

TECHNOLOGY ADMINISTRATION AND THE
NATIONAL INSTITUTE OF STANDARDS AND
TECHNOLOGY, INCLUDING THE ADVANCED
TECHNOLOGY PROGRAM

HEARING

BEFORE THE

COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION,
UNITED STATES SENATE,
ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

APRIL 16, 2002

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

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**TECHNOLOGY ADMINISTRATION AND THE
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TUESDAY, APRIL 16, 2002

U.S. SENATE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Committee met, pursuant to notice, at 9:31 a.m. in room SR-253, Russell Senate Office Building, Hon. Ernest F. Hollings, Chairman of the Committee, presiding.

**OPENING STATEMENT OF HON. ERNEST F. HOLLINGS,
U.S. SENATOR FROM SOUTH CAROLINA**

The CHAIRMAN. Good morning. The Committee will come to order. We are pleased this morning to conduct our hearing relative to the programs of the Technology Administration and NIST, particularly the ATP program. I want to put my full statement in the record and let me shorten it by observing that this ATP program has been tried and true. We have actually got great results—ATP has been studied to death in a sense. It's projects have improved automobile manufacturing processes, reduced the cost of blood and immune cell production, and developed new material for prosthetic devices, all of which have more than paid for all of the projects the ATP program has funded.

The reason I emphasize this is that it is always a struggle seemingly with the Office of Management and Budget on the cost of the program. Every attempt has been made over the years to eliminate the program, bluntly.

I have had the pleasure of working with Secretary Bodman—and we welcome you here today, Secretary Bodman—on the premise and promise of Secretary Evans relative to trying to fine-tune the ATP program to the satisfaction of the Administration. With regard to those changes, we go along with the participation of the universities and various other suggestions, save and excepting that recoupment.

We did away with recoupment in 1992, some ten years ago. We found it counterproductive in the sense it discouraged companies from participating on the one hand. On the other hand, we noted the Administration has suggested, essentially, a five times taxation for success of the technology itself. So we welcome you.

Let me yield to my distinguished ranking member here.
[The prepared statement of Senator Hollings follows:]

PREPARED STATEMENT OF HON. ERNEST F. HOLLINGS,
U.S. SENATOR FROM SOUTH CAROLINA

Today's hearing will examine the programs of the Department of Commerce's Technology Administration and the National Institute of Standards and Technology, with particular emphasis on the Advanced Technology Program. We are pleased to have Deputy Secretary of Commerce Dr. Sam Bodman, as well as our other distinguished witnesses, here with us today.

NIST is really a hidden treasure. Twice in the past five years, NIST Scientists have shared in the Physics Nobel Prize. Whether they are investigating the collapse of the world trade center, making small manufacturers better, sponsoring innovative research, or improving timekeeping, the people of this little-noticed agency continue to do amazing work, and I commend them.

Nonetheless, we continue to be embroiled in an annual tug-of-war on funding for the Advanced Technology Program, known as ATP. I am encouraged that Secretary Evans and Deputy Secretary Bodman want to stabilize this program.

After all, the benefits of the program are well-documented. The program has been studied thoroughly from individual case studies, to comprehensive examinations like the 2001 study for the National Academy of Sciences' National Research Council. What the analysis shows time and time again is that the ATP is stimulating collaboration, accelerating the development of high-risk technologies, and paying off for the nation.

The Commerce Department has proposed several changes to the ATP. I look forward to examining each of these changes and hope to include many of them in a NIST authorization bill this year.

However, the proposal for recoupment of up to 5 times the original amount of funding is not acceptable. First, the program has tried recoupment and failed. The Department cites the Clean Coal Technology Program of the Department of Energy as a poster child for recoupment. That program—established in 1986—has recovered approximately one-tenth of one percent of the \$1.1 billion invested in completed projects.

More importantly, recoupment discourages companies from participating in the program. When they do participate, a cost recovery provision encourages the companies to say that the enabling ATP research had no impact on successful products. In another ten years, supporters of the program will have no success stories to tell and through recoupment, we will have done what opponents of the program have failed to do for ten years, kill ATP.

And what successes the program has had. Since its inception in 1989 this industry-led, competitive, and cost-shared program has helped the U.S. develop the next generation of breakthrough technologies in advance of its foreign competitors.

On the second panel, we will hear from Scott Donnelly of GE. His company, with ATP funding, developed a new method to produce the X-ray panels that are the heart of a new digital mammography system. This system is giving women and their doctors access to better, cheaper digital mammograms.

A March 1999 study found that future returns from just three of the completed ATP projects—improving automobile manufacturing processes, reducing the cost of blood and immune cell production, and using a new material for prosthesis devices—would pay for all projects funded to date by the ATP.

The ATP is not the only well-regarded program that is threatened. In spite of rave reviews and dramatic successes, the Administration has proposed to eliminate Federal support for Manufacturing Extension Partnership Centers in FY 2003.

Ironically, these MEP Centers help fulfill one of the top priorities stated in the Administration's budget: "revitalize the economy and create jobs." MEP helps small manufacturers stay competitive and, in 2000, helped these businesses attain \$2.3 billion in increased or retained sales, save costs of \$480 million, and create or retain more than 25,000 jobs.

Support for MEP is strong. Members of the Senate have received approximately 8,000 letters from manufacturers and private consultants urging us to continue to support the program.

I look forward to examining these and other related issues and to the testimony of our distinguished witnesses.

**STATEMENT OF HON. JOHN McCAIN,
U.S. SENATOR FROM ARIZONA**

Senator McCAIN. Thank you, Mr. Chairman. Thanks for calling the hearing today. I want to thank our witnesses for appearing before the Committee.

As we look forward to the twenty-first century, it is impossible to discuss the future without considering the role of technology. In the past the United States has focused the majority of its research and development funds towards defense. However, recent analyses show that Federal R&D funding has shifted toward the civilian side. An essential element of a modern economy is a well-educated, versatile work force able to conduct R&D and to convert its results into innovative products, processes, and services. We must continue to refine our innovation models to ensure the United States maintains its position of leadership in science and technology development, given the constantly changing nature of the world.

Today we will review the Technology Administration at the Department of Commerce and its role in the Federal Government. The Technology Administration has broad responsibilities, ranging from space commercialization to publication of technical documents to nanotechnology to local building codes. The quality of work conducted at its laboratories in Gaithersburg, Maryland and Boulder, Colorado is evident by the awarding of two Nobel Prizes to NIST researchers, Dr. Bill Phillips and Dr. Eric Cornell, in the past 5 years. To Dr. Bodman and the many other engineers and scientists at the laboratory, we look forward to your third award in the near future.

This year's budget request, as usual, is not without controversy. Usually Advanced Technology Program funding level is a point of contention. This year the controversy extends into the Manufacturing Extension Partnership Program. I understand that the administration had to make some tough choices based upon limited resources. It appears the administration made a decision to fund ATP at \$100 million above last year's request while cutting MEP funding by \$100 million below last year's request.

Although the administration stated that the decision to reduce MEP funding was based on retaining the 6-year sunset envisioned in the original statute that created the MEP program, the sunset was repealed in 1998.

I look forward to hearing not only what criteria were used to reach these budgetary decisions, but also the results of the evaluations of the ATP and MEP programs. I think it would be helpful to understand how it is in the best interests of the country to take away millions of dollars in a program which provides assistance to small manufacturers in adopting new technologies, processes, and business practices and give these millions to a small number of companies, including Fortune 500 companies, for high-risk long-term research.

In the spirit of making tough decisions, I would also like to understand why the Teacher Science and Technology Enhancement Program that was created in 1998 by the Congress to work with high school math and science teachers during the summer months to help them better understand the relationship between technology and commerce, did not receive any consideration in this

budget request. Given the importance that everyone is placing on math and science education and realizing the economic potential of technology, how is this a loser?

I know there are also other programs in which Members of this Committee have expressed an interest that are not included in the budget request. I hope we can reach a resolution on these matters.

Finally, Mr. Chairman, I am interested in hearing about activities at the Technology Administration concerning climate change. In the energy bill that is currently on the Senate floor there are several provisions that will have an impact on the programs of the Department. It would be useful to hear the Department's evaluation of these provisions.

Thank you, Mr. Chairman. I look forward to the witnesses' testimony.

[The prepared statement of Senator McCain follows:]

PREPARED STATEMENT OF HON. JOHN MCCAIN,
U.S. SENATOR FROM ARIZONA

Mr. Chairman, thank you for calling this hearing today. I also thank our witnesses for appearing before the Committee.

As we look to the 21st century, it is impossible to discuss the future without considering the role of technology. In the past, the United States has focused the majority of its research and development funds toward defense. However, recent analysis show that Federal R&D funding has shifted toward the civilian side.

The essential element of a modern economy is a well-educated, versatile workforce able to conduct R&D and to convert its results into innovative products, processes, and services. We must continue to refine our innovation models to ensure that the United States maintains its position of leadership in science and technology development, given the constantly changing nature of the world. We must ensure that our research continues to lead to innovations which are fueled by a technically savvy workforce, and is supported by appropriate technology transfer and commercialization activities creating further economic growth.

Today, we will review the Technology Administration at the Department of Commerce and its role in the Federal government. I hope that we can learn more about the vision for the organization. Because a vision without a strategy is just an illusion, I am also interested in hearing about the associated strategy.

The Technology Administration has broad responsibilities ranging from space commercialization, to publication of technical documents, to nanotechnology, to local building codes. The quality of work conducted at its laboratories in Gaithersburg, Maryland and Boulder, Colorado is evident by the awarding of two Nobel Prizes to NIST researchers, Dr. Bill Phillips and Dr. Eric Cornell, in the past five years. To Dr. Bodman and the many other engineers and scientists at the laboratory, we look forward to your third award in the near future.

This year's budget request, as usual, is not without controversy. Usually, the Advanced Technology Program (ATP) funding level is the point of contention. This year, the controversy extends into the Manufacturing Extension Partnership (MEP) program.

I understand that the Administration had to make some tough choices based upon limited resources. It appears that the Administration made a decision to fund ATP at \$100 million above last year's request while cutting MEP funding by \$100 million below last year's request. Although the Administration stated that the decision to reduce MEP funding was based on retaining the six-year sunset envisioned in the original statute that created the MEP program, the sunset was repealed in 1998.

I look forward to hearing not only what criteria were used to reach these budgetary decisions, but also the results of the evaluations of the ATP and MEP programs. I think it would be helpful to understand how it is in the best interest of the country to take away millions of dollars in a program which provides assistance for small manufacturers in adopting new technologies, processes, and business practices, and give these millions to a small number of companies, including Fortune 500 companies, for "high-risk" long-term research.

In the spirit of making tough decisions, I would also like to understand why the Teacher Science and Technology Enhancement Program that was created in 1998 by the Congress to work with high school math and science teachers during the

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Finally, Mr. Chairman, I am interested in hearing about activities at the Technology Administration concerning climate change. In the Energy bill that is currently on the Senate floor, there are several provisions that will have an impact on the programs at the Department. It would be useful to hear the Department's evaluations of these provisions.

Thank you Mr. Chairman, and I look forward to the witnesses' testimony.

The CHAIRMAN. Thank you.

Secretary Bodman, we would be delighted to hear from you at this time. We include your statement in its entirety in the record and you can deliver it as you wish or summarize, either way.

**STATEMENT OF HON. SAMUEL BODMAN, PH.D.,
DEPUTY SECRETARY, DEPARTMENT OF COMMERCE**

Dr. BODMAN. Well, I have a summary statement. Chairman Hollings, Ranking Member McCain, thank you very much for your invitation to be here. It is a privilege to be here to talk about something near and dear to my heart, namely technology and the commercialization of technology.

I know that the Committee has particular interest in the proposals related to the ATP program and I am happy to discuss our thinking related to that. I also want to say at the outset that I recognize that the level of funding in the administration's request is disappointing in some areas and to some Members of the Committee. That has already been made clear. But this has been a challenging budget year. As you well know, the priorities of the administration have been focused on the war on terror and on homeland security, and therefore our requests for the various programs here represent our best judgment as to how to balance the needs of those priorities versus the various science programs that are of interest here.

TA and NIST are committed to maximizing the contribution of technology to our Nation's economy. They work with the private sector, with our universities and other agencies to spur innovation and entrepreneurship. More than ever before, as Senator McCain has said, technology is vital to maintaining and building our country's strength.

It is no accident that our country leads the world in technology. Our achievements are in my view a dividend of funding that was started in the forties, largely from the Office of Naval Research, that helped establish the technological beachheads in many of our research-based institutions, which has then spread nationally to most of our universities in America.

Private enterprise takes the lead in ensuring that the United States remains on the cutting edge of technology from a commercial standpoint. But our government, our Federal Government, plays a critical role in enabling the creation of new technology for private industry. The Technology Administration is the principal Federal agency with the explicit mission to maximize technology's contribution to our economy. TA is the leading portal, a bully pul-

pit, if you will, for the Federal Government in its relations with the technology industry. The Under Secretary and the Office of Technology Policy coordinate policy for the government in partnership with industry and the technical or the high tech community.

Recently, TA hosted a number of workshops, several of which I have chaired myself or co-chaired. Topics have included the environment for innovation and R and D in the United States, the factors affecting domestic demand for broadband technologies, the state of technological development in the European Union, and the flow of venture capital in Russia.

As this Committee well knows, NIST is a world-class organization that performs cutting edge research. NIST programs support homeland security. Currently NIST conducts more than 75 projects that aid law enforcement, military operations, emergency services, airport and building security, and cyber security. On March 29th, NIST and FEMA entered into a memorandum of understanding that establishes a framework under which NIST will be a research source for FEMA in disaster prevention and homeland security.

The administration requests a total budget of \$578 million for NIST, which represents a total decrease of \$103 million from the fiscal 2002 appropriation. Within this amount, \$396 million is provided for NIST labs, or a \$75 million increase relative to 2002, of which \$50 million will be used to complete and equip the Advanced Measurement Laboratory now under construction.

The new laboratory is a unique facility. It is to be completed in late calendar year 2003. Key technology industries will require extremely precise measurements and standards at the atomic scale and growing demand for these capabilities can only be met with the special equipment and the highly controlled environment in this new lab.

NIST will also undertake some long-overdue improvements at NIST's Boulder, Colorado, laboratories. Most of these buildings are over 50 years old. I would respond, if I may, to Senator McCain's comment about our next Nobel Prize winner coming along, which I devoutly hope will be the case, but I would tell you, based on my eight months of experience in working for the government, I have found that our physical facilities do not seem to attract maintenance funds in the same way that happens in private industry.

So we find ourselves with a physical infrastructure, of which Boulder is an example, that is not conducive to world-class research, and in fact I think it is raised from time to time as a reason that we might have difficulty holding onto the kinds of scientists that we wish to keep.

The plans also are to expand our operations out in Gaithersburg at the Center for Neutron Research. This center is the best facility of its kind in the United States and is now chockablock with demand for time on it and we wish to expand the facility.

The ATP program has been, as has been noted, a subject of perennial debate. Last summer Secretary Evans initiated a review with the intention of stabilizing the program. He asked me to head that up. As has been mentioned, we have confirmed that which the Committee already knew, namely that this has been a very effective program. We nevertheless concluded that some reforms could

be put in place that would improve the performance of the program.

Specifically, we have proposed reforms that include first recognizing the significant value of the resources that institutions of higher education offer by allowing universities to lead ATP programs; secondly, to allow universities to negotiate with joint venture partners for the right to intellectual property, which they are denied permission to do under current law.

It is our view that it would be appropriate to limit very large companies' participation in the ATP program to joint ventures. We do have a proposal that we believe in that—again, this relates to the funding stress that we find ourselves under—that some kind of cost recoupment for successful projects, a royalty, if you will, from successful awards would be appropriate.

We have recommended that we modify ATP project management activities and selection criteria to ensure that the program funds technical innovation and development. This is a technology program, as to be contrasted with marketing or other commercialization activities.

Then lastly, to ensure that ATP's project evaluation boards where appropriate have additional private sector non-proprietary input as to whether a specific technology is truly innovative and not already being adequately supported by the private sector. You can read into that some input from the venture capital or angel investor community we think would be useful.

We would like to work with the Congress to implement these reforms. The Secretary and I have been deeply involved in this issue. Personally, I have done so myself and spent a good deal of time on it. We have asked for a budget of \$108 million, which would demonstrate our commitment to the program, of which \$35 million would be for new projects and the balance would be for continuation of those projects which began in prior years.

In tomorrow's Federal Register the Department will announce the fiscal 2002 competition for ATP. We plan to hold a single competition open to all technology areas. Those proposals received by the first deadline in June will be eligible for funding this fiscal year.

With respect to the MEP program, our \$12.9 million request for the MEP partnership would return that program, as has been mentioned, to its original plan, which called for the phaseout of Federal moneys after 6 years of funding. The administration's proposal would continue NIST funding for two centers which are less than 6 years old and continue full funding for those administrative centralized activities that are appropriate for coordinating the network of some 60 MEP centers, at least in the near term.

This past year was a notable one for the Baldrige program. We awarded our first Malcolm Baldrige Awards in the education category. Two school districts, the Chugach, Alaska, School District and Pearl River, New York, School District, as well as the University of Wisconsin at Stout, accounted for three of the five awards.

I may mention in passing that the young man, a 17-year-old senior from Chugach, Alaska, gave the acceptance speech and made it exceedingly difficult on those who followed him to the podium, who

were 20 years older and had to fight to do as good a job as he did in his acceptance speech.

There was a column, David Broder's column, this past Sunday about the success of the Chugach School District. Apparently the word is getting out that working hard and applying the Baldrige quality principles can help our educational institutions, and we are optimistic about future awards in this field.

That concludes my introductory remarks, sir, and I would be happy to try to respond to questions.

[The prepared statement of Dr. Bodman follows:]

PREPARED STATEMENT OF HON. SAMUEL BODMAN, PH.D,
DEPUTY SECRETARY, DEPARTMENT OF COMMERCE

Chairman Hollings, Ranking Member McCain, and Members of the Committee, I thank you for this opportunity to testify in support of Congressional authorization of the programs of the Technology Administration and the National Institute of Standards and Technology (NIST) within the Department of Commerce. I also understand that the Committee wishes to focus particular attention on the reforms that the Administration has proposed concerning the Advanced Technology Program. I look forward to discussing them with you today.

Technology Administration (TA) and NIST Programs: their goals and importance.

TA and NIST are committed to maximizing the contribution of technology to our national economy. They also work with the private sector and other agencies to spur the innovation and entrepreneurship that lead to more high-quality, high-paying jobs, which in turn foster our country's economic security. A strong economy and national defense are not only the bedrock of our quality of life and global leadership, but of our very freedom. More than ever before, technology is vital to maintaining and building these U.S. strengths.

As we have all witnessed in the past few months, technology is our force-multiplier in the war on terrorism and in homeland security. Thanks to technology, we can put the world's finest tools in the hands of our military, law enforcement and public safety personnel. Our advanced technologies are significantly reducing the risk to these American men and women in service to their communities and their country. There is every reason to believe that, in the years ahead, technology will continue to be a significant force in our economy and in the defense of our nation.

I would like to report to the Committee that on March 29th, NIST and FEMA entered into a Memorandum of Understanding (MOU) that we believe will significantly enhance the effectiveness of the two agencies' cooperation. The MOU establishes a framework under which NIST will be a research resource for FEMA in the areas of disaster prevention and homeland security.

It is no accident that the United States leads the world in sophisticated technology, both civilian and defense. Our achievements are the dividends that flow from sustained public and private sector investments in research and development since the late 1940's, coupled with America's entrepreneurial spirit and willingness to take risks. While under our economic system private enterprise takes the lead in ensuring that the United States remains on the cutting edge of technology and stays competitive in the world's high-tech markets, the Federal government plays a critical enabling role. The U.S. Government, in recent decades, has strongly supported scientific and technological research, fostered excellence in standards development, and maintained laws that foster innovation. These activities—in which the Technology Administration plays a key part—have not only helped our industries become technology leaders, but have caused our universities to become world-class scientific and technological research institutions. I would like briefly to outline some of the key operational elements and programs of TA and NIST that support this role.

The Technology Administration

The Office of Technology Policy. In support of the President's priorities for science, technology, and U.S. competitiveness, the Technology Administration's Office of Technology Policy develops and advocates national policies and initiatives that support the use of technology to build America's economic strength. Its activities include:

- Promoting innovation through leadership and advocacy of policies that encourage research, development, and commercialization of new technologies (such as nanotechnology and biotechnology);
- Representing the interests of U.S. innovators and entrepreneurs in international forums and partnerships;
- Working with states, localities, and Federal labs to institute policies that promote technology-led economic development;
- Fostering national workforce policies that promote and improve the education and training of future scientists and engineers, and by recognizing excellence through the National Medal of Technology program;
- Working with industry to employ technologies, such as telemedicine and other e-commerce applications, in new ways for greater productivity and higher standards of living, and encouraging more students to pursue scientific and technological careers through the GetTech public-private partnership;
- Maintaining close communication and understanding between government, industry and academia on technological and innovation issues. Recently TA has hosted a series of workshops, several of which I have chaired, that build mutual understanding of important market trends and developments. Topics have included the environment for innovation and R&D in the U.S., the factors affecting domestic demand for broadband technologies, the state of technological development in the EU, and the flow of venture capital in Russia.

The National Technical Information Service (NTIS). The overall role of NTIS is to enhance public access to Federal ly generated scientific and technical information. I am pleased to report that NTIS is performing this important work on a self-sustaining basis. Part of its revenue is derived from the sale of technical reports. But, consistent with Congress' 1988 mandate that NTIS develop new ways to disseminate information and its 1992 mandate to focus on electronic media, NTIS is also generating revenue through services to other Federal agencies that help them communicate more effectively with their own constituencies online.

The National Institute of Standards and Technology (NIST).

As this Committee well knows, NIST is a world-class organization that performs cutting edge research driven by its mission of developing and promoting measurements, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life.

NIST, has just begun its second century of service to the Nation, and in this period it has already produced some notable achievements. In 2001, for the second time in five years, a NIST scientist won the Nobel Prize in Physics, the ultimate recognition in science. This time, NIST's Eric Cornell, along with a colleague from the University of Colorado and another from MIT, won the prize for creating an entirely new state of matter, called a Bose-Einstein condensate. This super-cold creation, first accomplished in 1995, has launched a new branch of atomic physics and unlocked a potential treasure trove of discoveries and new technologies. The work of Cornell and his colleagues builds on the contributions of NIST's 1997 Nobel Prize winner, Bill Phillips, who perfected methods for trapping and cooling atoms with lasers. This capability is now exploited in NIST's newest atomic clock, which neither gains nor loses as much as one-billionth of a second in 20 years.

NIST's standards and measurements activities actively support efforts to strengthen homeland security. Currently, NIST is conducting more than 75 projects that support law enforcement, military operations, emergency services, airport and building security, cyber security, and efforts to develop new types of security technologies. NIST is truly the "crown jewel" of the Federal laboratory system.

Three particular ongoing or planned initiatives address homeland security. The first of these deals with current building design standards and practices. Current building design practices do not consider fire as a design condition or the consequences of injected fuels or other highly flammable materials. Architects, not engineers, specify fire protection in buildings, and the current testing standards are based on work carried out by NIST in the 1920s. In addition, progressive collapse—the spread of failure by a chain reaction disproportionate to the triggering event—is an important issue that will be investigated in connection with the World Trade Center collapse and was responsible for the high number of deaths in the 1995 bombing of the Federal building in Oklahoma City. Yet there are no U.S. standards, codes, and practices to assess and reduce this vulnerability. Beyond designing buildings that are better able physically to withstand major disasters, the development of "intelligent" buildings could significantly affect the outcome in terms of lives saved.

For this and other reasons, NIST is proposing to increase the resources devoted to its Program for Accelerating Critical Information Technologies. This increase in emphasis will support the development of networked systems of embedded devices (“EmNets”) to detect, prevent, and respond to natural and human-caused disasters. As computing device costs decline and capabilities increase, devices and sensors will be embedded in buildings, office spaces, manufacturing floors, transportation medians, and appliances and will be interconnected using wired or wireless networks. EmNets could offer enormous benefits to personnel responding to a disaster, providing substantial amounts of information in real time that could help to save lives and resources.

NIST’s third new initiative in support of homeland security involves the Computer Security Expert Assist Team. This team, based at NIST, assists other Federal agencies on a cost-reimbursable basis. Federal agencies are taking action to improve security, but most do not understand what actions to take or in what order. NIST staff includes world leaders in all aspects of information security.

The Advanced Technology Program. The Advanced Technology Program (ATP) has been the subject of perennial debate that has hindered its stability and effectiveness. Last summer, Secretary Evans initiated a review of the Program with a view toward resolving this debate. The results of that review are outlined in a report, *The Advanced Technology Program: Reform with a Purpose*, which was issued earlier this year.

Based on the Department’s careful review and analysis of ATP, the report highlights important reforms for the Program and more clearly defines its role in the R&D enterprise. Technologies developed through ATP have significant potential to bring economic growth and benefits to the entire Nation. Nevertheless, our review concluded that some reforms are needed to provide ATP with the proper tools and direction it needs in order to be effective in the 21st century. For example, much has changed since the Program’s inception over a decade ago, such as the increasingly important role of universities in innovative activity. Despite this expansion in their R&D role, universities may not, under current law, lead ATP joint ventures or hold rights in the intellectual property that results from ATP-funded research. The Program needs to respond to this and other changes in the research and business environment. Specifically, the proposed reforms include:

- Recognizing the significant value of the resources that institutions of higher education offer by allowing universities to lead ATP joint ventures;
- Offering universities increased incentive to participate in developing commercially relevant technologies by allowing them to negotiate with joint venture partners over the rights to hold the intellectual property that results from research;
- Limiting very large companies’ participation in ATP to joint ventures. ATP support for companies of Fortune 500 size as single applicants is inappropriate. However, in recognition of the economic value of the diffusion of knowledge—as well as other national benefits that arise from large firm participation in joint ventures—very large companies should be permitted to receive ATP awards, although only as part of a joint venture;
- Allowing recoupment from companies, and reinvestment into the Program, of a percentage of revenues derived from successfully commercialized awards. To accomplish this, ATP-funded companies that achieve commercialization would pay an annual royalty to the government of 5 percent of any gross product revenues, up to 500 percent of the amount of the original award;
- Modifying ATP project management activities and selection criteria to ensure that the Program funds technological innovation and development, as contrasted with marketing or other commercialization activities; and
- Ensuring that ATP’s project evaluation boards, where appropriate, have additional private-sector, non-proprietary input as to whether a specific technology is truly innovative and not already being adequately supported by the private sector.

We want to work with the Congress on the implementation of appropriate reforms, including recoupment of the government’s investment in profitable ventures, which can be re-invested into the Program. In this way the stability and effectiveness of the Program, we believe, can be greatly improved. The Secretary and I have been personally involved in this issue and feel strongly about the proposed reforms. The Administration’s proposed budget of \$107.9 million demonstrates our commitment to an enhanced ATP.

NIST Laboratory Initiatives. For the upcoming fiscal year, the Administration has requested a budget of \$396.4 million, an increase of slightly more than \$75 million

over last year's appropriation. Of this amount, \$50 million will be used to complete and equip NIST's state-of-the-art Advanced Measurement Laboratory, now under construction. A facility like no other in the world, the Advanced Measurement Laboratory is due to be completed in late 2003.

The Advanced Measurement Laboratory (AML) is extremely important to the Nation's technology future. Its unique, highly controlled environment is essential to NIST's ability to develop necessary capabilities and tools. High-technology industries need advanced measurement methods and standards to efficiently develop and produce new products and services. The semiconductor, telecommunications, data storage, biotechnology, and other key technology industries already require extremely precise measurements and standards that are approaching atomic scale. Growing demand for these and other exceedingly accurate measurement capabilities can only be met with special equipment in the unique AML environment.

NIST is also planning construction and renovation activities that will include long-overdue improvements at NIST's Boulder, Colorado, laboratories, where most of the buildings are nearly 50 years old. Facility-related problems at the Boulder campus include severe temperature fluctuations and power interruptions that often threaten the quality of NIST data; power outages, spikes, and brownouts that damage sensitive equipment; and poor heating and air conditioning controls that have prevented the on-time delivery of specialized superconducting chips to defense contractors, instrument makers, and other NIST customers.

Key initiatives of the NIST laboratories will help to achieve the President's aim to leverage the Nation's technology resources to speed progress on several security fronts. For example, NIST plans to expand operations and strengthen research capabilities at the NIST Center for Neutron Research. This Center is the best and most productive facility of its kind in the United States and among the best in the world. As growing numbers of researchers are discovering, neutrons are incredibly useful probes. Requests for "beam time" (experimental measuring time) at this facility greatly exceed the Center's existing capacity. We plan to take steps to meet this demand for what is a truly unique resource for U.S. science. NIST will build staff expertise for the development of new instruments and capabilities that will allow the agency to increase the number of users by a minimum of 25 percent, from approximately 1,750 to 2,300 per year, and strengthen key program areas ranging from materials science to biology to fuel-cell research.

NIST also plans to expand its program in nanotechnology, an exceptionally promising area in which NIST is already a leader. Miniature technologies are important in many fields, including health care, semiconductors, information technology, biotechnology and data storage—many of which applications are important to homeland and national security. Nearly all industrial sectors plan to exploit nanotechnology, and most of their plans call for appropriately scaled measurements and standards—NIST's specialty.

The Manufacturing Extension Partnership Program (MEP). The original blueprint for MEP called for NIST to provide cost-share support to new centers in the network during their crucial start-up years, after which the Federal funding would be slowly phased out and the centers would become self-sufficient. The \$12.9 million FY 2003 budget request would return MEP to this original plan, which called for the phase out of Federal monies to centers after six years of funding. The Administration's proposed budget will continue NIST cost-share funding for two centers that are less than six years old, while allowing MEP to continue to provide full technical and product support and coordination for the network of centers.

Malcolm Baldrige National Quality Program. This past year was an especially notable one for the Baldrige Program. It awarded its first Malcolm Baldrige National Quality Awards in the education category. Two school districts—Chugach, Alaska, and Pearl River, New York—and one university—Stout University in Wisconsin—accounted for three of the five awards given this year. These award winners will be excellent role models for 21st century education organizations. We are optimistic that, in the years to come, adoption of the Baldrige criteria for performance excellence will spread across the education sector. As it does, we anticipate that the Program will motivate the same kind of revolution in the quality of American education that it helped to launch in U.S. industry.

Mr. Chairman, I thank you for the opportunity to address the Committee on these important issues. I will be happy to answer questions you may have.

The CHAIRMAN. Secretary Bodman, let the record show that you and I have been conferring and also with Secretary Evans—I have the highest regard for both you and the Secretary—in trying to iron this controversy regarding ATP out, because I think you folks have

the understanding and want to make this program a success or, let us say, continue it as a success.

In other words, the hearing is to how are we going to save a little here, save a little there. For the benefit of the hearing, let me relate my feelings with respect to the elephantine size of government. It started under President Nixon. I will never forget it. What we had was a donnybrook. He wanted to send all the money back to the States. Governor Allen and I would love that because we have been governors. And the Congress wanted to continue all the particular programs.

So in the conference we had over at the White House, the President said: Well, go ahead, just pass both of them. We did not know and mind how tricky he was, and we passed both of them. He signed both of them and then he impounded ours. In other words, the program that the Congress had continued, the President cancelled, so we had to sue him.

Secretary Bodman, you know, you and I are good friends, so we are not going to sue each other to get you to spend the money. The only reason I think of this story is that you say that finally the end of April we are going to begin the 2002 ATP competition. The fiscal year began in October of last year, months and months ago and just now you are coming for the ATP program that you say is a very good program, yet none of the \$60 million in awards are made.

So in a sense, that is one way to administer it, and another way for us to make sure it is administered in the way the Congress intended is to sue the so-called tentative impoundment or the one-half impoundment, because you are going to carry over the \$35 million and that is only a request.

That is one way to save money, but if you want to save money, this Committee might look at the space station which started out at \$8 billion. It is now 10 years over schedule and will cost \$98 billion over its lifetime. It is \$90 billion over cost. If you want to save money, Senator, we can go down on the floor and save some on that \$30 billion farm subsidies that they are trying to embellish with this other particular program, the corn. They want to put in some several billion more there.

Here with ATP, we have got just a few million dollars and, like you say, world-class research. This ATP program of NIST started with Craig Fields over there in DARPA. He found out that we had all this technology backed up in the National Bureau of Standards, and so we created ATP and renamed the Bureau as the National Institute of Standards and Technology. Now, we are trying to keep it going.

With regard to ATP, you speak of the original intent. You are talking to the original intender. I do not want to sound like Al Gore, I invented technology.

But for example, if we had put it in the universities originally that would not have passed muster with Chairman Danforth, then Chairman of this Committee. We were trying to make sure ATP was not pork, and universities are famed for pork. We have got the expert Senator on pork right here to my right. They would have eliminated the whole program. That is why the universities were not in it.

Now you are coming recommending pork. You want to get the universities into the program. We had it studied out by experts and each project has to be vetted by them before an award could even be considered and then brought over to the Department of Commerce and by your Committee—not you, not me, not the President, not the Secretary—on a competitive basis make those awards.

So we made all the fences for pork. Here we come back in with the universities' pork, which we are glad to go along with. We know about pork. Yet on the other hand, the recoupment you propose would discourage participation and the taxation really of five times the value of the particular program is really on the one hand let us award technology, but make darn sure we penalize it if it succeeds.

I would like your comment with respect to that and with respect to only now just coming with the awards. Do you expect to make the grants this year of the full \$60 million amount provided by Congress?

Dr. BODMAN. First I want to reiterate that I am aware that you were the creator of this, sir. Secondly, I am relieved at your statement that I will not be sued, which I take some solace in.

Thirdly, against the fiscal constraints within which we operate, it was my judgment that we would operate with \$35 million of new projects in 2002, \$35 million of new projects in 2003. When we get to the end of 2003, we would be in a position where we would not have any carried over funds. This year, as you have pointed out, we have had carryover funds, between \$30, \$40 million for each of the last 2 years.

The current plan would be to award some \$25 million by the end of June and that we would expect another \$10 million plus or minus, depending on what we find in the applications, by the end of the fiscal year. So the answer is the current program would call for awarding some \$35 million this year, which would be consistent with the requested number for next year.

That was a judgment that I made, given the overall fiscal constraints and trying to even it out so that we would have an equal amount of new programs that we would be able to support in each of the 2 years.

With respect to your comments on the recoupment, I do not consider it a penalty. I do consider that if there is success in these programs, having a royalty to provide additional funding that would be able to support the ATP program is a reasonable and a responsible thing to do.

What we have attempted to do, Senator, is to stabilize the program. As you pointed out yourself in your opening remarks, there has been a lot of controversy apparently over the years about this program. It has been criticized on the one hand for being corporate welfare; it has been criticized on the other hand as being ineffective. We have found that neither of those is the case, that there is a need, the so-called "valley of death" in terms of funding new technology, that that is in fact the case.

We have consulted at some length with Dr. Branscomb up at the Kennedy School, who is by my way of thinking the great expert in this field, on this topic, and in this country on this topic, in order

to try to get his views on the matter. Out of that came a sense of the reforms that we have put before you.

We do believe in the ATP program, and we will do our best in representing the program both to you and to the people at OMB who we deal with, as you know, in making the budgetary tradeoffs that are part of the budgeting system.

The CHAIRMAN. Thank you.

Senator McCain.

Senator MCCAIN. Thank you, Mr. Chairman.

For years I tried to put a cap on the space station expenses as we received testimony after testimony that it was spiraling out of control. In fact, we did put a cap, but that was weakened by other legislative action, and we now see a classic example of a system once beginning to be built assembling a coalition of special interests to allow it to go, as you mentioned, from \$7 or \$8 billion to about \$98 billion, and I guarantee it will be well over \$100 billion before we are through. However, because one program is out of control does not justify other programs doing the same.

Just to start with, Mr. Secretary, General Electric, one of the largest companies in the world, with revenues of \$126 billion in 2001, was awarded an ATP grant in October 2001 as a single applicant. That is not corporate welfare?

Dr. BODMAN. I believe that, depending on what definition you want to use for it—

Senator MCCAIN. Why would one of the largest corporations in the world need government money to pursue anything?

Dr. BODMAN. The idea of the ATP program is to find the best technology that this country has to offer, and those—

Senator MCCAIN. The largest corporation in the world needs that money from the Federal taxpayers?

Dr. BODMAN. Senator McCain—

Senator MCCAIN. You do not need to bother to continue to answer, sir. You have no grounds with which to respond that we need to spend the taxpayers' dollars of America in a single applicant grant that is awarded to one of the biggest corporations in the world. I do not think my constituents would agree with such a decision, no matter how worthy the cause.

Dr. BODMAN. Sir, one of the reforms that we put into place, at the risk of continuing to answer when you told me not to, one of the reforms we put into place would be to put companies like General Electric, like IBM, to continue to allow them to participate in the program, but not as a sole participant, that they would have to be in there as a joint venture participant.

Senator MCCAIN. Well, that is a wonderful breakthrough.

But at the same time, while you give corporate welfare to one of the largest corporations in America, you cut the Teacher Science and Technology Enhancement Program. They do not have any big lobbyists around here, the average teachers. They are not big soft money contributors. They do not get corporate welfare, and yet you cut their program. How about explaining that one?

Dr. BODMAN. Sir, to my knowledge that is not a program that we have cut and I cannot speak to that. That is a program—

Senator MCCAIN. You have not looked at this year's budget request?

Dr. BODMAN. I have looked at this year's budget request.

Senator MCCAIN. According to my reading, the Teacher Science and Technology Enhancement Program has not received any funding request.

Dr. BODMAN. That may well be the case, sir. But as far as I am aware—I am not familiar with that program, I have to tell you, sir.

Senator MCCAIN. I can understand that. They are not big donors. I can understand why you would not know about a program such as that.

Dr. BODMAN. I do not know how to respond to that, sir.

Senator MCCAIN. I am sure you do not. Senator Brownback and I introduced legislation last year requiring the Secretary of Commerce to establish a registry whereby companies can register reductions in greenhouse gas emissions. The registry would provide for trading of these reductions among various companies. Similar registry programs are under consideration as part of the energy bill.

One of the main reasons surrounding the registry is which Federal agency would lead the effort. DOE currently has a registry, but it does not contain the robustness that industry needs. Some of those involved in the current industry trading activities have told the Committee that what they need most is a consistent approach to measuring and reporting reductions to ensure when they buy a ton of carbon they are indeed buying a ton of carbon.

Do you feel that the Commerce Department because of its relationship with industry has any unique advantages to serve this need as opposed to any agency like DOE or EPA?

Dr. BODMAN. No.

Senator MCCAIN. How do you respond to some critics who may say that by making revisions to provide for more university involvement it is just an effort to build a larger constituency base?

Dr. BODMAN. Is this with respect to ATP, sir?

Senator MCCAIN. Yes.

Dr. BODMAN. It is my view that the whole funding of universities has been modified and changed over the past one to two decades. More and more universities, I believe correctly, are engaging in the development of new technology, are participating in licensing programs, and therefore have greater capacity to manage the commercialization or participate in the commercialization of technology.

Therefore, I view it as perfectly appropriate to see that universities can participate as full partners in the ATP program. The ATP program, as I mentioned before, has been successful. I think it can be more successful with greater participation of our universities. I do not see it in my view as expanding or responding to any particular constituency other than trying to do our job of providing an environment for commercializing technology.

Senator MCCAIN. What plans do you have for completing a study of the collapse of the Twin Towers?

Dr. BODMAN. The people at NIST, who are among the world's experts both on the structures of buildings and on the modeling of explosions and conflagrations, are now working on a program to model the collapse of the Twin Towers and to reach some conclusions as to what modifications might be made in building codes throughout the country.

Senator McCAIN. Thank you.
Thank you, Mr. Chairman.
The CHAIRMAN. Senator Allen.

**STATEMENT OF HON. GEORGE ALLEN,
U.S. SENATOR FROM VIRGINIA**

Senator ALLEN. Thank you, Mr. Chairman. I very much thank you and Senator McCain for calling this hearing today and thank all our witnesses, especially Ms. Anne Armstrong from the CIT in Virginia. I have read her testimony. I think it is very cogent testimony and I substantially agree with her assessment of some of these proposals. I certainly look forward to working with my colleagues to pass this Technology Administration legislation and funding this year. There will be some controversial issues and it will need some massaging before it gets through.

I have a statement, Mr. Chairman, that I would like to have put into the record rather than reading.

The CHAIRMAN. It will be included.

Senator ALLEN. Included in there is also a letter from a constituent, Mr. Jeffrey Payne, on his experiences with ATP and some of his suggested changes and where the program is worthwhile.

The CHAIRMAN. it will be included.

[The prepared statement of Senator Allen follows:]

PREPARED STATEMENT OF HON. GEORGE ALLEN,
U.S. SENATOR FROM VIRGINIA

Mr. Chairman, I would like to thank you and Senator McCain for calling today's hearing, and thank all of our witnesses, especially Ms. Anne Armstrong, for appearing here today. I believe that it is important that we reauthorize the Technology Administration this year, and am willing to work with my colleagues to pass this legislation.

The Technology Administration (TA) serves as the President's principal voice on domestic and international technology issues. By working with the private sector, TA develops policies that will shape the future of American research and development.

The component parts of TA are the Office of Technology Policy (OTP), the Office of Space Commercialization (OSC), the National Technical Information Service (NTIS), and the National Institute of Standards and Technology (NIST). Through these organizations, TA develops policies to improve technology transfer from universities and research institutions to the commercial sector, fosters greater private investment in space, and serves as a clearinghouse for American and international research.

NIST serves as the most high-profile part of TA by conducting "cutting-edge" research and establishing measurement tools and technical standards that ensure national competitiveness. Examples of NIST's research include: research on quantum computing; developing nanotechnology measurements and standards to support the development of new devices and materials on the atomic level; and maintaining the Atomic Clock. NIST also runs the Baldrige National Quality Program, which is the Nation's premiere award for excellence in the categories of business, education, and health care performance.

The recent awarding of the Nobel Prize in Physics to Dr. Eric A. Cornell for his work in creating the Bose-Einstein Condensate underscores NIST's commitment to excellence. Dr. William D. Phillips won the Nobel Prize in 1997 for his work on cooling and trapping atoms with laser light. I would like to congratulate Secretary Bodman and Dr. Bement for these awe-inspiring achievements.

This morning, I would like to emphasize the role that TA plays in ensuring our homeland defense. Currently, NIST is formulating a plan to analyze the technical causes of the World Trade Center collapse in order to update building codes and improve physical infrastructure safety. Also, it is establishing voluntary standards for equipment that will protect police, fire and EMS personnel. In addition, NIST works with other federal agencies to protect our Nation's critical infrastructure by devel-

oping encryption standards, and resolving vulnerabilities in the federal information systems.

I am interested in hearing about the Administration's plans regarding the Manufacturing Extension Program. Virginia's A.L. Philpott Manufacturing Extension Partnership helping 1,000 manufacturers throughout the state. I am concerned that a cut in the federal funding to this center would result in a loss of expertise.

In addition, I would like to highlight the importance of fully funding the construction and maintenance of NIST laboratories and facilities. It is important that this infrastructure be properly maintained in order to ensure continued groundbreaking research.

I am also interested in hearing the Secretary's views on how to reform the Advanced Technology Program, and today's debate on this issue.

Finally, I would like to point out the important role that NIST can play in ensuring free trade and access of American goods to foreign markets. Some of our trading partners have used standards as non-tariff barriers to keep out American products. NIST can play major role in international standard setting organizations to establish commonly-accepted technical standards that will prevent this practice and expand international trade.

Again, thank you, Mr. Chairman, for holding this hearing. I look forward to hearing from our witnesses.

CIGITAL

Hon. George Allen,
Commerce, Science, and Transportation Committee,
Washington, DC.

Dear Senator Allen:

Your interest in the Advanced Technology Program (ATP) has recently come to my attention. As Virginia's first single company ATP award winner and also Virginia's first two time ATP award winner, I'd like to express my opinion about the ATP program.

Cigital helps companies build and deploy software that is reliable and secure. We have worked with 35 of the Fortune 500 helping them protect themselves against software failure. Cigital Labs, our award winning research laboratory, has won research grants and contracts from a number of prestigious federal agencies (e.g. National Security Agency, Defense Advanced Research Projects Agency, National Science Foundation, NASA) during our ten-year existence. The Advanced Technology Program out of the Department of Commerce has been the most beneficial research program we have been involved in. There are a number of reasons why this is so:

1. *ATP is the only research program that makes its awards decisions based partially upon business criteria.* In the past, Cigital has been frustrated by federal agencies that award research money to companies who have little or no plans or ability to commercialize the technology they are proposing. My belief is that applied research programs are most effective when there is not only a good research idea but a solid business plan for commercialization that has been thought through. ATP's rigorous review of an ideas business plan as part of the proposal selection process is an excellent way to accomplish this
2. *ATP is staffed by both scientists and business professionals.* Most research programs give no guidance on the business aspects of technology transfer and commercialization of ideas. By assigning both a technical and business program manager to each ATP project, the Advanced Technology Program assures that adequate time is spent on the business aspects of each research idea.

There are, however, several issues with ATP that if corrected, would improve the program:

1. *Too much money goes to Fortune 500 companies.* ATP is supposed to fill the gap between idea generation and institutional funding (i.e. Venture Capital). The program should not be giving scarce ATP money to large companies who are obviously not in this funding gap.
2. *Focused ATP programs have been abolished.* Traditionally, ATP awards were given in each of a series of programs focused on a particular technology topic (e.g. biotechnology, software component technologies, homeland security). These topics were selected by ATP program managers based upon industry feedback on those technology areas most important to our economic future.

Today, all proposals are evaluated through a "general competition" where any topic can be proposed. This has greatly increased the politics associated with which proposals are funded and which are not.

In summary, the ATP program has been of tremendous value for Cigital and America. If the above program issues are adequately addressed, ATP is a model for how all applied research programs should be structured and run.

Sincerely,

JEFFERY PAYNE,
President and CEO, Cigital, Inc.

Senator ALLEN. I would say that some of the aspects of NIST, which is obviously the most high profile part of the Technology Administration, is developing some examples of good research, including research on quantum computing, and developing nanotechnology measurements and standards to support the development of new devices and materials at the atomic level. I am going to ask you, Secretary Bodman, in a second about some of the fire and police and EMS personnel interoperability and communications improvements.

You do have some aspects of this that I have some concerns and it has not really been mentioned much on the Manufacturing Extension Program in cross-examination, but I do have some concerns, especially with the thousands and thousands of jobs we are losing, generally due to international competition. The only way that I see us competing in the future is with better technology that does not require maybe as many employees, but with better quality and better technology.

To my point of view and sentiments, this may not be the best time to be making such radical changes in that Manufacturing Extension Program, and that will all get worked out.

Let me ask you a question here or series of questions relating to public safety communications interoperability. One of the major issues that arose from the emergency responses to the attacks, terrorist attacks on September 11th, was the inability of fire and police and emergency services to work together. It was not that they could not work together. They were having a hard time communicating and they were all on different wavelengths, and they ought to be on the same wavelength.

The Office of Law Enforcement Standards at NIST has experience in developing wireless communications standards. You may know that here in the Metro D.C. area Maryland, Northern Virginia, and the District of Columbia are working on what is called CapWIN so they all can get on the same wavelength.

Now, as far as the guidelines for interoperability for criminal justice and public safety areas, what recommendations would you make on how to resolve this communications interoperability issue?

Dr. BODMAN. That is a very technical question, Senator. I do know that the NIST office that you referred to is in fact working on this matter and that we will have forthcoming a series of recommendations as to how to improve it. There are ways of, if you will, jerryrigging the system now so that we could solve it, but I think the more appropriate thing is to put standards in place, which these people are great experts on, that would enable the problem that you referred to, which is in fact a real problem, to be dealt with once and for all.

That is all I know about the topic. I would be happy to come back to you with a more complete schedule and answer on it than I can give you at this point in time.

Senator ALLEN. Well, I would just want to emphasize, Mr. Chairman, to Secretary Bodman how important this is for our homeland security. The standards being developed I think would be very helpful to local, regional, and state law enforcement and also emergency personnel.

I would also suggest in this and other areas, rather than trying to have the government or NIST reinvent the wheel or invent a new wheel, that there are many enterprise or commercial applications that can be adapted to the governmental needs, whether they are Federal silos that need to communicate or whether they are state or local, and all actually do need to communicate with one another.

I met with a company—I am not suggesting this is the only solution—but a company called M/A-COM, who said they had a system whereby you would not have to buy new equipment, but just get the existing equipment to communicate. So I would hope that in the midst of this study and analysis of standards and determining what is workable, that you listen very closely to hundreds of those in the private sector who have ideas.

I am not one to be able to evaluate what everyone says to me, but nevertheless if you can evaluate and be a testbed of assistance to law enforcement and emergency personnel, but also listen to the private sector to see which of those systems could work the best if they so desired to procure them.

Dr. BODMAN. I think the Senator is certainly correct in underscoring the importance of the problem. The challenge is there are any of a variety of ways to solve it, and the goal here is to try to get an approach hopefully making use of current equipment that is already available so that we do not have to, as you point out, reinvent the wheel.

So that is the challenge, where you have got a lot of different solutions and how do you pick the one that is optimum. That is the challenge that confronts them. I can, as I said before, be happy to get you more information as to what the schedule or anticipated schedule is.

Senator ALLEN. Good. I am very much interested in it. Although Senator Wyden is not here, I know that he shares the same view. We are working together on what we call NET Guard, trying to get technology people involved in helping out with national homeland security.

Thank you, Mr. Secretary.

The CHAIRMAN. Mr. Secretary, I can probably give one answer to the reason that the largest corporation would want taxpayer money. Thirty-five years ago, General Electric Corporation had this submersible called TECTITE. It was down over 100 feet at the bottom of the ocean and with the astronauts and others, aquanauts, we went down in it. I became friends of Mark Norton and Mr. Otto Clymer, two vice presidents of General Electric.

One day Mr. Clymer came in, he had a big briefcase full of technology and said he was headed to Japan. It seemed that what had occurred is the Pentagon had put on a competition out at Vanden-

berg Air Base for servicemen's housing. They wanted to get the finest little house at the most economical cost. Three bedroom, two and a half bath, for \$21,000 was the winner by General Electric Corporation. They put in, instead of copper gutterings, composite guttering and piping and different other innovations of that kind, with insulation and otherwise.

I said: Why are you taking that to Japan? He said: Well, the bureaucratic snarls here with all of the zoning laws. We will just waste too much time going through that bureaucratic maze, and we can make way more money by just selling the technology.

Otherwise, there is a better reason and that is that you put corporate executives under the pressure, if you do not get the stock up within 3 years you are gone, and so they do not have time for any long-term investments. A lot of this outstanding technology that needs to be entered into and researched, needs to be developed and commercialized, takes longer than the 3 years.

So the largest, richest corporation in the world would pass it by and sell it off, just like GE was selling off that housing technology that was the winner, that the Pentagon had put the program on and everything else and did not get the advantage of it because there were certain other things commercially they found with the city councils and otherwise on zoning laws. They said, look, this is fine, we won, but let us sell it and move on to something else.

That is the way the richest corporations operate. So they are encouraged in this program to participate.

Let me ask about those facilities, though, that you mentioned at Boulder, Colorado, and out here in Maryland. You said the physical infrastructure—this is not a hearing on what you need out there, but this Committee is vitally interested in it—will not attract first class research. Mr. Secretary, tell us about that before I yield here to Senator Wyden.

Dr. BODMAN. As far as I know, the physical infrastructure in Gaithersburg is in good shape. That is a more modern facility. Some of the funding that has been requested will go to providing a more secure environment, to providing, for example, protection of some of our nuclear instrumentation such that they cannot be attacked. So we are dealing there with the homeland security issue. That is really what is involved in Gaithersburg.

The statement that I made I believe to be true and that is that many of our older facilities have not been properly maintained, and that is certainly the case in Boulder. The Boulder facility is wanting in adequate utilities and just the things that one needs to do in maintaining any old structure. It needs to have funding in order to keep it up to snuff.

I have had the same experience, frankly, in visiting both the Census and the NOAA facilities in Suitland. The Suitland facility, which is owned and operated by GSA, is an embarrassment, and we have taken some steps to the extent that I can do it to see to it that we live with the facilities there until we can get new facilities built. That is now an ongoing thing.

But I was just making the observation, which I believe to be true—

The CHAIRMAN. It is an important observation, Mr. Secretary. Give us a memo, please. Give the Committee a memo on suggested

needs both out there at that NOAA facility and at Boulder and wherever. The Committee is vitally interested in that.

Senator Wyden.

**STATEMENT OF HON. RON WYDEN,
U.S. SENATOR FROM OREGON**

Senator WYDEN. Thank you, Mr. Chairman. First let me say, Mr. Chairman, how much your leadership has meant in this area. I mean, the fact of the matter is we would not have these public-private partnerships in the technology area except for the fact on ATP and on the MEP program you put those together. They exist because you have been at it all these years and we want you to know we appreciate that.

The CHAIRMAN. Thank you.

Senator WYDEN. Just a question or two, if I could, for you, Dr. Bodman. Your people have been very helpful to Senator Allen and myself. As you know, we have proposed a major initiative with respect to dealing with the events of 9/11, the NetGuard legislation. The Science and Technology Mobilization Act proposes the creation within NIST of a national clearinghouse, a testbed, to look at the security and response products that have flooded the Federal government.

Senator Allen and I found after our hearing that thousands of these products had essentially come unsolicited to the Federal government. Some of them seem promising, others not so promising. But there is no systematic way at present to really test them and evaluate them on the basis of objective criteria.

So in our legislation, Senator Allen and I proposed that NIST really look in a thoughtful way at these various technologies so that we can have in effect a government-wide capability for examining them. Your folks have been very helpful to the two of us, and I would just like to have your thoughts on the record with respect to NIST's ability to look at a function like this, assuming it was properly funded.

Dr. BODMAN. Well, first of all, I am aware of the legislation. Secondly, the Department is studying the proposed legislation and will be shortly issuing a formal response.

My own thoughts, in the absence of having had any preview of where the evaluation is going, is that I think it is a good idea to have some central facility. The people at NIST are largely qualified to deal with the technological evaluation of instrumentation. Whether they have the breadth of knowledge and experience that is necessary to do everything that is required in this field, I do not know. So that is part of what we are doing, is to try to understand what will be required and do we have the necessary capabilities of doing it.

I always worry where you have a centralized group that is trying to make a technical judgment, if you will, picking the winners from the losers, and you do not have the market involved in it, it makes it a problem. One man's expert is another man's meddler. So I would want to be sure that we can really do a good job, and we will do our best to evaluate precisely what will be required, the range of technical skills needed, and we will give you a response.

Senator WYDEN. That is a thoughtful answer. I want to make clear, and I know Senator Allen agrees with this, we are not interested in the Federal government picking winners in the technology area. The last thing we need to do now is to have some kind of industrial policy in the technology field.

What we do want is some objective effort to look and to report on whether or not these products seem promising and what areas the government and the private sector should look for. You have been very cooperative in this area.

The only other question stems from another hearing that we held in the Science and Technology Subcommittee after 9/11. In that hearing we found that there were no uniform standards for equipment used by firefighters in trying to respond to chemical and biological attacks. What we found there is that the typical department, the typical fire department, did not have the capability for looking at these various technologies.

As you know, NIST already tests equipment used by law enforcement agencies in many areas, so we have been interested in looking at the agency's role in again testing chemical and biological agent detection equipment so as to help the firefighters. My understanding is that you have begun some discussions within the Department on that and I would be interested in a report there as well.

Dr. BODMAN. I am less familiar with that. I always hesitate to say that there is anything that NIST cannot do because they are so able. They obviously have a lot of skill in the fire area. They have demonstrated their capability in the bioterrorism area in certain respects, that is to say dealing with the anthrax problem that we had and how to analyze it and deal with the issues.

So all I can say is I believe they will have the capability that you are looking for, but I do not have a specific response for you at this point in time.

Senator WYDEN. If you could give us a status report on that as well.

Dr. BODMAN. Be happy to do it.

Senator WYDEN. We will work with you closely on the NetGuard effort. I share your views with respect to the role of NIST, and obviously the agency is going to have to have adequate resources to do that. We do offer some additional funds in the NetGuard proposal, and we thank you for your cooperation.

Thank you, Mr. Chairman.

Dr. BODMAN. Thank you, Senator.

The CHAIRMAN. Thank you.

Any further questions?

[No response.]

The CHAIRMAN. Mr. Secretary, we are very lucky to have you and your willingness to serve in government. You have had some tough questions, but that in no way indicates anything other than the highest respect for you and for Secretary Evans. The Committee will continue to work with you, and we will see if we can iron out these differences and keep these two programs going.

I was just remembering Craig Fields of DARPA. He is the one who started us on this course with the Rapid Acquisition of Manufactured Parts. It was put in for the Navy. A ship breaks down in

the Gulf, the ship is 23 years old. They do not make the part any more. It lies fallow there in the Gulf for 2 or 3 months while they are trying to get the part. All the parts now, not just for the Navy but for the Air Force and everyone else has adopted this particular program that came out of the National Bureau of Standards, because we found that that research and technology was over there.

We computerize every part, and we file it. So all we have to do is just punch, find the history of that particular part, and it is manufactured and out there in a couple of days.

So we thank you very, very much—excuse me. Senator Nelson.

**STATEMENT OF HON. BILL NELSON,
U.S. SENATOR FROM FLORIDA**

Senator NELSON. Thank you Mr. Chairman. Just a quick question, Mr. Chairman.

Dr. Bodman, you have jurisdiction over the little Office of Space Commercialization and during another confirmation I asked about the importance of that office and spoke about the importance of that office from the standpoint of the United States having a viable commercial space industry. Yet the office has not had a director for about 2 years. Can you tell me when that position will be filled?

Dr. BODMAN. I do not have an answer for you. I can tell you that I have spent a good deal of my personal time with people from the space manufacturing industry trying to understand their needs and we have been working on particularly issues related to the licensing of products so that they can be more efficiently sold and made available in the marketplace. So that it is a topic that I have spent some time on.

But I do not have a quick answer as to any schedule for filling that particular role.

Senator NELSON. Well, I would suggest that you look at it. We are now a year and a quarter into the new administration. The office is vacant.

Let me just suggest, Mr. Chairman, quite quickly what is in the interest of the United States. If all of the capability of launching goes abroad to others, primarily the competitor, the European Space Agency, and the Chinese want to get into the market. There are combinations between the Russian Zenit rocket, and other folks that want to put payloads on the top of that. Pretty soon you start diminishing the U.S. ability to have lift capability to get into orbit, and sooner or later there is going to be a terrorist act in trying to deny us some of our capability of getting into space. The more robust stable of horses that we have to get to space, to get our assets, the more it is clearly in the interest of the United States.

That is one of the reasons why this little office was set up years ago when I was in the House, and I would suggest that you start looking for a director for that office.

Dr. BODMAN. I will certainly try to understand what that office, specific office, is and respond to it. As I say, I have spent time with the various industry associations and the companies themselves. The challenge that one has in this area is on the one hand trying to protect the national security, and our friends in the Department of Defense have strong feelings about what should or should not be exported.

The issue is having enough of a market to support industries that are U.S. industries that have this kind of capability. What you would like to have is a market greater than that in the United States, so that to the extent that products can be developed and sold elsewhere it allows you to spread the cost and keeps the cost down for each individual product. That is the reason that we have spent time on matters related to licensing and what can be exported and what cannot be exported and who controls that and what are the terms of it and so forth.

So those are some of the issues involved on it. But I will certainly—as I said before, I do not have a comment or a schedule for filling that particular job. But I thank you for your comments, sir.

Senator NELSON. That is not what I am speaking of. The issue that you raise, for example of whether there ought to be a license for an American spacecraft to be launched on a Chinese Long March rocket, I happen to take the side with the Department of Defense. I have been rather hard-line and hard-nosed on that for years.

But I am talking about keeping a viable expendable launch vehicle market alive with U.S. manufacturers. The Office of Commercial Space has a good bit to do with that and there needs to be a director in that office. So I would like very much, since I raised this at a previous confirmation hearing and a year and a quarter later it is still vacant and you have oversight responsibility on it, I would like to have a report from you of when that position is going to be filled.

Dr. BODMAN. You will have it, sir.

Senator NELSON. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. In that regard, Mr. Secretary, please pay attention to the satellite business. Specifically, today is April the 16th. By April 30th the Chinese are going to make a decision, and we are in competition with the French and the French have been using the bureaucratic holdup in the United States against one of the best producers of space satellites in all of history.

Specifically, this Committee was having all kinds of difficulties with our weather satellites in the Ford technology section of Ford Motor. There were cost overruns and everything else. Mr. Bernard Loral came, sat in that chair where you are seated, testified that he could do it with a certain cost fixed and a certain time fixed, and he produced, his company, under cost and under time.

He got delayed because there was an insurance investigation, they tell me, about certain instrumentalities there in China, but that has been cleared. The Defense Department has cleared it. The State Department is happy and everyone else is happy, but no one moves. Since we do not have anybody interested in the Department of Commerce in this particular business, if we lose this then they will go on, like investors will respond in the corporate world and we will lose that business and then we will lose that technology.

So get into the satellite business right now that they are interested in and have been trying to shake loose this particular administration. Otherwise, by the end of the month here in two weeks' time we are going to lose that business.

Dr. BODMAN. Senator, I cannot predict what is going to happen with respect to the decision. I can tell you, sir, that I have spent time on it.

The CHAIRMAN. You have?

Dr. BODMAN. Yes, sir.

The CHAIRMAN. You know about this one?

Dr. BODMAN. Yes, sir.

The CHAIRMAN. Oh, good.

Dr. BODMAN. So I have talked to the people involved and the issues, the complaints, come about whether, particularly from the European competitors, have been effective in describing the licensing process that goes on in the Federal Government and that is a delay and that therefore that causes delays and should be a reason for a foreign nation to buy something from the French or whoever.

So no, we have been. We have advocated. I have advocated for it. I have been in China, advocated for it. So we have not been uninvolved in this matter. But neither can I promise what the result will be.

The CHAIRMAN. Well, as long as you know about it and you are involved, you know as much as this Senator does, then. I just did not want to pass this by and nobody act on the particular measure.

We thank you very much and if there are no further questions then we will move to panel number two. Thank you very much, Mr. Secretary.

Dr. BODMAN. Thank you.

The CHAIRMAN. Ms. Anne Armstrong, the President of the Virginia Center for Innovative Technology; Dr. Lewis Branscomb, the Aetna Professor in Public Policy and Corporate Management at the Belfer Center for Science and International Affairs at the Kennedy School; Mr. Scott Donnelly, the Senior Vice President for Research in GE Global Research for the GE Company.

[Pause.]

The CHAIRMAN. Ms. Armstrong, we welcome you. We have your statement in its entirety. It will be included in the record and you can deliver it or summarize as you wish.

**STATEMENT OF ANNE A. ARMSTRONG, PRESIDENT,
VIRGINIA'S CENTER FOR INNOVATIVE TECHNOLOGY**

Ms. ARMSTRONG. I will give you a short version of it.

The CHAIRMAN. Thank you very much.

Ms. ARMSTRONG. Chairman Hollings, Members of the Committee, Senator Allen: I am the President of the Virginia Center for Innovative Technology. A lot of people know that as the upside-down building out by Dulles Airport, but we are a State-funded nonprofit organization that supports the growth of technology-based businesses in Virginia, the deployment of technology throughout the State, and the development of our State's research infrastructure. We have ten regional offices around the State and a staff of around 40 people.

Like ATP, we invest in early stage, high risk research, although such awards are part of a portfolio of programs that we provide to help build the technology industry in Virginia. Our total budget is around \$10 million a year, so we count on complementary programs from the Federal sector to help our businesses.

As our own State budgets have declined and as the availability of venture capital has dried up, particularly in the seed and early stages, we count even more on these valuable programs to help our companies and our State progress.

The two programs that support businesses at the very early stage of R&D before the venture capitalists will deal with them are the ATP and the Small Business Innovative Research, the SBIRs. But the ATP is typically earlier stage and it has larger scale projects. Virginia companies have done very well in winning the SBIR awards. For several years running, we have ranked third among the States in the total number of awards. We are working, like many other States, to improve that early stage research, how it is commercialized and moved into the economy.

Virginia companies have not won very many ATPs. We are participating in between one and five projects a year over the life of the program, but the ones that we do win are in very promising areas. These companies would not ordinarily receive venture capital for such projects because of the stage of development of the technologies and because they are located in parts of the States that do not have a strong venture capital community, places like Bristol on the Virginia-Tennessee border and Blacksburg, which has one of our largest, strongest research universities, but is not where a lot of venture capitalists live.

In the last 2 years CIT has established a good working relationship with the ATP management and we are focused currently on raising awareness throughout the State, as well as addressing what some people in the State perceive as barriers to participation on the university side. The Virginia General Assembly has given us a number of studies to look at in the coming year specifically on commercialization and looking at some of the intellectual property issues. I will not go into all of those.

Virginia companies since 1990 have won 24 ATP awards totaling \$38.4 million, a number that could be increased dramatically by reforming some elements of the program, particularly reforms that make it easier for our universities to participate, that promote small business involvement while still allowing large firms and their resources to participate, and improve the program marketing, most of which are addressed in the Evans report.

The Evans report makes six recommendations for reforming ATP and I would like to make a few comments on our reactions to those. The first recommendation concerns allowing university leadership of ATP joint ventures and the second would allow university and other nonprofit organizations to negotiate ownership of ATP-funded patents.

We support this approach as long as all the parties involved support it and the projects are evaluated with the same or perhaps more attention to the degree of industry participation and the market potential for the technology. We have heard and understand suggestions that universities should not take the lead in what is essentially a business venture. We have also heard universities' claims that they are unable to participate in the program if they have to relinquish ownership of the intellectual property. We suggest that allowing universities to lead might remove a barrier or

a perceived barrier to more university-industry participation in the program, which is an issue that we are facing in Virginia.

The third recommendation would allow large firm participation in ATP joint ventures. We support this as long as there is consideration for participation by small businesses. Small businesses can benefit from the resources and the infrastructure of their larger partners, and several of the existing projects in Virginia represent these sort of partnerships.

While the argument is often made that large firms can well afford to undertake this research on their own dollar, they do in fact contribute funding to the research. Further, ATP funding allows the firm to expand its research horizon beyond the immediate concerns of the bottom line and allows specific researchers within a large organization to explore a line of research.

The fourth recommendation would require royalties on government investments in profitable ATP ventures. We do not support this because we have found in Virginia that the approach does not work. It sets up a contentious relationship as the funding organization also becomes a bill collector. We have tried several versions of payback and we are about to abandon our own royalty-based programs and replace them with new arrangements.

When funding early stage research that is not always directly traceable from the product to the commercial stage, we have found that payback generally generates more heat than cash. We also believe with recoupment as a goal ATP program managers would have far less incentive to invest in high-risk projects, basically transforming them into government-sponsored venture capitalists.

I see my time is up and so I will pass.

[The prepared statement of Ms. Armstrong follows:]

PREPARED STATEMENT OF ANNE A. ARMSTRONG, PRESIDENT,
VIRGINIA'S CENTER FOR INNOVATIVE TECHNOLOGY

Chairman Hollings and Members of the Committee

In my testimony, I will discuss why NIST's Advanced Technology Program (ATP) is important to our organization and to Virginia. In the process, I'll tell you some of what our organization does. We do have specific responses to the recommendations for reforming ATP in the Evans report. Finally, we offer some additional thoughts on how state organizations, such as CIT, could work more closely with ATP in the future.

I am the President of Virginia's Center for Innovative Technology (CIT), a state-funded nonprofit organization that supports the growth of technology-based businesses in Virginia, the deployment of technology throughout the state and the development of our state's research infrastructure. We have ten regional offices and a staff of about 40. Like ATP, we invest in early stage, high-risk research, although such awards are part of a portfolio of programs we provide to help build the technology industry in Virginia.

Our total budget is some \$10 million per year, so we count on the complementary programs from the federal sector to help our businesses. As our own state budgets have declined, and as the availability of venture capital has also dried up—particularly at the seed and early stages—we count even more on these valuable programs to help our companies and our state progress.

The two programs that support businesses at the very early stages of R&D, before the venture capitalists will deal with them, are the ATP and Small Business Innovative Research (SBIR), but ATP is typically earlier stage and has larger scale projects. Virginia companies have done very well in winning SBIR awards. For several years running, we have ranked third among the states in total numbers of awards. We are working, like many other states, to improve how that early stage research is commercialized and moved into the economy.

Virginia companies have not won very many ATPs, winning or participating in between one and five projects per year over the life of the program, but the ones we do win are in some of the most promising technologies—transgenics, nanotechnology, and networking. These companies would not ordinarily receive venture capital for such projects because of the stage of development of the technologies, and often because they are not located in parts of the state with a strong venture capital community—places like Bristol, on the Virginia-Tennessee border, and Blacksburg, home to one of our strongest research universities, but far from where most venture capital firms are concentrated.

In the last two years, CIT has established a good working relationship with ATP's management, and we are focusing currently on raising awareness in the state as well as addressing what some perceive as barriers to participation on the university side. For example, The Virginia General Assembly has requested CIT and a number of other stakeholders to;

- develop a statewide policy and uniform standard for the commercialization of intellectual property developed through university research (HJ88),
- recommend incentives necessary to encourage the commercialization of university research and development (HB530), and
- establish a task force to study best practices for assisting the development of technology-based businesses that will produce jobs and other economic benefits throughout the Commonwealth (HJ206).

In addition, Governor Mark Warner campaigned on the platform of improving the state's technology transfer capabilities to extend prosperity to other areas of the state, and has continued this focus in the first months of his administration.

Virginia companies, since 1990, have won 24 ATP awards, totaling \$38.4 million, a number that could be increased by reforming elements of the program, particularly reforms that make it easier for our universities to take participate, promote small business involvement (while still allowing large firms and their resources to participate), and improve program marketing, most of which are addressed in the Evans report.

The Evans report makes six recommendations for reforming the ATP. While we generally support the recommendations, we do have some comments:

The first recommendation concerns allowing university leadership of ATP Joint Ventures, and the second recommendation would allow university and other non-profit organizations to negotiate ownership of ATP-funded patents. We support this approach, as long as all the parties support the approach and the projects are evaluated with the same, or perhaps more, attention to degree of industry participation and the market potential for the technology.

We have heard and understand suggestions that universities should not take the lead in what is essentially a business venture. We have also heard universities' claims that they are unable to participate in the program if they have to relinquish ownership of intellectual property. We contend that allowing universities to lead might remove a barrier, or a perceived barrier, to more university/industry participation in the program—an issue we face in Virginia.

The third recommendation would continue to allow large firm participation in ATP joint ventures. We support this as long as there is consideration for participation by small businesses. Small businesses can benefit from the resources and infrastructure of their larger partners, and several of the existing projects in Virginia represent these sorts of partnerships. While the argument is often made that large firms can well afford to undertake this research on their own dollar, they do, in fact, contribute funding to the research. Further, ATP funding allows the firm to expand its research horizon beyond the immediate concerns of its bottom line or allows specific researchers within the large organization to explore a line of research that would not normally be considered core to existing business functions. CIT has undertaken similar projects with large Virginia companies in addition to our mainstay work with small companies, and the resulting jobs, additional revenues resulting in additional taxes paid, cost savings to the company or their renewed commitment to remaining in the state has given us substantial return on these investments.

The fourth recommendation would require royalties on government investments in profitable ATP ventures. We do not support this because we have found the approach does not work well, and it sets up a contentious relationship, as the funding organization also becomes a bill collector. Virginia has tried several versions of payback, and we are about to abandon our own royalty-based program and replace them with new arrangements. Especially when funding early stage research that is not always directly traceable from the product and commercial stage, we have found the payback generates more heat than cash.

We also believe that with “recoupment” as a goal, ATP program managers would have far less incentive to invest in the highest risk projects, effectively transforming them into government-sponsored venture capitalists.

The fifth recommendation specifies that ATP would only fund projects that support removal of scientific or technological barriers to development. We support this approach *instead of* recommendation number 4. This language provides additional shoring up of the program’s intent, as we understand it, but doing this works directly against recoupment, since it ensures earlier stage research.

The report’s final recommendation would change the ATP Project Review and Evaluation Process. We have no comment on this. We have not heard or experienced anything to warrant changing the existing system, and we understand that using federal experts for the review ensures recourse for non-adherence to confidentiality agreements, but we use outside experts to review proposals from time to time and we would recommend leaving it to the ATP management to decide how to proceed.

Some additional comments:

Most federal (and state) programs would benefit from additional marketing in order to expand the pool of potential applicants. State entities—such as CIT—can help the program in these endeavors. We have existing relationships with a number of potential ATP clients. We recommend improving the mechanisms for working with state entities in spreading the word on the program, training potential applicants how to participate in the proposal process and potentially even evaluating proposals, if outside review is an avenue chosen by the ATP management.

We strongly support ongoing funding for this program, and this point was also made in a March 19th presentation to Virginia’s Congressional Delegation by the Virginia Research and Technology Advisory Commission. Our state entities support the program. Our companies and to some extent, our universities have benefited from the program. We support 5 of the 6 reforms proposed in the Evans report. We are troubled by the “recoupment” recommendation. We hope you will take my comments into consideration when considering the report. Thank you for your time.

The CHAIRMAN. Thank you very much.
Dr. Branscomb.

**STATEMENT OF LEWIS M. BRANSCOMB, Ph.D.,
PROFESSOR, HARVARD UNIVERSITY**

Dr. BRANSCOMB. Senator, as a former Director of the National Bureau of Standards, I had the pleasure of creating the laboratory that just won the two Nobel Prizes, and my pride in the National Bureau of Standards and NIST is great. It is a fine technical community and it is entirely appropriate that the ATP program should be rooted in its technical excellence. It is a technical program and we are grateful to you for your leadership in creating it.

I am going to respond quickly to the six recommendations made by the Department of Commerce. I do it on the basis of research that I have been doing for two years. The research is funded by ATP. You probably know that ATP has a small economic analysis unit independent of the actual project part of the operation, and I am pleased at their interest in our studies done collaboratively with an economist, Dr. Philip Auerswald.

We have in fact just completed the last two years of work tracing the sources of risk money for this invention-to-innovation transition, which is what ATP provides. While this is still under review by ATP and by our advisory committee, I have two copies of this available for your staff because I know you are actively considering it and I have been given permission to share that with you.

Let me turn immediately to the proposed reforms from the Department. I certainly support the first two related to universities. In particular, I know a number of universities that have told me that they just cannot see how they can participate if they are not

even allowed to negotiate with the companies in their consortium the intellectual property rights for the work done by their own people in the university. That seems like a no-brainer to me.

The issue of whether the university should play a lead role in the consortium, that just seems to me a practical issue. We are talking here about high-risk, very advanced technology. The universities are increasingly interested in going beyond just the basic research limits, which the government funds very generously, to do the sort of reduction to practice of the technology. A lot of this is done in engineering schools, and that kind of technology, practical but intellectually demanding work that the universities do is in many cases more sophisticated than what the companies can do, but much of the same kind.

So the collaboration is very logical, and I see no reason why, if the university assembles a group of companies for a project, that is any less desirable than a company assembling a university and several colleagues. The criteria for the award should not be influenced by whether a university had the talent and the leadership to put the program together.

With respect to the third proposal on the large companies, I listened to Senator McCain. I have heard that same reaction from lots of folks. I think that is a political reality. I do not believe that constraining the big companies would damage the program much, but I have to tell you that in the research we have done, we did four very detailed case studies of ATP awards or programs that involved, among other things, an ATP award. One of them was in fact a General Electric program, how they went about developing amorphous semiconductors and applying them ultimately to medical instruments.

I can respond to questions later about why I think that would not have been done without government funding of a variety of kinds, even though GE was a very rich company and even though Mr. Welch took a personal interest at one point in trying to keep this project alive when there was no market for it.

Let me skip to the third proposed reform, which is that ATP funding not fund product development but stay at the early stage, just beyond the invention stage, the reduction to practice stage. That is certainly right. That is what ATP does already. That is what I think your law says they should do, and so I see no problem in saying it again, and I will come back to that in just a second.

The fifth proposal says that the ATP people in their evaluation process—the sixth one, I am sorry—should look to experts from outside to a greater degree, and it mentions venture capitalists. I believe that is a wise thing to do, but the people they should talk to are the angel investors, not the venture capitalists. There are very few venture capitalists that do this very early stage seed investment. Venture capitalists are in the business of buying companies cheap and selling them high. Of course they like to buy technology companies cheap and sell them high because they typically have, may have, very rapid growth.

But that is very different from what angel investors do, who have been there, done that, and are looking—and cashed out—and are looking for bright young entrepreneurs who want to do it again. They offer not only money, but advice and entry into the network

that makes it all go. I am sure those folks can be very helpful to NIST providing can figure out how to protect the proprietary information of the companies, which they of course do and they are authorized to do under the law.

Having said that, let me return to the controversial recommendation for reform, which is the recapture. I have exactly the same arguments against it as you do, and that is this is a technology program and this would provide a very perverse incentive to the ATP managers. They would be driven to in fact invest in product development or even in manufacturing if they can get away with it, because the have got to get the money back somehow by recapturing profits.

If in fact ATP does what you have told them to do and what the Commerce Department tells them to do in their reform number five, and that is invest only in the technology and stop before they get to product development, and the company does the product development, then you are asking the company to pay the government a royalty on the money they spent on the product.

In fact, I do not even know exactly how the company would know which product actually benefited how much from the R&D that they did with the government. So it seems to me very difficult to administer and it drives the ATP management to do the wrong things.

Thank you.

[The prepared statement of Dr. Branscomb follows:]

PREPARED STATEMENT OF LEWIS M. BRANSCOMB, PH.D.,
PROFESSOR, HARVARD UNIVERSITY

I am pleased to have the opportunity to provide to this committee my views on the ATP program in general, and my observations on the evaluation of the program and recommendations for reform from the Secretary of Commerce in particular. Let me first address the recommendations from the Secretary of Commerce. I will follow with the reasoning behind my conclusions, which is based in part on research Dr. Philip Auerswald and I have conducted on the transition from inventions to innovations in the US economy.

I applaud the Commerce Department's report on ATP. They came to reasoned and well-supported conclusions that should go a long way toward ending the debate, often conducted along ideological lines, over the program's future. Secretary Evans and Deputy Secretary Bodman concluded that ATP is a useful policy tool for accelerating science-based innovation in our economy. They proposed six reforms, which I paraphrase for brevity.

1. Universities should be able to lead ATP consortium projects.
2. Universities should be able to negotiate patent rights with firms.
3. Large firms should be eligible for ATP funding only in consortia.
4. ATP should recoup profits by a 5 percent royalty.
5. ATP should fund only technology prior to product development.
6. ATP should improve its evaluation process with inputs from venture capital experts and other such sources of information.

I strongly support the first two of these recommendations, which would clarify the important role that universities already play in ATP and would remove one serious and unnecessary impediment to intensified university participation in ATP-supported projects: the denial of university access to intellectual property that results from their work with a firm or firms in an ATP program. I have heard from a number of senior research officers of universities that such denial of their legitimate rights to the fruits of their work—in contradiction to the intentions of the Bayh-Dole Act—caused them to decline to participate in any ATP consortium. The DOC wisely would have the Congress leave the negotiation of intellectual property rights to the parties directly involved—the firm(s) and the university. I urge the Congress to make whatever legislative adjustments are required to enact this change, and fur-

ther to allow a University to be the lead party in a consortium if such an arrangement is agreeable to all involved parties.

The third proposed reform would permit large firms to participate in ATP projects only when part of a consortium including smaller firms. I see this change as primarily responsive to the understandable political objection concerning grants going to firms with deep pockets. Examples exist in which an ATP grant to a large firm was, in our view, fully justified. We have studied in detail one such case involving GE. However, I do not believe this change would materially reduce the effectiveness of ATP, and it has the benefit of eliminating one point of contention regarding the program.

Let me now skip to the last two proposed reforms, before returning to the fourth pertaining to recoupment.

The fifth proposed reform, which limits ATP funding to projects that have not yet reached the product development stage, represents a reiteration of the rules already governing the program. This principle is certainly correct. ATP is a research and development program focused on early stage technology development. The only difficulty I see here is that the rule as stated will have to be interpreted properly. Policy debates usually characterize early stage technology development as a linear process that begins with a workbench model and ends successfully with the development, production, and marketing of a commercially viable product. In reality the process is often iterative. The first product may be unsuccessful, but by producing it the firm learns enough about customer needs and reactions to create another that is successful. With a breakthrough technology, the process of trying to develop an entirely new market may take years, with many stops and shifts in direction. This fifth proposed reform should be interpreted as focusing ATP funds on technology R&D in order to determine product specifications, production processes and costs of a developed product, but requiring projects to rely on private funds for the actual product development when such information is in hand. The possibility that a prior product of perhaps marginal success had been designed by a firm (with its own funds) should not disqualify the firm from submitting an ATP proposal for technology project that remedies prior problems with the technology, covers new technical ground and leads to other, more successful products that may follow.

Finally (reform 6) the DOC would have ATP improve the evaluation process with inputs from experienced venture capitalists and other sources. This is sensible advice, but I would suggest that only a small number of VC firms are experienced at evaluating technology based projects in early stages of development. A richer source of that talent is found among individual private equity investors, commonly known as “angel” investors—for example members of Silicon Valley’s Band of Angels and similar groups elsewhere. These experienced innovator-investors could indeed be of great help to ATP if protection of applicant firm’s proprietary information can be assured.

Let me now turn to the one reform (no. 4) to which I take exception: the proposal to recoup profits accruing to ATP supported projects by a capped royalty of 5 percent. While this proposal appeals to an intuitive sense of fairness, it is deeply problematic in at least two respects.

Firstly, to the extent that such recoupment might become a primary mechanism by which ATP was funded, it would introduce a perverse incentive into the ATP project selection process. In order to ensure ongoing funding, project managers would be motivated to pick projects that are close to product development. In this sense, proposed reform number 4 works against the spirit of proposed reform number 5. In effect it pushes ATP to act as if it were a “public venture capital” business, despite the fact that the program (correctly) lacks the ability to use many of the management tools that VC firms routinely use to manage their risks—staged investments, the taking of positions on the firm’s board, acting to replace the CEO when necessary, etc. As the 5th and 6th proposals from the Secretary of Commerce suggest, the proper role of a Federal technology program such as ATP is in the support of nascent firms and projects—more the domain of the Angel investor than of the venture capital firm. Popular press accounts notwithstanding, venture capital firms are not in the R&D business. Rather, they are in the business of earning maximal returns to their investors by buying firms low and selling them high. Venture capitalists do indeed back high-growth, new ventures. In many cases, though not the majority, they support firms that are bringing radical new technologies to market. However, even when venture capitalists do support technology-based enterprises, they prefer to support ones that have at least proceeded beyond the product development stage. For all of these reasons, I do not believe the “public venture capital” model is a good one for ATP.

A second problem with the recoupment proposal concerns the challenge of computing the royalty. In my view, this would be a daunting task. If royalties are based

on the profits generated by a product, what product shall be associated with the ATP R&D? Reform 5 says ATP stops before the product development phase begins. In essence, the recoupment would be on profits derived from the *firm's* investment in product development and manufacturing, not on ATP's R&D investment.

Let me conclude this part of my testimony with an observation based on my 50 years of experience with the Department of Commerce, beginning when I first went to work there in 1951. In my view, the Department of Commerce has today, with the appointments made in the last year, the strongest leadership team for understanding the role of innovation in our economy that it has ever had. We are fortunate to have a Secretary of Commerce who is trained in engineering; a Deputy Secretary who led one of America's most innovative firms and understands the world of industrial research and of capital investment in high tech industry; an Undersecretary, now also Chief of Staff, who is also experienced in the high tech world; and an exceptionally gifted and well qualified director of NIST, Dr. Arden Bement. The committee can place its confidence in Dr. Bement and the senior members of the department with whom he works. With support from the President and Congress, NIST can fulfill its promise as the one laboratory in government that truly understands the world of research and innovation in support of a strong, knowledge-based economy.

Let me turn now to a brief background discussion of the process of technological innovation in the United States that will support my previous observations regarding the reforms to ATP proposed by the Secretary of Commerce.

The transition from invention to innovation plays a very important role in our economy, and is unlike the pursuit of business growth in an established, competitive environment, or the performance of research in the pursuit of knowledge. For new product ideas to create new markets requires entrepreneurship, science and engineering imagination, cross-cultural trust, dreams of riches and willingness to risk failure. My coauthor, Dr. Philip Auerswald, and I have explored the risks faced by scientists and inventors with dreams of a new product or a new business; the risks faced by an entrepreneur trying to bring that dream to commercial fruition; and the risks faced by investors who put their own money—or other people's money—into a nascent technology-based venture with inherently and irreducibly uncertain prospects.¹ More recently we have completed a study for NIST tracking the sources and flows of risk capital that are available to high tech entrepreneurs to create commercially promising innovations. This work is now being reviewed by NIST, and I expect it to be published in the next couple of months.

I can share with the committee a few of the most important things we have learned:

- Entrepreneurs and private equity investors alike consistently state that there exists a financial “gap” facing early stage technology ventures seeking funding in amounts ranging roughly from \$200K to \$2 million. Entrepreneurs report a dearth of funding sources for technology projects that no longer count as basic research (and perhaps eligible for federal science funding) but are not yet far enough along to form the basis for a business plan (which could attract the typical \$7 million in venture capital funding). At the same time, venture capital firms and other investors are sitting on record sums, with over \$70 billion still undisbursed from funds raised during the boom years.

We should not be surprised by this. Whenever outcomes of investment are uncertain, social and private benefits diverge, and/or products are indivisible, we can no longer expect competition to yield efficient outcomes—a theorem that comes not from “New Economy” prophets, but rather from a classic analysis of inventive activity published four decades ago by Nobel Laureate Kenneth Arrow. Clearly, early stage technology development involves uncertainty, imperfect ability to capture full benefits, and indivisibilities. Whether or not efficient markets exist on Wall Street may be an open question. However, *efficient markets do not exist for allocating risk capital to early stage technology ventures.*

- The primary sources of funding for early stage technology development are not venture capital firms, as many people believe. Nor are they state governments or universities. The leading sources of support for the conversion of inventions to innovations are the “angel” investors to whom I referred earlier; large corporations still willing in the current highly competitive global economy to support promising technologies outside of their core business; and government programs like ATP and SBIR.

¹(See L M. Branscomb and Philip Auerswald, *Taking Technical Risks: How Innovators, Executives, and Investors Manage High Tech Risks* (Cambridge MA: MIT Press, 2001)

- Angel investors are especially important, not only because their investments in early stage technology development far outpace those by venture capitalists, but because the best of the Angels are themselves successful entrepreneurs who made their millions, cashed out and now look for promising images of themselves. They are more than sources of money; they are mentors who help newly minted entrepreneurs get access to the networks of trust that make Route 128 in Boston and Silicon Valley in California such a fertile ground for new ventures.

These findings lead me to four observations:

- The financial gap is real, but, as noted above, it reflects a gap in information, in networks of trust, and in the experience to perform the “due diligence” required by any investor. It follows that the government should not attempt to become a public venture capitalist. I am in full agreement with Josh Lerner of Harvard Business School, Richard Florida at Carnegie Mellon, and others on this point. But the government should selectively identify entrepreneurs with promising technical ideas and share with them the risks of reducing these ideas to practice in the context of a promising commercial market. This is what ATP does; and it does it well.
- ATP should therefore focus on its role as an R&D program (as the DOC’s 5th reform proposal requires), and take every opportunity to leverage the most important sources of radical, interesting technical ideas. The research universities have shown themselves to be rich sources of those ideas and their ability to help ATP achieve its goals should not be needlessly limited.
- ATP’s performance consequently should be evaluated by its success at identifying and nurturing—in partnership with innovative firms—promising new technologies capable of building a foundation for economic growth. The goal is, of course, to create jobs and wealth for Americans. But that is the ultimate, not the immediate, goal of the program. Indeed it is often the case that a R&D project that fails in terms of *ex post* objectives nonetheless yields extremely useful technical insights that translate into economic rewards as subsequent projects profit from earlier learning.
- ATP has now over a decade of experience. It has been the subject of extensive, impartial, and thorough reviews by a wide variety of leading scholars. Now the Department of Commerce has concluded that it is a useful program. Although much is still being learned about the nature and risks of high tech innovation, I believe that it is time to stop treating ATP as an experiment. Instead, it is time to promote continued prosperity and future economic security in the United States by funding the program at a level appropriate to its important mission. One guide to identifying such level is to analyze the relative resources available to ATP and SBIR, in comparison with their relative documented effectiveness in achieving critical national goals. I believe ATP is the more effective program of the two, and thus that it should be funded at a level closer to that of the SBIR program.

Finally let me note that this Committee might want to explore the potential role of ATP in the S&T component of the nation’s counterterrorism effort. I am co-chair with Richard Klausner of a project of the Academies of Science and of Engineering and of the Institute of Medicine to explore the role of S&T in counterterrorism. Our report is on schedule to be released in early June. I believe that report will make evident the kind of role ATP could play in this context, based on the diverse forms of innovation that are needed from the private sector in partnership with the public sector. When our Academies’ study is complete, I would be happy to explore this idea further.

Finally I want to acknowledge and thank Dr. Philip Auerswald and Brian K. Min for their contributions to the preparation of this testimony.

Thank you.

The CHAIRMAN. Oh, boy. You answered all of my questions.
Mr. Donnelly.

**STATEMENT OF SCOTT DONNELLY, SENIOR VICE
PRESIDENT FOR GLOBAL RESEARCH, GENERAL
ELECTRIC COMPANY**

Mr. DONNELLY. Thank you, Mr. Chairman, Senator Allen. In fact, he has given my testimony, so I will briefly summarize it.

GE, certainly we are appearing on behalf of support of the NIST ATP programs. We have had the opportunity over the last few years since the inception of the program to participate in a number of technologies that are certainly very early on in their technical life cycle, just coming out of basic research, in areas as widely ranging as health care, generation of electricity, and the consumption of electricity.

ATP for us has generated I think a unique environment that encourages collaboration between universities and academic settings, the government, as well as private sector businesses such as ourselves, as well as other large and small companies alike.

The nature of the program has been very supportive in terms of providing some funding for very early things. We look primarily at the role and responsibility of academia and nonprofit institutions to do the basic research. We obviously spend most of our research money in the adaptation of that technology and turning that to commercially beneficial products and services.

The nature of most of the programs funded under the ATP is such that these technologies are probably at least a decade from having a commercial revenue stream. So even though they may be large companies involved in the program, we still have a responsibility on the financial side to our shareholders, and we recognize that these programs, of which we actually cost-share a great deal of the funding, that these are not technologies that are going to show up as commercial benefit for some number of time.

I would also like to address the various reforms that have been proposed by the Department of Commerce. I have the exact same view as the others in terms of university involvement. In fact, we have had several universities participate as part of our AT programs. These universities bring that ability and in many cases the researchers who have participated in the basic research, and it is quite logical for them to participate as part of these program teams to make sure that we are efficient in how we take that basic research and demonstrate its feasibility for the commercial sector.

As to the issue of leadership, I see no reason why a university should not be able to lead one of these. I think it is simply a practical matter that any team should decide whether it is more appropriate for the university or the private sector to be responsible for the program in total. I feel the same about the intellectual property. That should be a fair and reasonable negotiation between all parties and no one should be exempted from that.

In terms of large firm participation, I think large firms actually bring a different perspective and a lot of value to add to an AT program. Companies like ourselves are actually quite good at understanding very early technology and providing requirements and feedback to universities and small companies on how that technology should be developed to make sure that it is going to hit the mark once it gets to the marketplace.

So in that regard, certainly I think exempting large firms would deny the program the opportunity to have participants who in fact have proven to be very adept and successful at that translation of technology in the past.

Most of our programs have been ventures where we have been teamed with other companies in academia. Over 80 percent of

those have been the case in fact. We certainly have no objection whatsoever in sort of a mandate that would require a large firm not to go it alone, but to have partners in either small companies or academia, as that has been our practice in general.

At the risk of piling on in terms of this issue of royalties, I see this as a very, very difficult topic. We work with universities. Negotiating and funding collaborations and trying to understand royalty payoffs and how those things would work in very early basic research, these are very, very difficult to do. The nature of these technologies—and in fact the later reform suggesting that these technologies and funds should only be used for that translation of basic research to validation would in my mind make it virtually impossible to go back and assign a value or understand where you apply that 5 percent and whose revenue would be extremely challenging.

In fact, most of these technologies—a company like ourselves could spend \$100 million in bringing a product to market and it could be that 5 years earlier a million dollars of NIST ATP money was spent. To try to assign a 5 percent royalty or any value to that would be extremely difficult and frankly, I think, beyond the philosophical opposition, an administrative nightmare to try to ascertain where to assess that royalty stream.

The last in terms of project review and evaluation I think is quite logical. It has been, I think, frankly a very fair evaluation process. There are some great people that work on evaluating these proposals and programs, and to the extent they would look for more industrial participation or for other agencies we are fully in support of that. I think it has actually been a very well-run and very well administratively applied evaluation process.

So with that, I want to thank you.

[The prepared statement of Mr. Donnelly follows:]

PREPARED STATEMENT OF SCOTT DONNELLY, SENIOR VICE PRESIDENT FOR GLOBAL RESEARCH, GENERAL ELECTRIC COMPANY

Thank you Mr. Chairman and Members of the Commerce Committee:

My name is Scott Donnelly and I am the Senior Vice President for Global Research for the General Electric Company. I am appearing today on behalf of GE to express my full support for the National Institute of Standards and Technology (NIST) Advanced Technology Program (ATP).

There is no better time to focus on strengthening technology leadership in the U.S. through collaboration among U.S. businesses, universities and government organizations. The NIST ATP is the best example of this type of collaboration in meeting our nation's competitive challenges and technology needs.

In the past several years, world-wide technology and innovation has exploded. This creates a large demand for the innovation process to have significantly more speed than just a few years ago. The NIST ATPs addresses this important factor, and excels at bringing technology to market very quickly.

We believe that when the government identifies areas of social and economic need that are strategic for the nation as a whole—but is highly risky for short-term commercial return—then joint government-industry collaboration makes sense. By sharing risks between government, universities and the private sector, U.S. Industry is able to take more chances, which results in breakthrough technologies that wouldn't have been viable for any of the three to try it alone. Successful examples of NIST ATPs where GE has participated range from new technologies aimed at improved health care through medical diagnostics, to highly efficient energy sources, to next-generation lighting.

The NIST ATP is not the only government program to share risks between the public and private sectors, but we believe it is the best program of its kind because:

- It focuses on industry- and market-driven programs that are selected based on merit;
- It has successfully stimulated customer, manufacturer and supplier alliances aimed at accelerating time to market;
- It employs a rigorously open, competitive process with market and economic impact factored into the selection criteria;
- Demonstrated willingness to work with industry to structure mutually acceptable terms and conditions (i.e. minimize cost accounting burdens and establish realistic intellectual property terms);
- NIST has assigned competent Technical Program Managers to add value to the industry-led programs;
- To measure performance, NIST has established metrics of evaluation to assess the success of the programs, as well as the return on investment by all parties.

I would like to address the proposed rule changes for NIST ATPs proposed by the Department of Commerce, but first, let me begin with a brief overview of our company so you can have an understanding of how our research and technology fits into our company.

GE is a diversified technology, manufacturing and services company with a commitment to achieving technology leadership in each of its key businesses, including:

- Aircraft Engines
- Appliances
- Capital Services
- Industrial Services
- Lighting
- Medical Services
- NBC
- Plastics
- Power Systems
- Specialty Materials
- Transportation Systems

GE Global Research is the cornerstone of research and development for GE. From our beginning more than 100 years ago, we have been and continue to be one of the most diversified industrial laboratories in the world. We have more than 2,100 technologists representing the full spectrum of scientific disciplines with more than 750 PhDs.

Now I would like to share our thoughts on all of the proposed reforms for NIST ATPs:

Reform #1: University Leadership of ATP Joint Ventures

GE supports this proposal. We have partnered with numerous universities for NIST ATPs, and we understand with the benefits and capabilities that university research partners add to the programs. Not only do academic research partners bring new ideas into a company's research programs, they are also a source for our future workforce. All funding that is committed to universities is ultimately educating future scientists.

It is important that administration recognized that there is increased value when universities and companies work together, rather than either working in a vacuum.

Reform #2: University and other Non-Profit Organization Ownership of ATP-Funded Patents

GE supports the rights to intellectual property (IP) for those who make inventions and discoveries. Universities and non-profits should have the ability to negotiate IP terms when collaborating with companies and other research partners.

Reform #3: Retain Large-Firm Participation in ATP Joint Ventures

GE supports this proposal as this is a common practice for GE. We have partnered in 83 percent of NIST ATPs in which we participate. We see this proposed reform as a positive contribution to the program that will allow large corporations like GE to offer commercialization and technology expertise to small- and medium-sized companies and universities that don't typically have this type of experience. We have found this approach successful, because some of our small company partners have been suppliers and other business affiliates that strengthens our relationships and creates a win-win situation for all involved.

Reform #4: Royalties on Government Investments in Profitable ATP Ventures

This proposed reform would modify ATP statute to require recipients of ATP awards to pay an annual royalty to the federal government of five percent of any gross revenues derived from a product or invention supported by or created as a result of ATP funding. It is intended that these royalties would be “reinvested” in the ATP.

We are concerned that this rule change introducing “recoupment” as a means to stabilize NIST ATP funding will render the program ineffective in stimulating the development of high-risk technology with real commercial potential.

One of the primary goals of the NIST ATP programs have experienced successes in bridging the gap between basic technology research and market implementation. The recoupment clause may erode participation from companies, which would remove their valuable cost share funding, commercialization, technical expertise that complements and often enables smaller sized companies’ participation in NIST ATP.

NIST ATP funding represents a very small portion of a research organization’s total R&D spending. To use GE as an example, in 2002 we will receive about \$4.4 million in NIST funding, which was two-tenths of one percent of our company’s total R&D budget. These funds are not going to further product development for GE. We use these funds to help our customers, suppliers and research partners with technology breakthroughs that they could not accomplish alone.

Secondly, the recoupment is based on 5 percent of gross revenue, which raises many serious issues. How would the Department of Commerce calculate the “government royalty” for an ATP. Often an ATP is focused on a specific, high-risk technical hurdle associated with a key component, process or subsystem. This component is then part of a larger system. The component may only be a small percentage of the total system cost. How could anyone agree on a fair and consistent formula to calculate the royalty fee owed to the government? This creates an administrative nightmare and adds additional expenses that would take away funding from the research programs.

In addition, to calculate the royalty on “gross revenues” would place undue pressures on industry to pay the government even if they are not making a profit. This would be difficult for GE, but it would be devastating for the smaller firms.

Reform #5: Ensuring that ATP Funding is Used Only to Support Removal of Scientific or Technological Barriers to Product Development

GE supports this proposal. In our company NIST ATPs are part of our Global Research labs, not the GE businesses. Research funded by NIST should be aimed at taking basic research and validating it, not product development or marketing.

In fact, this supports my previous point regarding recoupment. It would be practically impossible to correlate validation of scientific research with profits generated from specific products or services.

Reform #6: ATP Project Review and Evaluation Process

GE supports this proposal and fully supports the peer review process. Enhanced assessment of technologies supported in the private sector would add value to the process and lessen the chance of duplication of effort.

In conclusion, we would like to emphasize that NIST ATPs are highly valuable—not only because they meet national priorities and industry needs with the right sense of urgency—but they also allow GE to form strong R&D partnerships and mentoring relationships with smaller businesses that wouldn’t typically have the resources to participate in such high-risk technology development. NIST ATPs have GE’s full support, and we thank the Chairman and this Committee for their commitment to ATP. We applaud the administration’s efforts to address concerns and improve the program, and we appreciate the opportunity to provide input into the process.

I thank you, Mr. Chairman, for the opportunity to testify today and I welcome any questions.

The CHAIRMAN. I cannot thank this panel enough, because your presentation is outstanding. I was arguing with the staff about recoupment and they were trying to explain to me the position of the administration and I still could not understand it. I am glad to see you three cannot either.

Dr. Bement, that is no reflection on you, sir. We appreciate your leadership. He is our Director of NIST and we are proud of him. He is working hard, and we are glad he is here.

I just got briefed, Senator Allen, by a group back from China. I have been there in 1976, 1986, 1996, last year. What we have got going on in the Middle East is nothing compared to making friends and making sure we have a positive influence there in China, because a billion 300 million—there are just not as many Americans as there are Chinese and the only way we are going to survive is the superiority of our technology.

These three folks there are leading the way for that, and NIST and ATP is leading the way. That is, our first line of defense and security is technology. Secretary Rumsfeld understands that.

Ms. Armstrong, I am jealous. I will never forget sending my man up to Richmond, Virginia, for Governor Albertus Harrison. We had a red hot industrial development. Now I see what Governor Allen and you have got there. Every time I go to Dulles Air Base I say, how stupid I could have been. You folks are way ahead of anybody else—Research Triangle and anything else. I mean, it is outstanding and we commend you on your leadership and what you are doing out there. That is very good. I appreciate it.

Senator Allen.

Senator ALLEN. Thank you, Mr. Chairman. Thank you for your compliments of Virginia. As Governor I was envious of South Carolina and what you had done there as a State. In fact, the person I selected to head up our economic development effort was there, had been there with Carol Campbell, Wayne Sterling. We put together a good team, and South Carolina has done a great job.

I agree very much with your views as far as how Americans will compete and succeed in the future. We have to have the right policies here in this country—good science-based regulations, good probusiness tax policy, investment in research. The key will be knowledge and having the best, most knowledgeable individuals who have a good work ethic, but are innovative in improving our lives. That is how we will have better quality in our manufacturing, communications, and all aspects of our economy.

I would like to ask Ms. Armstrong the follow-up questions. You mentioned the universities, and I will not try to explain what the logic of the recoupment aspect is. I am sure it is the logic of keep using those funds to fund others in the future. I would guess that is the logic of it. But I think as a practical matter these three witnesses have shown the practicality of it and probably or possibly an improper incentive or factor to put into the calculations or determination as to who does receive ATP funding.

Regardless of that, on the universities aspect of this, especially with the CIT, when I was Governor the CIT was under the Secretary of Education. I moved it to Commerce and Trade because I wanted it to be job-oriented, not that the universities and education is not important. Subsequently, with the creation of a Secretary of Technology, logically it was put into that secretariat.

Now, the issue on the universities aspect of this. Universities in some cases, not all cases, can be useful partners and they have their own patent, intellectual property efforts, their patent and trademark, so to speak, offices there.

Now, one of the reforms focused on here is to allow greater university participation in the ATP program. Now, according—and it may not be right but according to the National Research Council report last year, it said: “176 universities have been involved in the program, participating in over half, 56 professional, of the programs 522 projects.”

Now supposedly there is a thread in here that there is some sort of barrier to university participation in ATP. So I would ask you, Ms. Armstrong or if Mr. Donnelly or Dr. Branscomb would want to join in, what are the existing barriers to universities’ participation?

Ms. ARMSTRONG. I will take a stab at it. In Virginia the universities own, hold their IP and they license it, and there is the perception that in the ATP program that the results of the research must be owned by the company. So we have an administrative barrier. There have been some ways around it, which is how we have managed to have universities participate. But I believe that it is a specific Virginia rule, which a lot of other States have as a result of some of the Bayh–Dole regulations. There are some States that have changed those regulations—I believe Arizona is one of them—and have made the licensing of the IP that is developed in the universities much more available and allow the companies to own it.

Senator ALLEN. Dr. Branscomb?

Dr. BRANSCOMB. I cannot speak to Arizona law. But on the issue, I know that—and I talked to the vice president for research at Cornell, who is very concerned about this particular element. He says there is no way Cornell can participate if they put their faculty into the program and they invent stuff and then they do not own the invention and they are not even allowed to negotiate with their countries partners what the ownership will be.

It seems to me that the right answer is to get the Federal Government out of the particular debate and leave it up to the companies and the university to work it out. If they cannot work it out, they probably are not ready to work together anyway.

The other issue—and I am delighted that you pointed out, Senator Allen, that half of these ATP programs already have universities involved in them. My understanding of what sometimes happens is there is a university, there are companies in the same city, they talk to each other, the people in the same areas, the engineers and the industry people. They are talking about interesting technologies. They know something about what everybody is doing, and the idea comes up, let us think about doing something together.

I think very often the university people actually sit down and work out what the technical strategy might be, then the company picks it up and puts it in a proposal that includes the university. All this particular reform does as far as I can see is a fairly simple and in some sense purely administrative thing, which is to say if a university is thought to be by the companies the right group, has the right person, the right leader there ready to put the consortium together and work out, negotiate the details, why not let that happen.

It does not change anything as far as I can see in either the criteria for deciding whether they get an ATP award nor does it change anything on the expectations that the Congress and the government are entitled to have for what the outcomes would be.

It is a question of not forcing the university to pretend it did not ghostwrite the proposal, which I think sometimes they actually do.

Senator ALLEN. So you would support this aspect of the proposal?

Dr. BRANSCOMB. Sure. I am not at all afraid of—maybe the NIST will get accused of pork by letting universities in. My understanding is the company is pretty good at pork, too, and I do not think NIST is ever good at pork. I have never seen NIST do a piece of pork. In fact, I think the reason they have trouble selling the ATP program politically is they have leaned so far over backwards to make sure that there is no pork that they are not even willing to talk to politicians.

I at one time advocated putting the headquarters office for ATP down in the Commerce Building so that Mary Goode could teach them how to talk to politicians. Now I think we have got a really good team at NIST and in the Department and that is not necessary. But this is not a pork problem and it really is—these projects really are high tech projects. They really call for brainy people being involved. Not many companies have the depth of high-level competence technically that some of the better universities have in their midst.

Senator ALLEN. Thank you for explaining it. I assume that all three of you, including you, Ms. Armstrong—and that is why I asked you first, because before you were there, but nevertheless the CIT has been under these different secretariats. You all three would agree with the proposals from the Secretary of Commerce insofar as the universities aspects, right?

Mr. DONNELLY. Absolutely.

Ms. ARMSTRONG. Yes.

Dr. BRANSCOMB. It seems to me consistent also with the spirit of the Bayh–Dole Act, which goes back to 1980, and a huge amount of the technical revitalization of this country has come about through Bayh–Dole and the basic philosophies that it contains.

Senator ALLEN. Thank you. Thank you all.

Thank you, Mr. Chairman.

The CHAIRMAN. Dr. Branscomb is heading up the counterterrorism panel over at the National Academy of Sciences. A role for ATP now in homeland security; do you see a role? If any, what would that role be?

Dr. BRANSCOMB. I think that could be quite plausibly a role. Of course, we have not finished our study. We are shooting to get it out in early June. But we are certainly going to identify in that massive study a very large number of technologies that lie just over beyond what is now commercially reachable. Many of them will have the feature that, while everywhere we can for homeland security we will look for dual use technologies so there can be a commercial market to help make it available to the country for homeland security purposes, but I think it will be a feature of many of these homeland security projects that, number one, they need innovative companies to do the actual development; number two, there is a weak or questionable or unknown or in some cases nonexistent commercial market and there is a big public interest involved in them.

So it seems to me just, I do not see these programs as any different from other ATP projects. They will have the characteristic

of being very high tech, very early stage, markets yet not well identified, and requiring technical exploration, and in many cases involving the skills companies have.

So I look around the government, where do we have really good experience with public-private partnerships at doing things with industry that the country badly needs? This program looks to me like the one that has the best track record.

The CHAIRMAN. Very good. The appearance of each of you has been most valuable here this morning.

The record will stay open with respect to questions, and the Committee will be in recess until the call of the chair. Thank you very, very much.

[Whereupon, at 11:05 a.m., the Committee was adjourned.]

A P P E N D I X

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN MCCAIN TO HON. SAMUEL BODMAN

Question 1. The ATP program has consumed a tremendous amount of management time, not only of NIST's, but also the Department's. One of my concerns with the program is that other managerial areas of the laboratories are not receiving the proper attention. Congressman Udall and I wrote to the Secretary last year concerning the deteriorating conditions of the NIST laboratories in Boulder, Co. The Secretary responded to this letter stating that he would have the NIST update its facilities plan and that it would be provided to the Congress as soon as it is available. We have noticed that a report on proposed changes to the ATP program has been completed within that time frame.

a) Can you provide us with a date as to when we can expect to receive this updated facilities plan?

Answer. Elements of NIST's Boulder Construction Plan are reflected in the President's FY03 Budget submission to Congress. In particular, the budget requests \$11.8M for the first phase of a new Central Utility Plant (CUP) as well as \$5.5M for the installation of upgrades to the facilities' Primary Electrical Service.

The current Boulder renovation plan, subject to future budget priorities, is to renovate Building 1 (multiple wings), Building 2, and Building 4, phased in over a ten-year period.

Question 2. The Energy bill that is currently under consideration by the Senate contains a provision that allows NIST to hold a portion of the ATP competitions in thematic areas designed to develop and commercialize enabling technologies to address climate change. The bill also contains provisions for NIST to develop a program to support the implementation of new "green" technologies and techniques at the more than 351,000 small manufacturers.

a) What are your thoughts on these provisions?

Answer. Since the ATP provision was dropped from the version of the Energy Bill (S. 517), this response will not comment on that provision. Section 1364, titled Technology Development and Diffusion would give the Manufacturing Extension Partnership (MEP) the opportunity to increase the adoption of green technologies by small and medium sized manufacturers by helping them to overcome the technical issues associated with the insertion of these new technologies.

Currently, MEP provides small and medium sized manufacturers with technical assistance to improve their energy efficiency and reduce their impacts on the environment. This is important because manufacturers consume more than 25 percent of the natural gas used in the U.S., and they have been especially hard hit by the rising cost of energy. A few examples of MEP results include:

- Klune Industries of Spanish Forks, Utah, eliminated 1 million pounds of CO₂, 7,700 pounds of SO₂, and 3,300 pounds of NO_x, and conserved 600,000-kilowatt hours of electricity by converting to MEP's recommended lighting technology.
- In Maine, the NIST affiliate helped Naturally Potatoes, a small producer of potatoes, to conduct an energy audit and find ways to save nearly \$364,000 in annual energy costs.
- NIST's New York affiliate helped Akron Agway reduce energy costs 46 percent while slicing processing time by two thirds by introducing new drying oven technology to the company.
- MEP can also help companies meet the challenges of getting customer acceptance of new products, their performance, and associated price adjustments.

Aspects of an assistance program for "Green Manufacturing" could include:

—Developing and disseminating assessment tools to help companies conduct cost benefit analysis on different green technologies and existing capital equipment.

—Positioning MEP services in the marketplace to help educate technology development companies to produce products and services that are properly scaled to meet the demands of small and medium sized manufacturers.

—Helping small and medium sized manufacturers:

—Identify sources of funding to underwrite the cost of acquiring new capital equipment needed for the conversion to green technologies.

—Implement the conversion to green technologies including testing and production ramp-up.

—Identify and take advantage of the available tax relief and incentive programs.

—Train company employees in the use of green technologies including energy efficiency work practices.

—Develop and implement marketing strategies to gain customer acceptance of new products that may look and behave differently yet meet customers' functional requirement.

Question 3. Can you provide the fiscal year carryover balances for ATP for the past ten years?

Answer. The following are ATP's carryover balances for fiscal years 1990–2001.

FY	Carryover into following year
1990	\$9.3M
1991	\$35.4M
1992	\$42.4M
1993	\$49.2M
1994	\$168.1M
1995	\$136.4M
1996	\$41.7M
1997	\$15.1M
1998	\$33.1M
1999	\$67.7M
2000	\$50.4M
2001	\$31.1M

Question 4. The President's budget would cut federal funding to all MEP centers that have been in existence longer than 6 years. However, Congress eliminated this six-year limit in P.L. 105–309, Technology Administration Act of 1998. Were there any additional reasons for recommending this cut?

Answer. In making the decision regarding funding for MEP, the Administration had to weigh several factors. In times of war, tough budget choices must be made and this was one of those tough decisions, especially in light of MEP's success at delivering services to small and medium sized manufacturers. However, given the MEP centers' success in improving productivity and efficiency, we felt that increasing fees for service should be the direction in which the program heads. The benefits of seeking MEP assistance, such as improved productivity and efficiency, should outweigh the increased cost of the fees.

Question 5. The President has proposed elimination of the Partnership for a New Generation Vehicle program, which was a 10-year government/industry partnership for research on a light-duty-vehicle, and instead proposed his Freedom Car Initiative at the Department of Energy. Can you discuss whether the research that was being conducted under this program at the various agencies has been eliminated also?

Answer. Although there will be no multi-agency coordinated R&D program in the agencies after the termination of the PNGV Program, each agency participating in the PNGV is able to continue their R&D work as appropriate to their mission and budget guidance. We do not have specific project information for the other agencies. Within the DoC, NIST has 78 automotive related measurements and standards activities currently in process. Although many of these were never specifically directed to the PNGV roadmap requirements, all are high priority projects needed by the auto industry and the major suppliers.

b) Also, the Washington Post is reporting the prototype of a "one-liter Volkswagen" which gets 239 miles per gallon. How does this vehicle compare to the vehicle that was envisioned in the Partnership for a New Generation Vehicle program?

Answer. Volkswagen, AG has not released any details or specifications with respect to the vehicle we think is referenced in the Washington Post. The only information we can obtain is from a photo in the 4/22/02 Automotive News

which shows F. Piech and B. Pischetsrieder in a front-to-back configuration vehicle. This appears to be a very small, two seat, vehicle, which may have a 1-liter diesel in a hybrid powertrain. If this is the vehicle in question, it differs significantly from the mid-size, 5-passenger sedan used as the basis for the PNGV R&D roadmap plan. Without details of the vehicle body and powertrain, it is impossible to provide item-by-item comparisons.

Question 6. One reform advocated by the Administration is that recipients of ATP awards should pay an annual royalty of 5 percent of any gross revenue derived from the product up to 500 percent of the original funding received by the award recipient. Do you believe that this recoupment plan can be used as an initial step to turning ATP into a self-sufficient program?

Answer. The recoupment plan as proposed in "Reform with a Purpose" could be considered the initial step to turning ATP into a self-sufficient program. Under certain terms and conditions, and not in an effort to penalize success, it is fair and reasonable to require a direct repayment based on the initial Federal share if a company is profitable and nets considerable gains from a technology developed under ATP. As such, the financial returns that would stem from ATP projects could potentially transform ATP into a self-sustaining program and thus optimize Federal investment.

Question 7. The ATP program recently announced that Advanced Cell Technology Group had won an award for "Transdifferentiation of Adult Somatic Cells." Advanced Cell Technology Group has also announced their efforts in the cloning of humans. Can you elaborate what steps are being taken to ensure federal funding is not being used for human cloning activities at this company or any other ATP award recipients?

Answer. The ATP award to ACT will fund research using human somatic cells. Somatic cells are cells such as skin or liver cells, and are neither sperm nor eggs. The ACT award aims to use somatic cells to develop transdifferentiation technology that could ultimately lead to the production of replacement cells for patients suffering from diseases such as Parkinson's, Alzheimer's and diabetes.

Through its cooperative agreement, the ATP has imposed stringent award conditions on ACT that are designed to ensure that the award funds are solely used for transdifferentiation research involving human somatic cells. Included in these award conditions is a requirement that ACT demonstrate prior to the release of funds that its accounting system will adequately segregate and track ATP expenditures.

The Department of Commerce's Office of Inspector General has completed an independent survey of selected aspects of the ACT award and is completing work to ensure that ACT has policies and procedures in place that will allow its financial management systems to adequately segregate and track federal funds and comply with ATP's award conditions. In addition, high-level technical, administrative, and legal officials at the Department have reviewed the ACT award, and are satisfied that the award issued to ACT is in compliance with all Presidential policies, statutes, regulations, and guidelines for the use of human subjects in federally funded research.

In addition, the ATP Human and Animal Subjects Advisor has been assigned as a special regulatory and technical advisor to this award. In addition to his normal oversight duties, this individual will attend all meetings, and site visits with ACT and its subcontractors; review quarterly technical reports; review all business reports; review all correspondence involving ACT; ensure that ACT is in full compliance with Federal guidelines on the use of human and animal subjects in Federally funded research. Further this advisor will provide written quarterly progress reports to the ATP Director, senior ATP management, and the Project Management Team on ACT's technical progress and compliance with applicable Federal regulations.

As ATP and NIST monitor this award, we will continue to strengthen the oversight activities as warranted.

Question 8. The families of the victims of the September 11 terrorist attacks in New York and professional associations have requested that NIST study the technical causes of the World Trade Center collapse.

a) Do you believe that Congress should establish a specialized team that would be analogous to the National Transportation Safety Board, to investigate the collapse of large buildings?

Answer. At this time we are not prepared to comment on the need for a "specialized team" analogous to the NTSB to investigate the collapse of large buildings. NIST has put in place a very thorough response plan to the collapse of the World Trade Center Buildings. This plan is different from and responsive to the efforts of

the Building Performance Assessment Team, or BPAT, led by the American Society of Civil Engineers (ASCE) and sponsored by the Federal Emergency Management Agency, FEMA. The NIST response plan addresses all major recommendations contained in the BPAT report. NIST has also identified other critical issues that need study, especially in areas that impact life safety and engineering practice.

The NIST proposed response plan consists of three key program elements including an investigation to be conducted in parallel. These are:

- First, a 24-month *building and fire safety investigation* into the collapse of the Twin Towers (WTC 1 and 2) and WTC 7. The goal of this program element is to investigate the building construction, the materials used, and the technical conditions that combined to cause these disasters following the initial impact of the aircraft. While WTC 4, 5, and 6 will not be investigated specifically in this phase, what we learn in examining WTC 1, 2 and 7 would benefit buildings of all designs.
- Second, a multi-year *research and development (R&D) program* to provide the technical basis to support improved building and fire codes, standards, and practices. This program element addresses work in critical areas such as structural fire safety, prevention of progressive collapse, and equipment standards for first responders. It includes BPAT recommendations for WTC 3, 4, 5, and 6, Bankers Trust, and peripheral buildings as well as recommendations for future studies to address specific issues of broader scope not covered by the BPAT. The program outputs and recommendations will support the voluntary consensus process that is used to develop building and fire codes and standards in the United States.
- Third, an industry-led *dissemination and technical assistance program (DTAP)* that will provide practical guidance and tools to better prepare facility owners, contractors, designers, and emergency personnel to respond to future disasters. The DTAP will also be an important complement to the R&D effort to demonstrate and gain acceptance of proposed changes to practice, standards, and codes. This program element addresses BPAT recommendations for the training and education of stakeholders.

We have shared the overall response plan approach extensively with public and private sector organizations and have welcomed their inputs since the middle of October 2001. The plan was modified in January 2002 when FEMA requested NIST to initiate an investigation under NIST's unique legislative authorities to conduct structural and fire investigations. This request was in direct response to a growing demand for a broad-based federal investigation into the World Trade Center disaster from technical experts, industry leaders, and families of building occupants and first responders who lost their lives on September 11, 2001. We continue to revise the plan as more technical information becomes available and to be responsive to the suggestions and needs of these many stakeholders. We will continue to keep the Committee informed as we continue to update the investigation and response plan.

Question 9. Over the years the U.S. economy has become reliant upon a steady flow of technologies for continuous economic development. The U.S. government is investing over \$40 billion in civilian R&D. Can you update the Committee on the progress made on technology transfer at the federal laboratories?

Answer. Please refer to Question #13.

Question 10. As part of NIST investigation of the World Trade Center, you have mentioned the development of "intelligent" buildings. Can you elaborate on how such a system would work?

Answer. An "intelligent" building is one in which the automation and control systems used for environmental comfort control, fire detection, access control, lighting, and elevator control are integrated so that they can exchange information and interact with each other. This kind of integration is useful for energy management and to improve response to emergency situations. For example, the detection of a fire can cause changes in the ventilation system, lighting, elevator, and access control systems to aid evacuation of the building.

Intelligent building systems can also permit interaction between the building and outside service providers. In the future, these systems will be used to interact with utility providers to manage loads, provide a way for service companies to help the building owner maintain the facilities, and also to provide access to critical information about the building and its occupants to police, fire and others responding to an emergency in the building.

NIST's Building and Fire Research Laboratory (BFRL) has been working with industry for approximately fifteen years to develop communication standards and other technology that will enable widespread use of these integrated building systems. BFRL research also involves automated detection of faults in building control systems and other technologies that can take advantage of the information that can be available because of the integration. Today there are hundreds of thousands of building control products installed around the world that use technology based on BFRL's work in this area.

Question 11. With the growing demand for communication services and foreign competition in satellite launch services, what do you see as the future of the U.S. commercial launch industry?

Answer. Although there is a healthy demand for satellite-based telecommunications services, this demand has not translated into a dramatic increase in demand for launch services, due to several factors. First, the traditional geostationary orbit (GEO), fixed satellite services market has been satisfied by larger and more capable satellites, so that it has been possible to meet growing consumer demand without a significant increase in the overall number of satellites launched. Second, the satisfaction of demand for wireless services by terrestrially based systems has led to the financial troubles of several low earth orbit (LEO) satellite constellations which could have otherwise stimulated a large increase in demand for LEO satellite launch services.

Programs for development of new launch vehicles, such as EELV, had been predicated, at least in part, upon the expectation that there would in fact be a significant increase in launch services demand. Consequently, there is growing evidence of oversupply in the international launch services market, resulting in financial difficulties for U.S. launch providers.

Near-term commercial development of reusable space vehicles has also been adversely affected by the apparent overcapacity of launch services. However, if new reusable vehicles can eventually be developed in the U.S. to provide launch services with dramatically lower cost, higher safety/reliability, and greater capability, the U.S. launch industry could benefit in two important ways. First, U.S. providers utilizing these new vehicles would be highly competitive in the international marketplace. Second, new vehicles might enable development of large new markets that would greatly increase overall demand for launch services.

NASA's Space Launch Initiative represents a major effort to create new technologies that can be applied to development of reusable launch vehicles by early in the next decade, with commercial as well as government applications. One or more of the remaining private entrepreneurial reusable vehicle development efforts may succeed even earlier in producing commercially profitable orbital launch services. Finally, there may be considerable commercial promise in suborbital reusable vehicles under development both in the U.S. and elsewhere. Although suborbital vehicles would not travel to—or generally place payloads in—orbit, they might provide a near-term financial bridge between today's expendable launchers and tomorrow's orbital reusable vehicles. Commercial markets enabled by suborbital vehicles might provide at least some U.S. launch providers with revenues sufficient to sustain them during that period.

Question 12. The Technology Administration Act of 1998 created the Office of Space Commercialization within the Department of Commerce. NASA is currently pursuing a number of commercialization activities. Can you comment on any involvement that your Office of Space Commercialization has had with NASA on commercializing the International space Station?

Answer. The Office of Space Commercialization (OSC), which as you note in your question was authorized by Congress in 1998, is working with NASA in a number of areas, including commercialization of the International Space Station (ISS). As you are likely aware, the space policy of the Administration is handled in large part through the National Security Council- and Office of Science and Technology Policy-led Space Policy Coordinating Committee, often referred to as the Space PCC. Under that larger umbrella, the Office of Space Commercialization serves as a co-lead (along with representative from the Intelligence Community and from the Department of Defense) of a sub-team on commercial strategy. Although the primary focus of that sub-team has been commercial remote sensing, at the suggestion of OSC, the group's agenda also includes the issues of advertising, entertainment and tourism aboard the ISS.

OSC, both on its own and as a representative of other Commerce bureaus such as the International Trade Administration, has worked with NASA on a draft plan to address these issues as they relate to ISS.

Apart from ISS, OSC is also engaged in activities related to NASA's Space Launch Initiative, and has proposed to NASA leadership that OSC host events in partnership with NASA that will focus on what the Space Launch Initiative has to offer businesses that are outside of the usual space-based business interests, but which could begin to use space transportation for commercial purposes.

For further information, I would refer the Committee to the report to Congress submitted by OSC in February 2001.

Question 13. The Office of Technology Policy (OTP) is one of the only offices in the federal government charged with conducting analysis, formulating policy, and advocating national policies to maximize technology's contribution to U.S. competitiveness and economic growth.

a) What areas of technology policy development is OTP currently focused upon?

Answer. As you note, the Office of Technology Policy (OTP) is one of the few offices in the federal government charged specifically with providing policy guidance to enhance the environment for technology and innovation in this country. I would further contend that it is the only office at the federal level that is concerned with the entire process of technological innovation—how technology gets developed, and how the results of research and technology development make their way to the marketplace or get deployed throughout the economy. The conversion of research and technology development into wealth-generating, productivity-enhancing products, processes, and services strengthens our country's competitive advantage, brings value to society and contributes to global prosperity and stability.

Currently, OTP is focused on pursuing a number of concrete policy objectives important to strengthening and serving the priorities of the Under Secretary for Technology, the Secretary of Commerce and the President of the United States.

These objectives are focused in three critical areas:

- I. Supporting technology's contribution to the nation
- II. The business climate for innovation
- III. Building a workforce for the knowledge economy

Supporting Technology's Contribution to the Nation.

Technology Transfer

- OTP has a statutory responsibility to report to the President and the Congress on the status of technology transfer activities by the federal laboratories. In accordance with the Stevenson-Wydler Act (as amended in 1986), OTP has prepared periodic biennial reports for the President and Congress on this topic since the late 1980s. (OTP's May 2000 report in this series, "Tech Transfer 2000: Making Partnerships Work," was well received by the policy community and was a basis for congressional testimony in that year.) More recently, the Technology Transfer Commercialization Act of 2000 enlarged the reporting process in number of ways, making OTP responsible for preparation of an annual report to OMB on the Department of Commerce's plans, activities, and achievements for tech transfer by its federal labs and for an annual summary report, authored by the Secretary of Commerce, for the President and Congress, on best practices and effective approaches for tech transfer in evidence at all the federal labs. This federal-wide reporting responsibility places OTP in an important role to observe and comment on current federal technology transfer trends, assess the effectiveness of prevailing policies and programs, and provide informed recommendations on any changes that may be needed in federal tech transfer policies.
- OTP continues to chair and coordinate the activities of the Interagency Working Group on Technology Transfer (IWGTT). This longstanding group is comprised of senior policy and technology transfer professionals from all federal agencies with federal laboratory facilities. The IWGTT meets monthly to discuss current issues about federal tech transfer laws and policies and to develop recommendations pertaining to pending legislation or other policy matters. Because technology transfer happens in differing circumstances across the agencies and numerous federal labs, the IWGTT plays an important role in identifying issues and policy solutions of common interest.
- As the U.S. Government representative to the Organization for Economic Co-operation and Development's (OECD) Working Group on Innovation and Technology Policy, OTP routinely coordinates with U.S. agencies, universities, and businesses to formulate the U.S. position on various technology transfer issues. Recently, OTP led the development of the U.S. response to an OECD study on publicly funded research organizations' licensing activities. OTP worked with

U.S. government agencies and universities (through the Association of University Technology Managers) to prepare the U.S. response.

Economic Growth

- With the growing interest in high-tech business clusters, state and local government leaders want information that identifies critical elements commonly found in successful state and regional technology environments and help identifying the presence of these elements in each of the states. To meet this need, OTP publishes “The Dynamics of Technology-Based Economic Development: State Science & Technology Indicators”, a data tool that provides metrics on science and technology assets in the 50 states. State and federal leaders have indicated this information will be valuable to state and local economic development officials across the country as they develop and implement their technology initiatives.
- Recognizing the critical need for economic stability in the Middle East and North Africa, OTP helped create, develop and launch the Middle East Business Development Initiative working with ITA, BIS, NIST, NOAA and NTIA. This initiative is designed to promote partnerships between U.S. and Middle Eastern and North African businesses in order to strengthen the international coalition against terrorism, expand business opportunities for American companies, and improve prospects for mutually reinforcing commercial growth and stability.
- Important trading partners such as Russia are seeking to actively pursue technology-led growth strategies and seek guidance and best practices from the United States. OTP recently hosted a roundtable that explored the venture capital (VC) environment in Russia. A number of U.S. VC and investment experts provided insight to a group of Russian investors, entrepreneurs and policy makers.

Cybersecurity

- In collaboration with NIST, and at the request of the Bureau of Industry and Security, OTP is contributing to the President’s Critical Infrastructure Protection Board. The Board has launched a series of Cybersecurity Board Policy Reviews, and OTP has been asked to contribute to its outreach strategy. This strategy will involve the IT business community in the development and execution of the recommendations delivered by the Board in its National Strategy to Secure Cyberspace.
- OTP is also focused on providing support to the Office of Homeland Security as it seeks to work with the numerous private sector providers of security technologies. OTP’s understanding and relationships with the U.S. IT community are valuable in leveraging private sector contributions in meeting the President’s national security objectives.
- OTP is playing a leading role in the revision of the OECD Guidelines for the Security of Information Systems and Networks. The revision of these Guidelines reflects a dramatic increase in the importance of a methodical, global approach to securing the information infrastructure that serves as the foundation for business, communication and government.

The Business Climate for Innovation

Understanding Broadband Demand

- OTP has played a leading role in examining the policy debate surrounding the availability and deployment of broadband technologies in the United States. OTP has taken up the challenge that, despite widespread availability, only a fraction of American consumers have chosen to subscribe so far—just 10 percent by some estimates. There are numerous market and regulatory forces at work, and OTP has convened experts for in-depth discussions on two factors: 1) the market and policy issues impacting online, digital entertainment; and 2) the potential for broadband business applications to catalyze demand. A third discussion is planned to explore the impact of e-learning and tele-medicine on broadband deployment.

The Environment for Innovation in America

- OTP is also conducting a series of roundtables examining changes in the U.S. innovation system at the start of the 21st century. The Innovation in America roundtable series brings together national experts in R&D and innovation from U.S. industry, universities and government laboratories to explore the changing innovation landscape; to inform R&D policymakers, practitioners and managers; and to identify trends and understand their implications for national R&D and

innovation policies and programs. This effort serves as a foundation for substantive follow-up with key stakeholders within government, the private sector and academia regarding improvements in the regulatory environment for innovation and best utilization of federal R&D resources.

Biotechnology

- The U.S. Government does not currently collect comprehensive quantitative information about the emerging biotechnologies that are transforming and creating industries. Recognizing that making good public policy requires factual information, OTP is leading an interagency effort to develop and deploy the first comprehensive survey of U.S. firms using and manufacturing biotechnology processes and products. Information collected about capitalization of the industry, number of firms and employees, and regulatory and workforce barriers to industry growth and competitiveness can provide a foundation for future data collection efforts by the Census Bureau and the National Science Foundation.
- OTP also is working with private-public groups to identify barriers and propose solutions to biotechnology firms' response to national homeland defense requirements for certain biotechnology products (such as vaccines, bio-threat detectors, and treatments).

E-Commerce Development and Growth

- OTP is engaged on a number of relevant policy issues that affect the electronic marketplace, working with industry and others in the Administration. These include:
 - Online Privacy
 - Internet Taxation
 - Online Gambling
 - Digital Rights Management

International Competitiveness

- In April 2002, the Under Secretary for Technology co-chaired with China's Ministry of Science and Technology a roundtable on business and university collaboration in China. The U.S. technology businesses participating in the roundtable then joined the Under Secretary in a meeting with China's Minister of Science and Technology. The meeting provided a unique opportunity for the U.S. companies to discuss with the Minister various impediments they encounter in China. The United States and Chinese agreed to pursue expanded cooperation in standards, intellectual property rights enforcement as well as venture capital development.
- In April 2002, the Under Secretary for Technology also met with senior science and technology officials in Japan. An agreement was reached to pursue a regular dialogue on technology policy issues. Through this dialogue, the Technology Administration expects to accelerate the exchange of information, identify best practices and gain increased insight into Japan's evolving strategy to promote technological innovation.
- The Assistant Secretary for Technology Policy recently completed consultations with European Union (EU) officials to pursue greater collaboration in establishing policies conducive to the growth of e-commerce. This builds upon substantial OTP outreach to industry, which provides OTP insight in the opportunities and challenges facing U.S. e-commerce and IT firms that are seeking to establish or expand operations in the EU.
- OTP serves as the Secretariat for the U.S.-Israel Science and Technology Commission, a binational initiative that helps stimulate economic developing by promoting the use of technology in both countries through collaborative science and technology programs. Activities include joint ventures between U.S. and Israeli private sector firms and ongoing dialogue to help reduce commercial impediments and harmonize standards and regulations. Each government provided funding (\$15 million in the mid-90s) to support this program.
- OTP supports U.S. technology development and technology-led economic growth by working with U.S. businesses to promote international partnerships. OTP normally pursues such activities through bilateral and multilateral initiatives with foreign governments (e.g., Egypt and Israel) and typically include direct participation from each country's private sectors. OTP was recognized in a May 31, 2001 cable from the U.S. Embassy in Cairo for its efforts in promoting public-private partnerships. The cable (Cairo 3326) notes that the TA-led Technology Subcommittee under the bilateral arrangement, the U.S.-Egypt Partnership for Economic Growth and Development, "has arguably been the most suc-

successful subcommittee in recent years” and “its strong private sector participation sets it aside” from other bilateral efforts and has contributed to its success.

Building A Workforce for the Knowledge Economy

IT Workforce

- Based on the success of OTP’s prior work on IT work force issues, OTP was assigned to fulfill a Congressional mandate under the American Competitiveness in the 21st Century Act to conduct a review of existing public and private high-tech workforce training programs in the United States, and submit a report to Congress on the study findings.

On behalf of the Secretary, OTP is conducting this review and will develop a report exploring: information technology (IT) worker demand in terms of education and skill requirements, the employer role in IT worker training, types of programs through which IT workers acquire their education and skills, key elements of successful programs, and the strengths and weaknesses of different IT education and training program models. The review process will include: data analysis and literature review; request for comments from employers, IT workers, and IT education and training providers; expert round tables; and site visits.

Global S&T Workforce

- The office is also undertaking a study of the S&T workforce issues in the G-7 nations, which budget and spend almost 70 percent of the world’s R&D. The objective of the study is to determine the policies and approaches adopted by the countries in developing and sustaining their technology workforce base. This study will look at the technology workforce “system” from three thematic perspectives—worker development, labor availability, and globalization of the workforce. This research can serve as input to discussions on national competitiveness, innovation, and technology policy.

GO4IT

- The Technology Administration maintains the GO4IT website for information technology workforce initiatives. Through the web site, which contains more than 300 resources, visitors can learn about high-tech workforce initiatives across the country, tap valuable information resources, and network with other people who can offer insight and opportunities for collaboration. For example, companies can explore ways that other companies have used to develop a skilled workforce. Individuals can get information on scholarships, internships, training, and job banks. State and local government agencies can find out what other governments are doing to build a high-tech workforce.

GET TECH Campaign

- OTP teamed with Women in Film and the National Association of Manufacturers to develop the GET TECH Campaign aimed at encouraging teens to prepare for high tech careers. Launched in October 2000, the campaign features radio and television public service announcements and a fun, interactive technical careers web site for teens. In the campaign’s first three months, the television public service announcements were aired a total of 4,848 times on 300 stations in 172 cities across the country. The web site had a total of 200,000 hits and the toll free number received requests for over 40,000 GET TECH kits sent to both students and teachers.

National Medal of Technology

- OTP has maintained a long-term effort to promote the National Medal of Technology laureates as role models who can inspire young Americans to prepare for and pursue careers in science and technology. This Presidential Medal is awarded annually for technological achievement and is administered by OTP.
 - b) How successful has OTP been in getting the federal government to adopt its policy recommendations?

Answer. While it is difficult to ascribe traceable and direct impacts on national policy to any specific agency within the Federal Government, OTP has successfully contributed to U.S. policy decisions. OTP analysis and recommendations—often made through discussions with other policymakers in the Executive and Legislative branches and foreign governments—have resulted in policy and procedural changes that promote business innovation and adoption of new technologies.

OTP Contribution to Specific Accomplishments

Promoting Investment in Technology

- The Economic Stimulus package signed into law on March 9th, 2002 contains an immediate expensing provision that will provide incentive for investments in technology and other capital expenditures. OTP provided insight on the positive impact this would have in the technology industry.

Collaboration with the President's Council of Advisors on Science and Technology

- PCAST has established official panels on science and technology investment and on the technical infrastructure for the 21st century. As part of their work, PCAST working groups will use OTP's analysis and information about market demand for broadband, the dynamic of corporate innovation partnerships in America, and federal laboratories' experiences with technology transfer. PCAST has requested transcripts from all 3 Innovation in America roundtables and has asked OTP to participate in working group deliberations.

R&D Trends

- OTP was the first Federal agency to identify the impact of rising Federal R&D expenditures on health and flat or declining Federal R&D investments in the physical sciences, mathematics and engineering on the overall balance in the Federal R&D portfolio. The Office has also analyzed the impact this has on U.S. competitiveness, technological innovation, and the production and availability of highly skilled scientists and engineers for the U.S. workforce. OTP has worked with the White House Office of Science and Technology Policy, the Director of the National Science Foundation, and the Director of Defense Research and Engineering to raise the visibility of the issue. Today the issue of balance in the Federal R&D portfolio is recognized by the Administration and Congress as an important science and technology policy issue.
- Recognizing the enormous importance of innovations in biotechnology, OTP developed and implemented a strategy to strengthen the Commerce Department's interaction and advocacy with biotechnology companies. OTP coordinated a public relations campaign (including articles in the industry newsletter) and led development of an interagency biotechnology group to provide rapid, coordinated Administration response to emerging policy issues. At the request of USG policymakers, and in cooperation with scientific and industry groups, OTP also develops and sponsors a series of educational forums about significant emerging biotechnology policy issues.

Intellectual Property

- TA participated in an initiative chaired by the White House Committee on International Science, Engineering, and Technology to improve the Intellectual Property (IP) Annex used in international S&T agreements. OTP worked with other agencies to reach consensus on an IP annex text and procedures for new S&T agreements. The result should be improved consistency in the U.S. approach to IP with foreign partners and with rights of the U.S. government. This new mechanism will also encourage commercialization of technology consistent with the Bayh-Dole Act and Executive Order 12591 and facilitate the negotiation and approval of international S&T agreements.

Technology Transfer

- The 1980 Stevenson-Wydler and Bayh-Dole Acts provide the essential national policy framework for technology transfer by the federal laboratories and federally funded researchers (such as at universities). Both of these laws have been fine-tuned through significant pieces of amending legislation since the mid-1980s—the most recent of which is the Technology Transfer Commercialization Act of 2000. OTP (and its predecessor office) played a key role in conceptualizing, crafting, and advocating much of this legislation throughout its history. The Stevenson-Wydler and Bayh-Dole policy framework for tech transfer was path-breaking in its concept, which many of our international trading partners are now seeking to emulate.
- OTP led the effort to establish a more complete and uniform reporting system for technology transfer activities at Federal laboratories.
- OTP was instrumental in securing legislative provisions that streamline and expedite the licensing of Federal technology while, at the same time, protect the public interest in the technology.
- OTP conducted roundtable discussions with Industrial Research Institute members to solicit industry perspectives on the efficacy of Federal technology trans-

fer efforts, laying a foundation for future efforts to improve government-industry collaboration. These roundtables provided key input to OTP's 1996 congressionally mandated biennial report "Effective Partnering: A Report to Congress on Federal Technology Partnerships."

- OTP led the multi-agency National Technology Initiative (NTI), which convened 16 town meetings across the country that brought together thousands of representatives from high-tech industry, Federal laboratories, universities, and government. Each meeting was designed to address regionally significant areas of technology, and the broad issues of cooperative R&D, financing technology, and manufacturing excellence. These conferences also served as a showcase for capabilities at the Nation's Federal laboratories and encouraged businesses to take advantage of them. In the two years following the NTI, cooperative R&D agreements between Federal laboratories and businesses more than doubled.

Supporting E-medicine

- OTP negotiated modifications to legislation developed by the Food and Drug Administration that would have held c-pharmacies to a higher standard of verification than is required of traditional "bricks-and-mortar" businesses. OTP also worked to eliminate language that would have adversely affected other c-medicine applications, such as medical consultations and diagnoses made over the Internet.

Workforce Issues and the H-1B Visa Process

- OTP's forthcoming report on the IT workforce will provide valuable information to policy-makers and others who invest in high-technology education and training.
- Working closely with officials from the Department of Labor and U.S. industry, OTP influenced the development of the H-1 B visa program regulations implementing the American Competitiveness and Workforce Improvement Act of 1998. OTP's goal was to minimize the burden of these regulations on the business community seeking access to highly skilled, foreign workers.

Accounting Rules for the Knowledge-Based Economy

- OTP worked with the SEC and the Financial Accounting Standards Board (FASB) to discuss the growing importance of intangible assets (such as R&D and goodwill) in the knowledge-based economy. By helping to define the far-reaching implications of proposed accounting rules for intangible assets, OTP and other interested parties facilitated a reexamination and amendment of U.S. accounting rules.

Impact in International Fora

- As the U.S. Government representative to the Asia Pacific Economic Cooperation Industrial Science and Technology Working Group, OTP coordinated the development of the APEC strategy on infectious diseases, which was adopted by the APEC Heads of State at the October 2001 Leaders Summit.
 - OTP wrote the APEC Agenda for Science and Technology Cooperation in the 21st Century, and won endorsement by Heads of State. The Agenda sets forth principles and the primary areas for cooperation among the 21 APEC member economies.
 - OTP has been instrumental in bringing to Federal policymakers and business leaders critical and detailed information on the aggressive technology strategies of foreign governments, and key foreign industrial competitors. These analyses detailed the national technology plans, policies, programs, and investments of more than 20 advanced and newly industrializing countries in Asia, Europe, North America, and elsewhere. OTP's groundbreaking work in "Globalizing Industrial Research and Development and The New Innovators: Global Patenting Trends in Five Sectors" assessed the extent to which R&D and technology have become globalized, and how newly emerging competitors are growing into technological prominence in some fields.
 - OTP staff has played critical roles on U.S. interagency teams negotiating bilateral framework Science and Technology Agreements (e.g., the U.S.-EU Science and Technology Agreement, the U.S.-Japan Science and Technology Agreement) and other bilateral R&D projects with Japan and China. Among OTP's goals in this work are ensuring equitable intellectual property rights provisions and administrative arrangements conducive to U.S. private sector participation.
- c) What metrics does the Department of Commerce use to measure OTP's performance?

Answer. OTP's principal activities and targeted outcomes are captured in the Department's GPRA plan (see FY 2003 Annual Performance Plan, Technology Administration chapter) as a single performance goal: "Provide leadership in promoting national technology policies that facilitate U.S. preeminence in key areas of science and technology and leverage technological innovation to strengthen American global competitiveness." This goal arises naturally from the mission Congress gave the office in the Stevenson-Wydler Act (15 USC Sec. 3710 (a) and (b)).

OTP's performance goal is orchestrated through a series of strategies and action steps for FYs 2002, 2003, and beyond, each of which have associated performance metrics. In general, the performance goal is achieved through OTP-initiated activities in three primary action areas:

- I. Outreach: Engage U.S. industry and the nation's S&T community on salient issues and policy needs.
- II. Analysis and Education: Prepare timely, value-added analyses and educate policymakers about the nation's resources, competitiveness, and capabilities for research and development (R&D) and innovation.
- III. Advocacy: Advocate policies, programs, and partnerships to promote U.S. innovation and enable technology-led economic growth.

OTP's current performance plan specifies several dozen specific activities across these three areas that grow from the office's statutory responsibilities (such as periodic reports to the President and Congress on the status of federal technology transfer policies and programs), ongoing attention topics for policy analysis/development (such as reviewing/revising existing federal guidelines for U.S. federal lab tech transfer agreements involving foreign parties, educational initiatives to encourage the interest and participation of young students in science and technology, state/regional/local initiatives to strengthen the contribution of science and technology activities to economic development), and new initiatives to address issues of emerging importance (such as analyzing the policy implications of the globalizing R&D system and efforts of many of our international trading partners to modernize and strengthen their own capabilities for new technology based innovation).

Generally, Secretary Evans and I both place a high priority on the ability of all the divisions and offices within the Department to work together in pursuing our overall mission to serve U.S. industry and strengthen the nation's economy. New technologies and the opportunities for economically significant innovation based on them clearly cross many organizational boundaries and have implications for many federal agencies. OTP has a unique ability to contribute beyond its own immediate objectives and priorities, to provide value by working effectively with other offices within Commerce and in other agencies. I believe that OTP recognizes these opportunities and is working hard to pursue them in advantageous ways.

Question 14. The President's FY03 budget recommends terminating the Experimental Program to Stimulate Competitive Technology (EPSCoT), which was designed to build the science base of states that have traditionally been underrepresented in federally sponsored research and development.

a) What was your rationale for ending this program?

b) Are there parts of this program that you would recommend continuing as part of the Technology Administration or in another government agency?

Answer. EPSCoT was structured and operated as an experimental program, designed to provide information about policy tools that work effectively to stimulate tech-led economic development (TLED). As such, EPSCoT grants (which were given in 1998 and 1999) were never intended to create any permanent entitlements. All projects were of limited duration with the expectation that the sponsored activity would be sustained by other organizations at the end of the grant life.

TA's current work in TLED builds on three things: (1) our mission of advocating policies that support tech led economic development, (2) the expertise garnered from lessons learned in administering the EPSCoT program and (3) the evaluation's recommendations.

Specifically, TA is leveraging its existing resources and those of other federal agencies to sponsor a series of national training and education events that will provide regions and communities with instructional tools that address a variety of tech-led economic development issues. TA's experience gained in EPSCoT and other tech-led economic development work is a critical asset in matching relevant technical expertise with community goals and potential.

Examples of activities under consideration include: workshops on how angel investor and entrepreneur networks can support technology transfer and technology-led

economic growth, and ways to improve telecommunications infrastructure—such as establishing consortiums of users to facilitate high-speed access at reduced prices.

In these outreach efforts TA will remain guided by the following principles:

- TA will ensure that the states and regions served by these activities will be consistent with those eligible for the EPSCoT program, and participants will include state and local governments, regional organizations, institutions of higher education, business organizations, non-profit organizations, tribal governments, and federal laboratories.
- The ongoing outreach work in tech-led economic development will remain integral to TA policy responsibilities regarding domestic technological innovation, transfer, and commercialization.
- TA staff will, as resources permit, provide ongoing advice and technical assistance.
- TA will continue to recognize that local entities are in the best position to determine what strategies should be implemented in each state; TA recognizes that different states and communities will identify different approaches, priorities, and needs.
- TA's work with EPSCoT states will continue to complement its data development and dissemination efforts—like the State Science and Technology Indicators report, which is a guide for those in the public and private sectors who are looking for a consistent set of metrics from which to formulate their own science and technology strategies and economic development goals.

Finally, our ongoing work outreach work—with former EPSCoT states and others—will support two major themes of the DoC Mission: (1) build for the future and promote U.S. competitiveness in the global marketplace by strengthening and safeguarding the Nation's economic infrastructure; and (2) keep America competitive with cutting-edge science and technology and information.

Question 15. Several years ago, it was proposed that the National Technical Information Service be eliminated. What are the current plans for the service? Are you planning any changes in its operation?

Answer. NTIS has operated profitably for three consecutive years, generating cumulative net earnings of \$5.2 million over the period FY 1999–2001. While its basic core mission is to collect, preserve and sell scientific and technical publications, I am pleased to report that federal agencies continue to make significant use of its infrastructure and expertise for distributing specialized information packages, such as multi-media training materials, to their own constituents.

For many years, NTIS' business model was to distribute information about the materials in its collection through information aggregators who would sell access to many databases, including the NTIS Bibliographic Database, through paid subscriptions. NTIS would receive a portion of their revenue to the extent it was derived from the NTIS Bibliographic Database. This worked well in the pre-Internet days when NTIS had no practical way to reach the vast community of research scientists. The downside of this approach, however, is that it only provides information about the NTIS collection to those who can afford such subscription services—mainly business, industry, and universities.

NTIS is implementing a new business model in which it will post a significant portion of the Database on the World Wide Web, refer users to web sites of the source agency where a desired document may be downloaded for free, and allow users to download for free any document in our collection for free if NTIS has it in electronic image and it is less than 20 pages or, if larger than that, for a flat fee of \$8.95. NTIS is hopeful that this will expand its customer-base and that revenue from downloads and orders for paper products from new customers will more than offset any revenue losses.

Question 16. You mentioned in your statement that you are optimistic that adoption of the Malcolm Baldrige criteria for performance excellence will spread across the education sector. What are your plans for implementing the Baldrige criteria at the Department of Commerce?

Answer. Although the Department as a whole has not assessed its activities specifically using the criteria prescribed by the Malcolm Baldrige National Quality Award Program, the administrative and operational issues that the Baldrige criteria address are the focus of various management reforms under way at Commerce.

Central to this effort is the Department's ongoing implementation of the Government Performance and Results Act (GPRA). Under GPRA, Commerce establishes long- and short-term goals and targets through its five-year Strategic Plan and An-

nual Performance Plans (APP), and evaluates its success in achieving those goals and targets in the Annual Program

Performance Reports. These regular assessments help to ensure that our daily operations mesh with our strategic goals and further the mission of the Department.

While preparing the fiscal year (FY) 2003 APP, we thoroughly evaluated our existing performance measures to determine whether they optimally reflect program objectives and the needs of our clients. This exercise resulted in substantial changes being made. One of the areas most significantly affected was Departmental Management (DM), which provides policy and administrative oversight for many of the management functions addressed by the Baldrige criteria. These functions include, among others, human resources, safety and security, information technology, financial management, and acquisition management. The Department has made management reform a priority by adapting DM performance measures and targets to incorporate the five cross-cutting initiatives established in the President's Management Agenda.

The resulting blueprint is guiding many of our efforts to: structure and train our workforce to provide the best quality service possible to the American taxpayers; link the performance of senior managers to organizational goals; maximize the effectiveness with which we employ information technology to enhance program performance; review the extent to which activities could more efficiently be carried out by the private sector; and ensure accountability for public funds through sound financial management. As we seek to improve our operations, I have encouraged our bureaus to include self-assessments among the tools used to achieve that end. The National Institute of Standards and Technology, as an example, has relied on the Baldrige criteria to do so.

Through these initiatives and other attempts to strengthen performance, we hope to achieve the same level of excellence as that sought through the Malcolm Baldrige National Quality Award Program.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. ERNEST F. HOLLINGS TO
HON. SAMUEL BODMAN

Question 1. At the hearing, you and I discussed the deterioration of some of NIST's scientific facilities. Please provide the Committee with information regarding the specific repairs needed, as well as the associated costs for NIST facilities in Gaithersburg and Boulder.

Answer. Elements of NIST's Boulder Construction Plan are reflected in the President's FY03 Budget submission to Congress. In particular, the budget requests \$11.8M for the first phase of a new Central Utility Plant (CUP) as well as \$5.5M for the installation of upgrades to the facilities' Primary Electrical Service. In addition NIST's FY 2003 budget request includes \$15M for "fitup" of the Advanced Metrology Laboratory and \$22M for safety, capacity, maintenance, and major repairs (SCMMR).

The current Boulder renovation plan, subject to future budget priorities, is to renovate Building 1 (multiple wings), Building 2, and Building 4, phased in over a ten-year period.

Question 2. ATP projects funded between 1990 and 1991 were subject to the recoupment provisions in the original ATP law.

(a) How much was spent on the 39 projects to which recoupment applies?

Answer. These 39 projects received \$130 million in federal funding.

(b) How much of the cost of these projects has the Department recovered?

Answer. No funding has been recouped from these projects.

Question 3. The National Academy of Sciences' National Research Council, in its June 2001 study *The Advanced Technology Program: Assessing Outcomes*, recommended that ATP concentrate a significant proportion of the awards in thematic areas. There are a number of areas—such as enhancing homeland security or reducing energy dependence—where fundamental breakthroughs in enabling technologies could make a significant impact on problems facing this nation.

(a) Is the Department considering any thematic competitions for FY 2002 or FY 2003? Why or why not?

Answer. NIST has not to date administered competitions for awards on a "thematic" basis. However, we have announced (by a Federal Register notice in Docket No. 020328074-2074-0 1) that the FY 2002 proposals we receive may be distributed for review to technology-specific source evaluation boards.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN B. BREAUX TO
HON. SAMUEL BODMAN

Question 1. There is an executive order that directs executive departments and agencies to make available federal buildings and lands for the siting of mobile service antennas.

What steps have you taken or are you considering to carry out this directive, and who has the responsibility for ensuring that the wireless industry has access to federal property pursuant to this executive order?

Answer. In August 1995, President Clinton directed the General Services Administration (GSA), in consultation with the other Executive Branch agencies, to develop procedures to facilitate access to Federal property for the siting of commercial radio antennas. In February 1996, Congress mandated similar action by federal departments and agencies in section 704(c) of the Telecommunications Act of 1996.

In June 1997, GSA issued guidelines and procedures to assist federal agencies in complying with the Presidential order and their statutory obligations (*Placement of Commercial Antennas on Federal Property*, 62 Fed. Reg. 32611 (June 16, 1997)). Those procedures, among other things, require agencies to provide a preliminary written response to an antenna siting request within 60 days. Furthermore, the GSA guidelines provide that siting requests from "duly authorized telecommunications service providers should be granted unless there are unavoidable conflicts with the [agency's] mission, or current or planned use of the property or access to that property."

The Department of Commerce is complying fully with the GSA guidelines. The responsibility within the Department for antenna siting lies within the Office of the Chief Financial Officer and Assistant Secretary for Administration. To date, the Department has not received many siting requests because we do not own or control a significant proportion of federal buildings or lands.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN MCCAIN TO
ANNE ARMSTRONG

Question 1. You mentioned that Virginia's Center for Innovative Technology is a state funded non-profit organization. What activities does your non-profit status allow you to perform that you would not be able to perform if you were a state agency?

Answer. CIT was set up as a non-profit for a variety of business and organizational reasons. First, as a non-profit, we can have the oversight of a Board of Directors, drawn from government, industry and academia. Second, we have the legal ability to keep business proprietary information confidential, as we are exempt from FOIA, and thus can deal with business proprietary information. Third, we are not state employees and are more flexible to tailor our programs and our staff to market imperatives.

Question 2. In your testimony, you stated support for five of Secretary Evan's six recommendations for reforming the ATP. Are there any other suggestions that you would like to offer?

Answer. We would like to offer our services in helping to market the program. We have suggested that improving the dialogue with the states could help bring more applicants, more small businesses and more consortia with industry and academia into the pipeline. We have seen improvements in our companies' participation over the past couple of years that we have focused on this opportunity. In fact, we are in the preliminary stages of formulating a states' ATP pilot program that would allow for the germination of more high tech ideas at the local level.

Question 3. You stated that "most federal and state programs would benefit from additional marketing in order to expand the pool of potential applicants."

a) How important a role does marketing provide for CIT?

Answer. Building awareness is a big issue for CIT. On the one hand, our stakeholders want to know that we are being the most cost-effective stewards of their money, but on the other hand they want us to broaden awareness of our programs. We devote about 10 percent of our budget to "program communications" as we seek to broaden awareness of our programs among likely clients while devoting maximum funds to service and program delivery.

b) Do you think that a new marketing strategy is needed for ATP?

Answer. ATP has been fairly aggressive in their outreach to Virginia and the DC metropolitan area, which is the environment in which we operate. Any program could benefit from increased exposure, particularly to its target audience.

Leveraging the outreach ability of state organizations could be an add-on to ATP's existing marketing strategy. However, it is not a uniform approach, since the states have a variety of different organizations and approaches to science and technology-based economic development. CIT would very much like to become a marketing or outreach arm of ATP and would encourage the open discussion of how best to accomplish mission.

Question 4. Why would you support the granting of intellectual property rights to universities, non-profits with a mission of education, and not supported recoupment for a government agency, whose non-profit mission is directly for the public good?

Answer. We support the granting of IP rights to universities as a means of removing administrative barriers to participating in ATP projects. The guidelines of the projects should focus on the outcomes, which are early-stage high-risk projects with future market potential. Universities as sole applicants should probably not receive ATP monies—they need the industry connection and market potential. We do not support recoupment because recoupment can change the nature of the projects funded. If project managers focus on the potential for recoupment, they will lean away from funding the earlier stage, higher risk research. If the technology is successful, and years later leads to new product lines or new businesses, the government will recoup its investment in tax revenues.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN MCCAIN TO
DR. LEWIS BRANSCOMB

Question 1. You have mentioned your agreement with ATP funding technology prior to product development. How would you distinguish which activities are product development and which ones are not, given the shortened development cycles and the technical nature of some technologies today?

Answer. Your question raises two issues, the effect of shortened product cycles in competitive industries and the distinction between early stage technology development and product development. I will address them in turn.

Effect of shortened product cycles:

The point raised concerning shortened development cycles is valid and highly relevant in this context. Before addressing that point specifically, let me offer a more general response. The shortening of product cycles is a real phenomenon in the core businesses of established companies. The fact that in the 1980s Japanese manufacturers were able to turn around incremental improvements in their products faster than many US firms was a significant contributor to their superior competitiveness at the time. When mature firms are challenged by a competitor with shorter product cycles, their normal reaction would be to shorten their own by being less ambitious with their own technology injection and to rely more on outsourcing components and subsystems (or even whole new products which they re-label and sell).

But these were incremental improvements, not the radical technologies in which ATP is intended to invest. ATP addresses a different industrial situation: new technology leading to new markets. If an ATP grantee is the first firm to create a product for a previously non-existent market there is no crush on product cycle time except for the obvious fact that the longer it takes to get to market successfully, the more expensive it is. And there is always the risk that some other innovator will get there first. In many of the product cases of firms that received ATP grants and were ultimately very successful with breaking open new fields with new technology it took up to 10 years to mature the technology and create a truly viable, growing business. Short product cycles are not typical in radical high tech innovations.

Distinguishing early stage technology development from product development

In the "mainstream" economy, design and production technologies usually evolve incrementally. Little research is required. Product development incorporates most of the limited R&D needed. Firms with established products serving known customers have strong incentive to advance such work. The mandate of ATP is not to support this sort of incremental product development, but rather to support further development of promising, but not yet commercially mature, science-based technologies. In the areas in which ATP invests, before product development can begin, the science (research) on which the invention or product concept was based must be shown to be practical in a product design whose manufacturing process is reasonably well understood. In other words, the technology must be "reduced to practice." In the course of this work, whose costs ATP might share with an applicant firm, the product spec-

ifications are quantified in order that the match of the product to its intended market can be verified.

Thus the R&D that precedes product development is market sensitive, and *may require iterative changes in market specifications and product specifications*. Before final product development leading to production can begin, this iterative process must have converged to some specific outcome. To be sure the lines are not sharp, but, as the Booz Allen research we sponsored shows, industrial R&D executives have little difficulty in distinguishing them. In larger firms with corporate research laboratories these two phases are typically distinguished organizationally. The technology reduction to practice may be done by the corporate research laboratory (financed by the risk funding provided to the laboratory out of corporate profits), while the product development is done in an operating product division (financed out of a business case predicting product revenue). In smaller firms that do not have a distinct, centrally funded corporate laboratory, the organizational distinction is not so clear, but financially the two activities—early stage technology development (ESTD) and product development for production—are still distinct.

In some industries, notably some biotechnology and pharmaceutical products, the research phase tends to be quite intensive and risky while manufacturing is a relatively modest challenge. In this situation, much of what might be called product development in other industries is in fact hard to distinguish from research to reduce the product technology to practice. That is, once the biological scientists have demonstrated evidence of medical efficacy and safety in animal experiments, the product may be said to have been 'developed.' However, in order to gain approval from the FDA to produce the drug, it may be necessary to go back to the research lab repeatedly. Here it is truly hard to make a clean separation between research to reduce the technology to practice and the development work to ready the product for manufacturing.

Finally, let me call attention to the special case of software products, the products of the so-called "dot.com" industry. While it is commonplace to refer to all IT products as comprised of "technology" very little if any computer science research is required for software products. Those software products that can truly be called "high-tech innovations" may indeed be radical innovations, but they are usually market or business model innovations, not those based on science in the way most ATP products are. In this situation there is very little R&D and very little manufacturing. Product development consists largely of writing the software code and then refining it to adapt to market signals and discovery of errors ("bugs").

Question 2. You mentioned that the government should not attempt to become a public venture capitalist. At the same time, you mentioned that the government should identify entrepreneurs and share with them the risks of reducing their ideas to practice in the context of a promising commercial market. If the government is to share in the risk with entrepreneurs with taxpayers' funds, what should the taxpayers expect in return?

Answer. The argument against ATP engaging in public venture capital has two parts:

Firstly, 96 percent or more of private venture capital invests during or after product development and market entry—the area in which ATP does not invest.

Secondly, even if this were not a constraint, government agencies cannot expect to use the management tools private VC firms find essential, using a board seat and their equity to participate actively in management, even to the point of removing the CEO when necessary.

When sharing with entrepreneurs i.e. company management—the cost of high-risk but highly promising new technology development, the Government should expect to see the emergence and diffusion of new technology, embodied in products and services, that creates new growth areas of the economy and, in the process, adds to technical knowledge that can find its place in other applications not foreseen. To the extent that ATP can stimulate Schumpeterian growth that might not have happened otherwise (or least would have been significantly delayed), the practical return to taxpayers is in tax revenues; the technical return is in new and useful technology; and the social return is in new employment, new wealth and new products that serve the public.

Question 3. You mentioned in your statement that venture capitalists are not in the R&D business. You later mentioned that venture capitalists do support firms that are bringing radical new technologies to market. Where do you draw the line as to what is in the R&D business versus bringing technologies to market?

Answer. Something like 4 percent of VC investments (in 1998) are in "seed" ventures, which like Angel investments and ATP projects are to finance the R&D required to reduce to practice a research-based technical idea with commercial promise. But the other 96 percent (early stage and later investments) is also essential

for successful commercial innovation. Venture funding is the most promising instrument for taking the next step after Early Stage Technology Development. It is specifically designed to finance the rapid growth of a new business element and to liquify the equity assets of all the participants in a venture either by an Initial Product Offering (IPO) or by a merger or acquisition which accomplishes the same end. *VC funding is used for all the financial requirements of the firm (i.e. from legal fees to Super Bowl ads) including but by no means restricted to R&D.*

Question 4. You have noted that you are in strong support of university lead ATP consortium projects, and the right for universities able to negotiate patent rights with firms. Do you, in any way, see drawbacks from these two reforms?

Answer. I see few drawbacks. However there are a few situations for which ATP managers should be on the lookout: (a) a consortium, led by a university, in which the industry partners have joined for largely cosmetic reasons, for example to help participating firms curry favor with the university; (b) a university that assembles a consortium to work on a technology is that so immature that the work to reduce the technology to practice in environment of a real or prospective market cannot be started and the university is simply looking exploratory or basic research funds without a clear commercial concept and identified market. On the issue of university developed intellectual property (IP) it is only common sense for government to leave that question to the parties (university and business) to resolve.

Question 5. In your testimony, you discuss the iterative process of bringing new technology to market as a commercial product. Are there other government programs, besides ATP, that also play a role in helping companies commercialize technology? How do these programs compare to ATP in effectiveness?

Answer. ATP is devoted to private commercial markets, so we can exclude from the markets in this question those that are created by government (DoD, NASA, nuclear weapons related research in DOE). The only other program that is not technology specific and seeks to encourage research-based commercial innovations is SBIR. A number of agencies, however, engage in R&D funding to private firms to develop technologies that the Congress and the President believe serve a public interest in ways that market incentives alone will not adequately address. Examples include genomic research, computer security, environmental pollution mitigation technologies Some of such programs do look fund R&D intended to define an economically attractive technology, such as the public-private partnership with the auto industry and other firms to accelerate the commercialization of fuel cells or other alternative power plants for cars.

SBIR is a much more generously funded program than ATP because it is funded by mandatory set aside of agency R&D funds to be spent with small businesses. Thus no member of Congress has to vote for a line item budget for SBIR. But there are SBIR "mills"—firms that exist only to compete for SBIR funds and pay little attention to commercialization. ATP does a much more careful job of avoiding investing in product development and at the same time insuring that there is a high likelihood of commercialization if the R&D is successful.

Question 6. One concern about ATP is that in the past it has been a corporate welfare program that helped large companies bring technology to market, while leaving small business at a disadvantage in applying for grants. If Fortune 500 firms are forced to be parts of joint ventures with smaller firms, will that resolve this problem or do other reforms have to be initiated?

Answer. As our case study of GE's research on amorphous semiconductor technology shows, there are circumstances in which it makes economic sense for ATP to participate in funding entities within even the largest firms. Such cases usually involve scientific work in the large firm whose application lies outside the core business interests of the firm. In this situation the technical advocates within the firm, usually in central corporate research departments, are in a similar position to a high-tech entrepreneur seek to start up a new high-risk, high tech business.

But I well understand the political difficulty of defending this rather special situation. I do not think the economic benefits of allowing large firms to be funded solo by an ATP project outweigh the political price paid for keeping this possibility in the program. Thus I support the Commerce Secretary's proposal.

Question 7. Why would you support the granting of intellectual property rights to universities, non-profits with a mission of education, and not supported recoupment for a government agency, whose non-profit mission is directly for the public good?

Answer. This is a two part question, in my opinion not logically connected. I support allowing universities and firms to negotiate the property rights for inventions that might arise in an ATP project for two reasons.

(a) First, the Congress passed the Bayh-Dole Act for good reason in 1980, granting all institutions that perform R&D for the government to own the intellectual prop-

erty (IP) subject to a royalty free license for the government. Many studies have shown that protected IP is more likely to be made available to the public (through commercialization) than is government sponsored, commercially valued R&D put into the public domain. The Bayh-Dole act applies both to commercial firms and to non-profit institutions. Thus it is entirely appropriate for ATP projects to allow the grantees to own the IP.

(b) Once that is established, it is entirely consistent with our free market principles that the parties should determine among themselves the appropriate division of the IP generated under the project. In free markets will well informed participants this should yield the economic optimal outcome.

The second half of your question asks whether recoupment to a government agency is not merited since the agency's non-profit mission is directly for the public good. My answer is very simple. The costs of the vast majority of government services to the public are shared by the citizenry through taxes they vote to impose on themselves because they realize that markets allocate capital very efficiently for some goods, but not others. In a limited number of cases the government does make a charge for a service, such as entry fees to national parks or the sale of stamps to access distance independent mail service. Here the logic is that Congress concludes that the market is not sufficient to generate the revenue needed to create or preserve national parks, but nevertheless all citizens do not benefit equally and those who enter national parks are willing to pay a modest participation fee.

But recoupment is a special ease. Recoupment might be considered when government activity creates economic value responsive to a competitive market, and the government then chooses to collect some or all of the profits. In socialist countries this is an entirely familiar, even dominant model for economic activity. In our economic system I believe it is inappropriate to apply the socialist model. Any government program capable of competing with market forces in generating revenue should be seriously questioned. If recoupment is sufficient to pay for the investment that is a sufficient test to convince me that the program should not have been initiated in the first place.

But the ATP program does not pass the critical test. If it invests in early stage technology development (ESTD) that markets will not finance because the risks are too high and the appropriability is too low, it will not be able to recoup its costs if the recoupment is calculated on the economic returns from the ESTD alone. If the recoupment is calculated on product development which is 100 percent funded by the firm (since ATP does not invest in commercial product development) a serious inequity results. Of course the consequence of a recoupment fee on investments made with only private capital, no rational firm will participate in the ATP program.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JOHN MCCAIN TO
SCOTT DONNELLY

Question 1.

a) Are you aware that ATP funding should be a source of "last resort" for its applicants?

b) What verification did you have to provide to the ATP program to demonstrate that you had sought funding elsewhere?

Answer. NIST ATP requires applicants to describe efforts they have been made to get internal funding and/or external private financing and how ATP funding will change scope, scale, and/or timing of proposed research effort. GE has appreciated this requirement and has always provided an explanation as to why NIST ATP funds are needed. In general GE seeks NIST ATP funding for high technical risk projects where no other government funds exist and that GE would not fund on its own. In addition, the ATP funds serve as a powerful incentive to rally outside R&D collaborations with companies who on their own would not come together.

In the case of GE's recent CY01 PM MRI NIST ATP win the GE technical team had requested funding for this project from management annually since 1997, and had received limited feasibility funding to see if the program had merit. However, funding sufficient for the total program has not been received because the project is viewed as too high a technical risk and was targeted for a relatively low population group, which does not meet business investment criteria.

Program support was also requested in 2001 from GE Global Research and GE Medical Systems management. Program dollars were committed as part of a total NIST ATP program. However, these funds are conditional on receiving NIST funding. If a NIST award is not granted, then the cost share dollars will be reevaluated

in light of the program risks. Previous history leads us to believe that without NIST funding, this program will not meet the cutoff for full internal funding, and while it may receive some level of decreased support, it will not be enough to sustain its development in time to ward off foreign competition, if at all.

A related proposal entitled "Compact Permanent-Magnet MR Imager" was submitted for potential funding on August 22, 2000 to the U.S. Army Medical Research Acquisition Activity. Although this program has various differences from the one submitted to NIST, they both included the development of a more cost-effective, high-quality imaging system using permanent magnets. The Army proposal was not viewed as meeting the needs of the government's defense priorities and was not funded. NIH was considered as a funding source but typically funds clinical research. The nature of our proposal is more suited to meet the priorities of NIST than that of the Defense or other federal programs. The ATP defining criteria, while demanding, provides an outstanding mechanism for a high-risk, high-impact program, where the technology enabled provides a clear roadmap leading to subsequent commercialization.

Question 2. It was recently reported that GE's last quarterly income was \$2.5 billion on revenue of \$30.5 billion. GE invested \$2.3 billion in R&D in 2001. In October of last year, GE won an ATP award as a single applicant for a project entitled, "Affordable Open MRI for Unserved Markets". In this project, GE was providing \$2 million and ATP providing \$830,000.

a) Given GE Capital, the financial arm of GE, enjoys a credit rating of AAA from Standard and Poors, why was GE not able to provide funding for the additional \$830,000?

Answer. NIST ATP funding represents a very small portion of a research organization's total R&D spending. To use GE as an example, in 2002 we will receive a total of \$4.4 million in NIST funding, which is two-tenths of one percent of our company's total R&D budget. These funds are not going to further product development for GE, they are for research. The purpose of going to the federal government for additional funds is generally to leverage our investment, in order to surpass technical hurdles and to make the project technically feasible for product development.

b) A description of the project on the ATP website states "in fact, the project might not be pursued at all otherwise because of the high risk involved". If ATP funding was not granted, would GE have pursued this project?

Answer. For GE, the research drives the pursuit of ATP we are not creating projects at the Research Center in order to access ATP funds. We look to government programs such as NIST to supplement our own investment.

c) What benefits did GE get from the ATP program that it didn't have before?

Answer. NIST ATPs have allowed GE to form strong R&D partnerships and mentoring relationships with smaller businesses that wouldn't typically have the resources to participate in such high-risk technology development. We also benefit from working with the highly-skilled and talented Technical Program Managers at NIST. These Technical Managers add real value to the industry-led programs. ATP is a very well-run and professionally managed program.

d) What additional sources of funding were considered prior to applying to the ATP program?

Answer. Please see answer to question #1. As stated, GE often investigates numerous alternative funding options for its targeted high-risk technical projects. In the case of the MRI program we sought US Army and considered NIH funding. In both cases the program did not fit the Agency's investment criteria.

Question 3. One concern of this Committee is the decrease in R&D funding by private industry during this recession. Could you please explain how GE allocates its R&D funding, and what factors will lead the company to invest its own money, instead of applying for an ATP grant, into a research project?

Answer. We are proud to report that at General Electric Company we are increasing our investments in research and development. We have identified several areas of emerging technologies to focus on including: molecular imaging, nanotechnology, photonics and alternative energy. As we stated above, ATP grants represent two-tenths of one percent of our company's total R&D budget.

Question 4. Why would you support the granting of intellectual property rights to universities, non-profits with a mission of education, and not supported recoupment for a government agency, whose non-profit mission is directly for the public good?

Answer. First, we believe that the federal government has an important role in spurring innovation and that role is not as a loaning institution but as a partner

in the research enterprise—public sector, private sector and academia. We believe that this commitment and the investment made by the Federal government is directly linked to the prosperity of the US economy. One might look at government-sponsored research in the computer sciences that brought us the Internet as an example, or, the advances in medical sciences that we may not have without the National Institutes of Health and its partners.

As stated in my testimony before the committee, one of the primary goals of the NIST ATP programs that has experienced success is in bridging the gap between basic technology research and market implementation. The recoupment clause may erode participation from companies, which would remove their valuable cost share funding, commercialization, technical expertise that complements and often enables smaller sized companies' participation in NIST ATP.

Secondly, the recoupment is based on 5 percent of gross revenue, which raises many serious issues. How would the Department of Commerce calculate the "government royalty" for an ATP. Often an ATP is focused on a specific, high-risk technical hurdle associated with a key component, process or subsystem. This component is then part of a larger system. The component may only be a small percentage of the total system cost. How could anyone agree on a fair and consistent formula to calculate the royalty fee owed to the government? This creates an administrative nightmare and adds additional expenses that would take away funding from the research programs.

In addition, to calculate the royalty on "gross revenues" would place undue pressures on industry to pay the government even if they are not making a profit. This would be difficult for GE, but it would be devastating for the smaller firms.

With regard to intellectual property (IP) rights for universities, GE supports the rights to IP for those who make inventions and discoveries. Universities and non-profits should have the ability to negotiate IP terms when collaborating with companies and other research partners.

