Testimony of
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Before the
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on

*"PROMOTING INNOVATION, COMPETITION, &
ECONOMIC GROWTH: PRINCIPLES FOR EFFECTIVE
DOMESTIC AND INTERNATIONAL STANDARDS
DEVELOPMENT"*

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Introduction

Chairman Quayle, Ranking Member Edwards, and members of the Subcommittee, on behalf of Secretary Bryson, and the Director of NIST, Patrick Gallagher, I want to thank you for this opportunity to discuss the current dynamics in the world of standards and standardization, and NIST's role in the opportunities and challenges presented. With the growing importance of standards as key drivers in innovation and international competitiveness, and the attention and resources that our key trading partners are investing in this area, this is a very timely hearing.

We often hear the statistic that over 80% of global trade is affected by standards or technical regulations. This estimate comes from a 1999 OECD Report on Regulatory Reform and International standardization. This estimate should be considered within the context of the explosive growth of global trade since the time of the report. Clearly, today, standards impact trillions of dollars in trade.

With the emergence and growth of new technologies, such as those needed for the development and deployment of an interoperable Smart Grid, nanotechnology, cloud computing and emergency communications, these are exciting times in the standards world. International standards and broadly accepted conformity assessment programs are playing a critical role in the development and commercialization of these technologies.

In my testimony, I will address the impact of standards on innovation and competitiveness, the complex interplay of the U.S. and international standards systems, the challenges that are we are currently facing, and NIST's efforts to address these challenges.

Standards Matter

The pervasive nature and ubiquity of standards often de-sensitizes us to how much we depend upon standards that work. As examples, the spacing and operation of sprinkler heads that provide fire protection in this room are dictated by standards. We know that this hearing is being webcast to the standards community in the United States and abroad. Webcasting is made simple and seamless due to international standards for audio and video which are built into the computer software and hardware. These standards and specifications are just a few of the more than 250 standards and specifications implemented in a laptop computer, according to a study by Arizona State University.[1]

Standards also provide great benefit by helping to ensure our health and safety. From standards which define the size, color, shape and positioning of roadway stop signs, to standards that determine safe levels of exposure to radiation when getting an x-ray upon visiting a dentist, standards underpin a large number of our daily activities and interactions.

Broad use of standards clearly helps enhance the safety of products, while reducing cost to consumers, and also providing consumers greater choice. Widespread reliance on standards also creates tremendous market opportunities for those with ideas and technologies that can be

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[1] Brad Biddle, Andrew White and Sean Woods, *"How Many Standards In a Laptop? (And Other Empirical Questions)"* Arizona State University Sandra Day O'Connor College of Law

standardized and used around the world. In an increasingly global economy, standards are not only important for consumers, they are also critical underpinnings for business. In today's hyper-competitive world economy, ignoring the importance of standards can prove costly for both industry and government. Companies, and even entire industries, may become less efficient. Transactions may become more costly in both dollars and resources necessary for buyer-seller negotiations. Markets can fragment as divergent requirements for products and services are developed and imposed.

U.S. competitiveness in technology requires leadership by U.S. industry in standards and standardization. Leadership in standardization provides a first-mover opportunity to drive technological innovation. However, such active participation and leadership also requires significant time and resource commitments. In today's resource-constrained environments, U.S. industry is faced with very tough choices regarding investment in standards activities, the benefits of which may not be evident in the short-or medium-term. This becomes an even more significant issue for small and medium enterprises, who may not have the resources to invest in standardization when struggling to make payroll or pay for raw materials.

Standards as Engines of Innovation

Standards play an important role in enabling technological innovation by defining and establishing common foundations upon which product differentiation, innovative technology development and other value-added services can be developed. Standards are also essential for enabling seamless interoperability between products and systems. Thus, standards are often the technical foundation enabling global trade, competitiveness and innovation.

Standards promote efficiency in domestic and international markets. By adhering to agreed-upon standards, businesses can use widely accepted requirements and specifications to negotiate deals for products or services, avoiding contract ambiguities that might otherwise undermine such transactions. Standards promote understanding between buyer and seller and facilitate mutually beneficial commercial transactions.

Most products have become exceedingly complex; and, in our global marketplace, suppliers are often unknown entities. Thus, standards provide us the assurance that products will perform the way they are supposed to. At the same time, they are the common platform, upon which innovators and developers can design and build a wide range of value added products which in turn can drive greater innovation and competition. The Universal Serial Bus, or USB specification, is a great example of such a protocol driving innovation. This specification defines how data can be transferred from a peripheral device to a computer's Central Processing Unit (CPU) through a USB port, and how the same port can also be used to charge a device. The broad utility of this specification, however, has driven applications well beyond the CPU, with the result that consumers enjoy low-cost USB connectivity for many, if not all, of the electronic devices in common use today.

Considering the broad impact that standards can have, and the global nature of trade and supply chains, which in turn support the global trade, standards also have a significant role in ensuring international competitiveness.

Standards as a Tool for International Competitiveness

"Third class companies make products, second class companies develop technology, while first class companies set standards".

This very telling quote, originally attributed to Sony Corporation, resonates with industry and policy makers around the world. It also explains the significant investments by countries such as China to increase their participation in international standards activities, and to attempt to assume leadership positions in such standardization activities. Increasingly, developing economies are viewing international standards as a powerful tool for competitiveness, and are developing strategies and tactics to play a greater role in international standardization.

An important element of this approach is increased participation in international standards developing bodies. We welcome such participation, as we believe that the best standards result when there is broad participation representing all interested stakeholders in open and transparent fora. The resulting standards then reflect consensus of this wide stakeholder group, and when used as intended in multiple markets, such standards drive significant economies of scale. The U.S. government has long advocated that countries should consider adopting and using international standards where available, and that the opportunity to participate in standardization activities in other countries should be made available to all interested stakeholders.

Principles for Effective Standardization

A limited set of foundational attributes of standardization activities is called out in OMB Circular A-119, focusing on voluntary, consensus standards activities. These attributes include openness, balance of interest and due process.
It is important to recognize as well the contributions of standardization activities that take place outside of the formal voluntary, consensus process, particularly in emerging technology areas.

The October 2011 report of the National Science and Technology Council's Subcommittee on Standards noted that, in addition to the attributes identified in OMB Circular A-119, the following additional attributes should also be considered, to maximize the impact of those activities on enabling innovation and fostering competition, while also assuring fulfillment of agency regulatory, procurement, and policy missions:

Transparency: essential information regarding standardization activities is accessible to all interested parties.

Open Participation: all interested or affected parties have an opportunity to participate in the development of a standard, with no undue financial barriers to participation.

Flexibility: different product and services sectors rely on different methodologies for standards development that meets their needs.

Effectiveness and Relevance: standards are developed in response to regulatory, procurement and policy needs, and take account of market needs and practices as well as scientific and technological developments.

Coherence: the process avoids overlapping and conflicting standards.

International Acceptance: as product and service solutions cross borders, the public and private sectors are best served by standards that are international in scope and applicability; and

Net Benefit: standards used to meet regulatory and procurement needs should maximize net benefits of the use of such standards.

The Standards Ecosystem

The U.S. voluntary, consensus standards system is bottom-up, industry-driven, and sector-focused. The government participates as an equal and interested partner. Federal, state, local and Tribal government representatives participate when the activity is relevant to their needs, and consistent with their respective missions and functions. In contrast to the government-directed, prescriptive standards that characterize the systems in place in a number of other countries, the Federal government does not control or direct the standards system in the United States.

The modern day engagement of the U.S. government in the formal U.S. standards system can be traced back to the founding of the organization that has evolved into the American National Standards Institute (ANSI). In 1916, the Department of Commerce was one of the founding members of the American Engineering Standards Committee, formed to be an "impartial national body to coordinate standards development, approve national consensus standards, and halt user confusion on acceptability"[2].

Since the founding of the American Engineering Standards Committee, U.S. government agencies have been extensively involved in the development and use of standards to meet agency missions and priorities. This engagement was catalyzed in 1995 by the passage of the National Technology Transfer and Advancement Act (P.L. 104-113), which directed Federal agencies to "use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments"[3], except where inconsistent with applicable law or impractical.

The strength and agility of the U.S. standards system stems from its sector-specific focus. Individual industry and technology sectors are served by standards developing organizations that are sensitive to and responsive to that sector's needs, and understand the dynamics of that technology and industry. While there is no formal count of the number of standards developers in the United States, it is estimated that there are about 600 standards setting organizations based in

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[2]http://www.ansi.org/about_ansi/introduction/history.aspx?menuid=1

[3] P.L.104-113 National Technology Transfer and Advancement Act of 1995, Section 12 (d)(1).(available at: http://standards.gov/standards_gov/nttaa.cfm)

the United States, with approximately 19[4] developing most of the standards in broad use in the U.S. market, in regulation and procurement. The membership and organizational structure of these organizations vary widely: some are professional societies closely associated with a technology or technical sector; others are industry associations; and others are standards setting organizations that are not associated with a specific technical sector. Most are accredited by the American National Standards Institute.

In addition to formal standards setting organizations, consortia and other non-traditional standards setting organizations contribute significantly to the diversity of the standards landscape. There has been a remarkable growth in consortia since the early 1990s, driven in large part by the growth of the information and communications technology industries during this period. Consortia are organizations with participation from parties interested in rapidly addressing a specific technical issue or in developing a specific solution. Consortia follow different organizational models, with some having a very narrow scope of activities and a selective membership. Other consortia, for example, the World Wide Web Consortium (W3C) or the Open Geospatial Consortium, closely resemble consensus-based standards developing organizations, with membership open to any interested entity and standards developed through consensus-based processes.

The Federal Government's Role and Interest

The Federal government has a significant interest in a robust U.S. standards system. Federal government agencies engage in standardization in a wide range of mission-specific roles, including contributing to development of standards in the private sector, championing U.S. interests in standards (e.g., ensuring that standards are not used as technical barriers to trade by trading partners), using standards for procurement or regulatory actions, and addressing competition-related aspects of standards-setting activities.

In FY 2010, over 4000 Federal agency staff from across the Federal enterprise participated in more than 500 private-sector standards organizations. This participation is spurred in large part by the National Technology Transfer and Advancement Act of 1995 (PL 104-113), and the associated OMB Circular A-119. The NTTAA directs agencies to consider the use of voluntary consensus standards, in lieu of government unique standards, and OMB A-119 strongly encourages agencies to participate in standards development activities to ensure that the resulting standards are better suited to meet agency needs.

This extensive participation by Federal agency staff, and the use of the resulting standards, provides direct benefits to agencies and to taxpayers. The use of consensus standards significantly reduces costs to agencies that would otherwise be incurred if agencies had to develop and maintain agency-unique standards. The use of consensus standards also reduces the cost to agencies due to economies of scale resulting from using the same standards for government as are used for the commercial sector, and spurs innovation and greater product choice. Currently, almost 10,000 consensus standards are referenced in regulations, and just

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[4]M. Breitenberg, *ABC's of Standards Activities, NISTIR 7614, August, 2009 (*http://gsi.nist.gov/global/docs/pubs/NISTIR_7614.pdf) page 10

more than the same number of standards are referenced for procurement. Such extensive use of consensus standards has provided huge benefits to the United States. The European Commission recently undertook a major review of the European standardization system to see how it could be made stronger and more flexible, and a number of approaches that are central to our standards system were considered by the Commission.

It is important to appreciate, that participation in the U.S. voluntary consensus standards development system by Federal agencies does not equal a passive engagement or abdication of Federal responsibilities to the private sector. The Administration's Innovation Strategy recognizes that for certain sectors of exceptional national importance, self-organization may not produce a desirable outcome on its own in a timely manner. In such instances, where time is of essence to address national priorities, the Federal government can play the important role of an "impatient convener" to catalyze standards development critical for these sectors. Current national priorities include the development and deployment of an interoperable Smart Grid, innovations in health care technology brought about through the use of interoperable electronic health records, cybersecurity standards for securing Federal government IT systems and the interactions of these systems.

NIST's Role in the US Standards System

In the context of Federal engagement in the standards process, NIST plays a critical role. NIST is the nation's measurement laboratory, and has a unique role relating to standards in the Federal enterprise. NIST's coordination function, defined by statute, has been borne out by a track record of technical excellence and objectivity, embraced by NIST's world-class scientists and engineers, ever since the Institute was chartered by Congress in 1901. NIST's strong ties to industry and the standards development community, backed by technical excellence, have enabled NIST to take on critical standards-related challenges and deliver timely and effective solutions.

NIST views standards and standardization as an important tool to enable U.S. innovation and competitiveness. Standards enable the effective and efficient transfer of technology from the NIST laboratories to the marketplace. This is further made possible by the participation of nearly 400 NIST technical staff in over 100 standards organizations, and more than 1000 different standards activities, in support of domestic and international priorities. It is noteworthy that this number represents more than a quarter of the NIST technical staff. NIST's engagement with industry in these standards activities also provides us the ability to learn first-hand about industry's measurement, standards and research needs, and this provides valuable input into our prioritization of current NIST programs and planning for future programs.

An Impatient Convener

Our recent work convening stakeholders to catalyze standards development to meet national priorities, such as the ongoing development and eventual deployment of an interoperable Smart Grid and the development of a reference architecture for the Federal government's approach to Cloud Computing, reflects the NIST philosophy of working closely with the private sector, and looking to private sector standards to meet government needs. In each case, NIST was able to

accelerate the bringing together of a broad set of stakeholders to address a critical technology challenge. While these stakeholders might otherwise have self-assembled in due course, there is no question that NIST, in its role as convener, was able to engage and focus the very substantial energies of private sector industry, academia and government to much more rapidly address the critical area of national need. This approach can be particularly effective when addressing priorities that span different technologies, or where multiple agencies have an interest. In such instances, the stakeholders would include groups of professionals who may otherwise not be interacting through the usual channels of communication.

The Federal government in the role of convener enables clear communication of Federal government priorities, and also helps stakeholder groups to rapidly identify the state of the relevant technology, including existing standards strengths as well as gaps. These models have enabled the U.S. to clearly establish an international leadership role in standardization for Smart Grid and Cloud Computing. In the case of smart grid interoperability, NIST's role is laid out in the Energy Independence and Security Act of 2007. In the case of cloud computing, NIST's role is outlined in the Administration's Cloud Computing Initiative.

Does the Product meet the Standard? – Conformity Assessment

Another unique role that NIST plays in the U.S. standards system is that of providing conformity assessment guidance to Federal agencies. Simply put, conformity assessment is the process of demonstrating that a product, service or system meets the requirements of a standard (or standards), and thus provides users added assurance.

NIST's conformity assessment expertise is extensively relied upon by agencies to develop their conformity assessment procedures, based upon international systems, ensuring that the resulting procedures and schemes do not pose technical barriers to trade. These international systems-based conformity assessment approaches significantly reduce the cost imposed on the user community and thereby benefit both the government and consumers in terms of reduced costs, greater confidence in product quality and greater product choice. NIST is in the midst of reviewing its current conformity assessment guidance, and will be undertaking a process of extensive public consultation to update the current guidance, beginning in April.

The National Science and Technology Council's Subcommittee on Standards

In March 2010, NIST Director and now the Under Secretary for Standards and Technology Patrick Gallagher testified before this Committee about the need for more effective Federal engagement and coordination in standards development, use, and standards promotion. Dr. Gallagher noted the urgency of working more effective with industry and private sector standards developers, and need for more effective engagement across agencies to ensure that Federal efforts to work with the private sector are effectively planned and coordinated.

Soon after Dr. Gallagher's testimony, in April 2010, a Subcommittee on Standards was established within the National Science and Technology Council's Committee on Technology. Chaired by Under Secretary Gallagher, with the support of the Office of Science and Technology Policy and the participation of the Office of Management and Budget– this subcommittee is a

forum for senior leadership of Federal government agencies, bureaus and independent commissions within the executive branch to exchange information and develop positions on policy issues relating to standards and their impact on U.S. competitiveness.

In October 2011, the Subcommittee on Standards issued a report that included policy recommendations, mentioned previously in my testimony, on how Federal government engagement in standards to address national priorities can be enhanced (http://standards.gov/upload/Federal_Engagement_in_Standards_Activities_October12_final.pdf). The report was based on information and feedback obtained through extensive interactions with the private sector and with U.S. government agencies, examining what worked well, and looking at opportunities for further improvement. The policy recommendations included in this report gathered significant industry support, including that of the U.S. Chamber of Commerce and global companies such as IBM Corporation and Microsoft.

In January 2012, three White House offices (the Office of Science and Technology Policy, the Office of Information and Regulatory Affairs of the Office of Management and Budget, and the U.S. Trade Representative) issued a policy memorandum that formalized most of the recommendations included in the Subcommittee's report. The memorandum on "Principles for Federal Engagement in Standards Activities to Address National Priorities" (http://www.whitehouse.gov/sites/default/files/omb/memoranda/2012/m-12-08_1.pdf) underscores the strengths of the U.S. standards model of private sector leadership with strong Federal government participation, and articulates principles for Federal agencies to follow when they are tasked with a coordination or convening role, in order to accelerate private sector standards development to address national priorities.

Standards as Technical Barriers to Trade

With the reduction in tariffs globally, the use of standards and conformity assessment procedures as technical barriers to trade has become an issue of increasing concern. Within the Federal government, the Office of the U.S. Trade Representative (USTR) coordinates the development of U.S. positions and responses on technical barriers to trade-related matters and publishes an annual report on technical barriers to trade. By statute, USTR is also responsible for leading discussions and negotiations with other countries on these matters. The Department of Commerce is a member of USTR's Trade Policy Staff Committee. NIST staff provides technical expertise to the TPSC through the Department of Commerce..

In addition, NIST supports U.S. industry and government agencies in their efforts to address technical barriers to trade by providing various reference tools to inform U.S. stakeholders of potential - issues related to technical barriers to trade, and to assist them in addressing these. All signatories to the WTO TBT Agreement are required to establish a national Inquiry Point and Notification Authority to gather and efficiently distribute trade-related regulatory, standards and conformity assessment information to the WTO Member community. NIST serves that role for the United States.

Notify US – An Early Warning Tool

Pursuant to the statute[5] formalizing the U.S. implementation of its obligations under the WTO TBT Agreement to provide information to other WTO Members, NIST houses the national **Standards Information Center**. This Center serves as the U.S. source for standards and standards-related information at home and abroad. Examples of NIST assistance to U.S. exporters include providing reference information on standards and conformity assessment measures relating to energy efficiency labeling in Saudi Arabia, Aviation Safety Management Systems in Japan, and requirements for telecommunications equipment in India. The Center provides bibliographic information on U.S., foreign, regional, and international voluntary standards, mandatory government regulations, and conformity assessment procedures for nonagricultural products. The Center has developed an electronic tool, Notify U.S., where subscribers can sign up for alerts from different countries on their proposed regulations, and provide comments on the proposed regulations. Over 2,700 U.S. stakeholders actively use this tool, and in 2011 we notified over 1,700 proposed regulations to these subscribers. The users of this tool, particularly small and medium enterprises who have limited resources to track developments around the world, have mentioned that they find significant value in Notify US, which provides them a one-stop shop for information on proposed rules, regulations, or procedures that can impact their exports overseas.

Standards In Trade Workshops – Promoting the U.S. approach to standardization

NIST promotes the U.S. approach to standards and standardization with other countries where there is significant market opportunity for U.S. exporters. The Standards in Trade Workshop program, established by NIST in the late 90s, enables U.S. participants to share information about the standards framework in a particular sector or technology area, and the standards used within that framework. The target audience is key government and industry decision makers and policy makers in countries where U.S. industry would like to explore new opportunities, or where U.S. industry seeks government assistance to address specific concerns about that country or region's use of specific standards, technical regulations or conformity assessment requirements.

Over the past 15 years, the program has resulted in a wide range of successes, such as the adoption of the U.S. national architecture for Intelligent Transportation Systems in Israel and Brazil, the referencing of pipeline standards developed by a U.S. based standards developing organization in India's expansion of their natural gas pipeline network, and a delay in adoption of onerous conformity assessment requirements in the Gulf Cooperation Council region that would impact U.S. toy manufacturers and exporters.

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5 Trade Agreements Act of 1979 (as amended) and 19 USC 13 § 2544

Technical Exchanges

NIST engages in information exchanges relating to technical standards and conformity assessment systems with important trading partners such as the European Union, Japan, India, China, and Brazil, among others. These exchanges enable us to gather firsthand information about standards and related developments, including technical regulations that can impact American companies exporting to those countries. In instances where we have better approaches, we have been able to share our experiences about our approaches, why these have worked and the lessons learned.

Continued dialog with our international partners over the years has generated a significant level of trust, which has resulted in some NIST work products being used in these countries as is, or with minor modifications, further benefiting American exporters. In other instances, we have been able to caucus with our foreign counterparts to develop common strategies for collaboration in standardization in areas of mutual interest.

In closing, Chairman Quayle, Ranking Member Edwards, and members of the Subcommittee, NIST and the U.S. government are actively engaged in standards and standardization. While there are many challenges confronting our engagement, we are actively working with our private sector partners to address these challenges using a range of tools, and to leverage the opportunities to help our industries maintain their leadership roles. We look forward to working with you closely, and I will be glad to answer any questions that you may have.

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Mary Saunders currently serves as Director, Standards Coordination Office, NIST. In this capacity, she represents NIST and its significant interests in the standards and conformity assessment community and advises NIST leadership on policy and strategy as they relate to NIST's role in standardization. Her responsibilities include serving as a central point of focus for standards and conformity assessment policy for NIST, coordinating with the private sector and other federal agencies on standardization activities, leading interagency standards coordination, and leading NIST's standards interactions with foreign governments.

Prior to her return to NIST, Ms. Saunders served as Deputy Assistant Secretary for Manufacturing and Services, where she managed the day-to-day operations of the International Trade Administration's (ITA) Manufacturing and Services division.

At NIST, she served in a variety of positions during a 15 year career, including Chief, Standards Services Division. In that capacity, she administered a range of standards-related programs to provide solutions to regulatory and industry needs and increase trade opportunities. Over the course of her Commerce career, Ms. Saunders has managed programs to advance U.S. business and technology interests in the European Union, Russia and the Newly Independent States, China and Japan. She has worked with a broad range of sectors on competitiveness and market access issues, including information and communications technologies, telecommunications, medical devices, oil and gas equipment, construction equipment, energy technologies and consumer goods.

Ms. Saunders has been in federal service since 1979, serving in a variety of positions with the Department of the Army, including the Office of Institutional Research, U.S. Military Academy, before joining ITA in 1986.