Testimony Before the House Subcommittee on Technology and Innovation Regarding the National Institute of Standards and Technology (NIST)

By
Mary L. Good
Donaghey Professor and Dean, Donaghey College of Engineering and Information Technology
University of Arkansas at Little Rock

Chairman Wu and Members of the Subcommittee: It is a great pleasure for me to be able to testify on the behalf of NIST and its activities. I regard NIST, as does most of the technology community (including the technology based industry), as perhaps the most important national laboratory because of its relevance to the long-term success of American industry in the stimulation of innovation and contributions to the competitiveness of the American enterprise. NIST has a long history of providing the standards for commerce which allow for an orderly and fair process for doing business, protecting the health of the population, and promoting best practices in the complex enterprise which is today's global economy. The value of NIST and its pervasive influence was brought home to me a few years ago when I was invited to South Africa as part of an international advisory group to review the South African Bureau of Standards and to provide the government with proposals for improvement. The work there could be defined as developing, institutionalizing, and monitoring everyday weights and measures used in everything from country stores to gasoline distributors to food processors to multinational companies manufacturing everything from automobiles to everyday household goods. The quality of transactions that we in the US take for granted were still being monitored and improved. Some of these activities in the rural areas of the country would have been NIST activities a hundred years ago! The US public just assumes that commerce and regulatory activities will be carried out with

consistency and be based on appropriate standards that can be verified if necessary. This complacency is possible because of the long history of NIST standards work including calibration and metrology science in all areas of our enterprise. The value of the government's role in these activities was first acknowledged by the Founding Fathers when they included in the Constitution the need to establish a system of weights and measures. The establishment of the National Bureau of Standards in 1901 (NBS) gave this important government function to NBS. New responsibilities for direct industry interaction were added and NBS was renamed the National Institute for Standards and Technology in the 1980's. NIST continues the production and distribution of standards for all areas of commerce and modern life but it has now gone beyond these early responsibilities. Today NIST is the premier laboratory for metrology research in the world with applications in all areas of emerging technologies like nanotechnology, biotechnology, and high performance computing. The quality of this work is epitomized by the receipt of three Nobel Prizes by NIST scientists in the last few years. In summary, NIST is an American jewel that provides one of our advantages in a competitive global environment. Long term support for its programs should be an investment at a very high priority in our federal budget. However, NIST should be held to very high standards and should be expected to justify its activities and prioritize its opportunities to play a significant role in the competitiveness initiatives in the Competes Act of 2007.

I have reviewed the President's proposed budget for NIST for 2009 and the planning document NIST provided to the Congress. The requested additional support for the NIST laboratories is certainly justified by the proposed new research activities outlined in their planning document. The facilities funding, particularly for the expansion and up-grade of the Colorado facilities, is long overdue. The world class research that takes place there deserves a world class facility.

However, the President's budget proposal to phase out funding for the Manufacturing Extension Program (MEP) and the new Technology Initiation Program (TIP) is both short sighted and represents a misunderstanding of the value of these programs. It is my assessment that this oversight is disastrous for the incentivization of innovation in small and medium sized enterprises and for NIST as it carries out its mandates for the support of cutting edge manufacturing technologies and the incentivization of new American companies utilizing emerging technologies. Two examples will be illustrative of these values. The National Academies convened a panel (I was a member of the panel) to review the National Nanotechnology Initiative funded through several government bureaus. Two of the findings were: (1) there are many (in the thousands) start-ups and early stage companies with potential products and processes utilizing nanoparticles and nanotechnology, and (2) the health and environmental effects of nanomaterials in the work place and in consumer products are not well understood. These findings certainly justify the proposed NIST work on nano-manufacturing processes and the development of metrology and standards for nanomaterials. The

question is how to effectively couple the NIST work to these businesses in emerging technologies.

The legislation renaming NBS contained the following directives: "to … modernize and restructure that agency to augment its unique ability to enhance the competitiveness of American industry while maintaining its traditional function …"; "to assist private sector initiatives to capitalize on advanced technology"; and "to advance, though cooperative efforts among industries, universities and government laboratories, promising research and development projects, which can be optimized by the private sector for commercial and industrial applications." These directives were further endorsed by the America Completes Act of 2007 where the Congress authorized MEP (with a proposed doubling of its budget over time) and TIP. How better to carry out the NIST mandate that coupling the MEP State programs with the NIST scientists who are developing these new manufacturing and metrology technologies? Many research studies have shown that technology transfer is most efficient if the technology developers have a close relationship with the users. Thus NIST could create a model of tech transfer by educating the personnel in the State MEP centers about their evolving technologies and then challenge the State centers to catalog and reach out to the start-ups and early stage technology companies in their State. The NIST scientists could both focus their efforts better and more rapidly see their efforts utilized by understanding the needs of these new companies in real time. Thus MEP represents a unique vehicle for a faster, better focused effort on NIST's part and the companies have the benefit of the early

adoption of NIST standards and manufacturing technologies. This provides a win-win success for NIST, the companies, and the American competitiveness.

A similar argument can be made about TIP. TIP was authorized in the America Competes Act to "support, promote, and accelerate innovation in the United States through high-risk high-reward research in areas of critical national need." The mechanism to carry out this mandate was the establishment of a program of competitive grants for partial funding of small or medium size enterprises via contracts, collaborative efforts with universities, etc. Again, if NIST is to carry out its mandate for aiding the private sector in moving successfully to new, promising technologies, what better vehicle than interacting with real companies who are trying to turn technology into commercial projects and processes. The NIST experience with ATP clearly demonstrates their ability to propose and effectively manage a grants/contracts program as outlined in the TIP authorization legislation. Thus I see the President's budget initiative to eliminate MEP and to not establish TIP, very short sighted and an example of not understanding what NIST gains from these programs and how important they are for the US to stake out leadership in the commercialization of the new and emerging technologies where we have funded much of the underlying fundamental research. These two programs can be very instrumental in the successful start-ups in nanotechnology, biotechnology, high performance computing (including light-scale communications), hydrogen fuel, and quantum computing.

With respect to the NIST Three-Year Programmatic Plan, it describes NIST's value in the US enterprise, its processes for internal quality reviews, and the programs they plan with additional funding the 2009 budget provides for the laboratories. However it is not a usual "strategic" plan. For example, they point out that the programs they plan to focus on are: "address critical national needs and measurement barriers to innovation; improve the capacity and capability of the NIST laboratories; and form new and strengthen existing partnerships with industry and academia." The plan, if you include the Appendices to the report, do a good job of the strategy pertaining to maintaining the NIST laboratories but the plan does not provide a strategy for determining national needs or how to make a significant increase in industry and academic ties. A strategic review and prioritization of the national needs results would then inform the planning for the laboratories. Recently the ASTRA (Alliance for Science and Technology Research in America) Legislative Task Force released a report entitled "Riding the Rising Tide: ASTRA's Strategy for Enhancing US Competitiveness and Prosperity." This report, which was contributed to and vetted by several scientific and engineering societies, several industry partners and several academic institutions, proposed a 14-point Innovation Action Agenda for the US. The 14 points can be divided into three strategic areas: Federal Funding of R&D; workforce and STEM education; and a business climate that supports innovation. NIST clearly has a major role in the federal research efforts but it also has the opportunity to play a role in assuring an "innovation agenda" for US based industry. Thus the NIST forward plan should include insight beyond just next year's budget constraints. It would have been helpful if they could have correlated

their forward plan to the overall innovation agenda so that they stake out their opportunities and responsibilities for a major impact on the rate and quality of innovation in the United States. Such a longer term strategic view would then maximize their opportunity to guide the budget process rather than having the yearly budgets guide their activities.

I would have also liked some detailed discussion of the Baldrige National Quality Award program although it is a small portion of the budget. This program has the opportunity to disseminate best practices in businesses, health, and education. It should be integrated into the overall push for innovation in these sectors.

Clearly, in the limited scope of this hearing and the time available, it was not possible to comment on all of the facets of the NIST activities. So, in summary, let me say that the attention to, and planning for, accelerated innovation in the US enterprise is the most important part of any plan to maintain US competitiveness. Other factors are important, but without innovative new companies and the ability of established businesses to continue to change and innovate, the US outlook for providing a high quality of life for its citizens gets much less positive. NIST is an important link in this plan for the future and a significant investment in both their internal and external activities is a must investment from the federal budget.