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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 US 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 US 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…"* NIST 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 especially 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 of 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 & 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 (1988-1993)
- Member of Board of Directors, Biotechnology Research and Development Corporation (1988-1994)
- Member of the National Institute of Standards and Technology (NIST) technology assessment panel (1990-1992)
- Counselor (alt), Analytical Chemistry Division, American Chemical Society (1992- 1995)
- Member of the Board, Center for Photochemical Sciences, Bowling Green State University (1994-Present)
- Member of ACS subcommittee for improvement of chemistry curriculum (1994-1995
- 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 & 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 2007-2008, Chair 2008-2010)
- President's Advisory Board for Advanced Technology, Research Corporation (2005- 2009)
- Chairman, Visiting Committee for Advanced Technology, NIST (2008-2010)