proposed restructuring of the laboratory program into Physical Measurement, Material Measurement, Engineering and Information Technology has the benefit of a thematic alignment within each laboratory and opportunity for better inter-disciplinary collaboration. The NIST Associate Director for Laboratory Programs and the Laboratory heads would be responsible for assuring that tasks requiring inter-laboratory cooperation and resources are properly addressed. Accountability and clarity of mission in this structure will be the key to its success and it seems evident that this is well understood by the NIST top management team.

Future Role in International Standards and Federal Agency Coordination

It has become increasingly evident that the United States faces rising competition in manufacturing, outsourcing of information technology services, high technology consumer goods and standards-making initiatives. Countries that had been followers of American or European-led standards are not only capable of but are actively pursuing the creation of standards. In some countries, the domestic market is large enough to justify the establishment of domestic standards that can, by virtue of their role in the export markets, become de facto international standards. Apart from this potential, the high population countries (e.g. China and India) are literally in a position to participate in international standards forums in overwhelming numbers. To the extent that American products and services must compete in an international marketplace, standards are critical for interoperability and compatibility with business and consumer needs. Coordination of documentary standards development and application for domestic and international use is therefore of strategic importance.

NIST has been assigned responsibility in varying degrees and ways for cyber-security, health information technology and smart grid documentary standards in addition to other standards work in non-IT areas. On the international front, the U.S. State Department has formal responsibility for coordinating U.S. positions in treaty-based standards organizations such as the International Telecommunications Union (ITU). In the private sector, the American National Standards Institute (ANSI) coordinates private sector and government inputs into a broad spectrum of national and international standards. ANSI represents U.S. interest in the International Organization for Standardization (ISO). There are other organizations that produce standards relevant to U.S. interests, notably the Internet Engineering Task Force (IETF) that is international in scope and participation.

Standards have become vital to the production of interoperable, competitive products and services. In an international setting, the U.S. Government has an interest in and responsibility for adopting technical standards policies that are favorable to international trade and U.S. private sector access to international markets. It is self-evident that coherent inter-agency standards positions will serve U.S. interests better than an uncoordinated approach. Moreover, to the extent that private sector competitors outside the U.S. seek to meet domestic business and consumer needs, it is vital that standards be developed and adopted that protect both the private sector and U.S. Government users of such products and services. As is well expressed in Dr. Serum's testimony, NIST is well equipped to serve as the primary coordinator for the development of U.S. Government positions on documentary standards. The VCAT strongly endorsed this recommendation.

Other Observations

I note that Dr. Serum mentions the potential elevation of the NEST Director to Undersecretary. Given the extraordinary mandates historically and especially, recently, assigned to NIST, this elevation would be particularly beneficial to the success of an enhanced role for NIST in facilitating domestic and international standards development and coordinating inter-agency standards policies. Given the increasingly important role for technology in America's domestic and international enterprise, it seems timely to re-establish an Undersecretary position that would have responsibility for technology and standards-related issues within the Department of Commerce. Like my colleague, Dr. Serum, my only reservation is whether the combined role of Undersecretary and Director of NIST would have a material effect on

the ability of one individual to service both roles. With the right organizational infrastructure in place, it would seem feasible.

I also join Dr. Serum in reiterating the VCAT's very strong support for Dr. Gallagher in his role as Director of NIST. He has demonstrated a remarkable range of scope and depth in his short tenure in this position. In addition to his technical qualifications, he has shown a considerable degree of creativity in his approach to management, priority-setting and organizational structure. I am confident in Dr. Gallagher's leadership and very much looking forward to the work that lies ahead for the VCAT in supporting the work of NIST.

BIOGRAPHY FOR VINTON G. CERF

Vinton G. Cerf has served as Vice President and Chief Internet Evangelist for Google since October 2005. In this role, he is responsible for identifying new enabling technologies to support the development of advanced, Internet-based products and services from Google. Cerf is the former senior vice president of Technology Strategy and Architecture and Technology for MCI. Widely known as one of the "Fathers of the Internet," Cerf is the co-designer of the TCP/IP protocols and the architecture of the Internet. In December 1997, President Clinton presented the U.S. National Medal of Technology to Cerf and his colleague, Robert E. Kahn, for founding and developing the Internet. Kahn and Cerf were named the recipients of the ACM Alan M. Turing award in 2004 for their work on the Internet protocols. The Turing award is sometimes called the "Nobel Prize of Computer Science." In November 2005, President George Bush awarded Cerf and Kahn the Presidential Medal of Freedom for their work. The medal is the highest civilian award given by the United States to its citizens. In April 2008, Cerf and Kahn received the prestigious Japan Prize.

Prior to rejoining MCI in 1994, Cerf was vice president of the Corporation for National Research Initiatives (CNRI). As vice president of MCI Digital Information Services from 1982–1986, he led the engineering of MCI Mail, the first commercial e-mail service to be connected to the Internet. During his tenure from 1976–82 with the U.S. Department of Defense's Advanced Research Projects Agency (DARPA), Cerf played a key role leading the development of Internet and Internet-related packet data and security technologies. Cerf also holds an appointment as distinguished visiting scientist at the Jet Propulsion Laboratory where he is working on the design of an interplanetary Internet.

Vint Cerf served as chairman of the board of the Internet Corporation for Assigned Names and Numbers (ICANN) from 2000–2007. Cerf also served as founding president of the Internet Society from 1992–95 and in 1999 served a term as chairman of the Board. Cerf served as a member of the U.S. Presidential Information Technology Advisory Committee (PITAC) from 1997 to 2001 and serves on several national, state and industry committees focused on cyber-security. Cerf sits on the Board of Directors for the Endowment for Excellence in Education, the Jet Propulsion Laboratory Advisory Committee and serves as Chair of the Visitors Committee on Advanced Technology of the U.S. National Institute of Standards and Technology. He also serves as 1st Vice President and Treasurer of the National Science & Technology Medals Foundation. Cerf is a Fellow of the IEEE, ACM, and American Association for the Advancement of Science, the American Academy of Arts and Sciences, the International Engineering Consortium, the Computer History Museum, the Annenberg Center for Communications at USC, the Swedish Royal Academy of Engineering, the American Philosophical Society and the U.S. National Academy of Engineering.

Cerf is a recipient of numerous awards and commendations in connection with his work on the Internet. These include the Marconi Fellowship, Charles Stark Draper award of the National Academy of Engineering, the Prince of Asturias award for science and technology, the National Medal of Science from Tunisia, the St. Cyril and St. Methodius Order (Grand Cross) of Bulgaria, the Alexander Graham Bell Award presented by the Alexander Graham Bell Association for the Deaf, the NEC Computer and Communications Prize, the Silver Medal of the International Telecommunications Union, the IEEE Alexander Graham Bell Medal, the IEEE Koji Kobayashi Award, the ACM Software and Systems Award, the ACM SIGCOMM Award, the Computer and Communications Industries Association Industry Legend Award, the Kilby Award, the Rotary Club International Paul P. Harris Medal, the Joseph Priestley Award from Dickinson College, the IEEE Third Millennium Medal, the Computerworld/Smithsonian Leadership Award and the Library of Congress Bicentennial Living Legend medal. Cerf was inducted into the National Inventors Hall of Fame in May 2006. He was made an Eminent Member of the IEEE Eta Kappa Nu (HKN) honor society of the IEEE in 2009.

In December, 1994, People magazine identified Cerf as one of that year's "*25 Most Intriguing People.*"

Cerf holds a Bachelor of Science degree in Mathematics from Stanford University and Master of Science and Ph.D. degrees in Computer Science from UCLA and eighteen honorary degrees.

His personal interests include fine wine, gourmet cooking and science fiction. Cerf and his wife, Sigrid, were married in 1966 and have two sons, David and Bennett.

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