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U.S.-E.U. REGULATORY COOPERATION ON EMERGING TECHNOLOGIES

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BEFORE THE

SUBCOMMITTEE ON EUROPEAN AFFAIRS

OF THE

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U.S.-E.U. REGULATORY COOPERATION ON EMERGING TECHNOLOGIES

Wednesday, May 11, 2005

UNITED STATES SENATE,
SUBCOMMITTEE ON EUROPEAN AFFAIRS,
COMMITTEE ON FOREIGN RELATIONS,
Washington, D.C.

The subcommittee met at 2:43 p.m., in room SD–419, Dirksen Senate Office Building, Hon. George Allen, chairman of the subcommittee, presiding.

Present: Senator Allen.

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

Senator ALLEN. Good afternoon to everyone. Welcome. I am sorry we are a bit late. We had a vote on the Senate floor. It is actually fortuitous it was at the beginning of the hearing as opposed to in the middle of it. I thank all of our witnesses for appearing this afternoon.

I am calling this hearing of the Foreign Relations Subcommittee on European Affairs to order.

We will be examining this afternoon how the United States and the European Union are regulating emerging technologies. Today we will be examining how the United States and the European Union can work together—where we are, and where we may not be working together. We need to cooperate to ensure that future advancements and innovations and technology are not stifled by overzealous or unnecessary government regulations, whether European or American.

The United States and the European Union have the largest bilateral trade relationship in the world, accounting for about 37 percent of the value of global trade in goods and about 45 percent of the world trade in services. It is unique not only because of its size and complexity, but also because it is one of the very few where both sides benefit immensely from this trade relationship. Making the effort to consult with each other prior to any new regulations becoming law, I believe, is a key element in keeping this trade and investment relationship beneficial and productive. Both the U.S. and European economies are so dynamic, so fast-moving, that changes enacted to either's regulatory system without prior consultation could hinder future commerce, investment, and job creation.

I will give you another example, not in commerce but in law enforcement. We had a hearing this morning in the Commerce Com-

mittee on the issue of spyware and combating illegal spyware applications, which hinder and impede the enjoyment of the Internet and computers, whether at home or in businesses. To the extent that we are going to be able to combat this illegal burden of spyware, it cannot just be the United States. We need our friends in Europe to be close partners in this effort, as much as we are close partners in combating international terrorism.

Now, nowhere is this close and consistent cooperation more important than when we are advancing, addressing, and actually embracing new technologies that emerge seemingly every month. Innovation and technology development have been a large part of both the United States' and the European Union's economic success. In fact, a 2003 U.S. Department of Commerce digital economy study found that frequent users of information technology and the Internet are growing the gross domestic product at almost double the rate of less frequent users. Without a supportive climate or conditions that foster breakthrough research and technologies, neither the European Union nor the United States would be able to compete so effectively in the global economy.

To ensure that U.S. and European companies are at the forefront of innovation and cutting-edge technologies, both the U.S. Government and the European Commission must work together to create a fair and free regulatory environment in which the technology community can continue to compete, succeed, and innovate.

For example, nanotechnology is one of the areas where I believe government must tread carefully. I have made, along with a partner of mine, Ron Wyden, nanotechnology one of our priorities, and I want to make sure the United States is in the lead in nanotechnology. I recognize also that the Europeans are making a concerted effort in nanotechnology, as are Asian countries as well. Ron Wyden and I held the first hearing on nanotechnology, on this emerging science, which I think is going to forever change the way we approach scientific and engineering challenges. We created the first bipartisan, bicameral Congressional Nanotechnology Caucus. We authored the 21st Century Nanotechnology Research and Development Act, which authorized appropriations for long-term investment in the multifaceted fields of nanotechnology. I know we have a witness from Hewlett-Packard who is very strong in nanotechnology, as are other companies, as well as colleges and universities.

Now, this field of science, nanotechnology, is quickly transforming almost every aspect of our world and is already significantly improving our quality of life. That is why it is important that we have cooperation with our international partners in this field as it continues to develop. It is my hope that United States and European regulators can work cooperatively to provide the needed safeguards and parameters of nanotechnology research without burdening scientists with needless bureaucratic constraints nor limiting innovation.

In copyright areas, we need to be working with our European friends to make sure traditional safeguards are still relevant to new products and technologies. The emergence of multi-media products has brought into question the role of Europe's so-called collection societies. These powerful groups are authorized by law in

most European countries to assign a tax or levy to equipment that can be used to copy commercial products like compact disks or movies. The revenue raised by collecting these taxes or levies is used to compensate copyright holders for the unauthorized copy of their work. The development of levies on digital media and equipment has resulted in a significant increase in the levies collected by European countries. The Business Software Alliance has found that increases in levies, coupled with a wider range of products subject to these charges, will result in a three-fold increase by 2006, compared to the levies collected in 2002.

The fact is there are more choices available to consumers in terms of how they access media content and information than any other time in our history. The ability to get media products directly from rights holders make collection of levies unnecessary and amount to double taxation. The United States needs to engage our European partners and question the legitimacy of these levies, given the uniqueness of today's media products.

Finally, the U.S. and the Europeans must begin to harmonize the regulation of IT (Information Technology) accessibility for the disabled. I know one of our witnesses will testify on this matter. Suffice it to say that we do need to reach a consensus with Europe, and that will go a long way to establishing a global IT accessibility standard and would allow companies to focus on developing their products rather than retrofitting to a multitude of accessibility standards.

Let me close by saying this, I want this country to lead in innovation, and I think the Europeans want to lead in innovation as well. Advancements in technology have beneficially changed our lives and the way we live our lives. We have more access to information, entertainment, commerce, and the sharing of ideas than ever before. It is vital that our Government work with the governments of Europe to make sure that regulatory demands do not stifle future innovation. We can be free in this country, keeping what I like to call Jeffersonian principles, which may not necessarily be shared by our European friends. But at least for commerce and jobs, it ought to be understood by our friends in Europe that having less regulation is actually beneficial for more creativity, more innovation, and ultimately, of course, better for the people whether they are in France, Germany, the Netherlands, or anywhere else in Europe. We do need to keep in close contact with our trade and investment partners to keep these regulatory guidelines reasonable and consistent.

I thank all of our witnesses for being here with us today. I look forward to hearing your testimony.

We have two panels, Harris Miller gets a panel of his own. So we will first hear from Harris. I will introduce the second panel after Mr. Miller's testimony.

Mr. Harris Miller is the president of the Information Technology Association of America. In addition to his work at ITAA, Mr. Miller serves as the president of the World Technology and Services Alliance. He is perfect to be testifying here today. He created the first international conference on global IT public policy held in Buenos Aires, and he also conceived the global information security summit, one of the leaders from that, to bring together the private sec-

tor of industry and government from around the world to discuss information sharing in the global security arena.

Last month, Mr. Miller represented ITAA at the Transatlantic High Tech Business Initiative meeting in London where many IT policy issues of major concern to both the U.S. and the E.U. comprised the agenda.

He has served up here. He worked for former Senator John Durkin from New Hampshire and certainly is well qualified and conversant on the issues that we are facing and will share with us his views.

Mr. Miller, welcome, and we look forward to hearing your insight and commentary for our policies on this very important issue.

STATEMENT OF HARRIS MILLER, PRESIDENT, INFORMATION TECHNOLOGY ASSOCIATION OF AMERICA

Mr. MILLER. Well, thank you very much, Mr. Chairman. We in the IT community are very fortunate to have you holding this hearing today. Certainly your knowledge of IT issues is unrivaled in the U.S. Senate, both from your tenure as Governor of my home State of Virginia, which is one of the leading IT States in this country, and of course, your service here in the Senate where you have been a constant leader on all these IT issues. So I commend you for holding this hearing on this important topic.

Also, there is such a thing as personal privilege. I would like to take one minute to recognize one of the staff of the committee, my friend, Dr. Mike Haltzel. I understand this is his last hearing after 11 years on the committee. Our wives went to college together. They were sorority sisters many, many years ago. And I understand Mike, after many years of service on the committee, is moving to the private sector, and I want to note that we have really appreciated working with him all these many years and look forward to working with him when he joins the private sector. So I would like to mention that.

Senator ALLEN. Well, I am sorry to hear that bad news. He is Democratic counsel, but we work very well together. He has always been a gentleman, straight shooter, and we work well together on the many issues that we actually all agree on, although no one focuses on those.

They are just not as interesting.

Mr. MILLER. *Tech Daily* will.

Today's hearing, Mr. Chairman, comes at a particularly opportune time because, as you know, President Bush will host European Council President Juncker and European Commission President Barroso at the annual U.S.-E.U. summit here in Washington, D.C. on June 20th. It is very much the hope of the high tech community that during the summit, they will make these topics of ICT (Information Communication Technology) one of the areas they will focus on.

Mr. Chairman, in my perspective, there are a lot of these issues of conflict which you identified between the U.S. and E.U. that make us almost like children on a beach fighting over small castles in the sand, utterly focused on issues which seem very important at the time, but what we cannot see is that the economic tide is rising. In the 21st century, the rising tide represents the devel-

oping markets, particularly China, India, Brazil. So here they are coming in, joining the global information technology community, and really posing a major challenge to the leadership that the U.S. and Europe and Japan have had during the first 60 years of the computer revolution, and we are not focusing on that challenge but instead fighting a lot of old battles.

What is at stake? Total ICT spending is expected to grow to more than $3.2 trillion just 2 years from now, from just $2.4 trillion 2 years ago. In other words, it is going to grow by over 30 percent in a 4-year period according to our annual study, Digital Planet. Asia, and China in particular, are the fastest growing portions of that span. In fact, China is growing faster than any other nation among the top 10 spenders on ICT.

With this bigger challenge in mind, we were very pleased and privileged to work with our sister association in the UK called Intellect and the European-American Business Council to host a conference in London last month, including high level officials from the U.S. Government led by Ambassador David Gross, senior officials from the European Union and high tech companies from both sides of the Atlantic, to focus on how we resolve some of these common issues and barriers that are hindering both the U.S. and Europe to be more successful in this new age of global competition.

What I want to emphasize, however, is that while the meeting went very well, I was very troubled by how long the list is of continued disagreements that exists between the sides of the Atlantic. Let me just focus on some of them.

Technology trade—we are in the midst of a very difficult and contentious global round of negotiations generally referred to as Doha. There are major differences of opinion between the so-called developed economies and developing economies. Yet, even here the U.S. and Europe continue to disagree on some important technical, but yet very, very substantive issues such as classification of software, the status of downloadable products, how to best define telecommunications services. If we are going to really move ahead in the Doha round to break down some of the global barriers to global ICT trade, the U.S. and Europe need to get on the same page and they need to get on the same page quickly.

Another topic, Internet governance. As you know, Mr. Chairman, this November in Tunis we are going to have the second meeting of the World Summit on Information Society, sponsored by the United Nations. We in the U.S., ITAA, and many of our members both in the U.S. and global operations, are somewhat concerned about the tenor of the discussions leading up to those. There clearly are people in the world who believe that the best way to run the Internet and to forward information technology is to have bureaucrats in Geneva making decisions about how to govern the Internet. I think that given that I believe about 45 percent of all Internet traffic passes through our home State of Virginia, you and I probably do not think that is a really great idea. Unfortunately, there have been some musings by some European Union officials which seem to indicate that they have at least sympathy for that argument, and we very much are encouraging our European colleagues and the European government officials with whom they deal to understand that the global growth of ICT is the fastest

growth of any technology in the history of humankind. Most of that growth is already occurring in developing countries, and we do not need governments to tell us how to do it better.

A third topic, which you mentioned in your opening comments, is this issue of device accessibility. The U.S. got a little bit out in front of the European Union on these issues. The disabilities community, the U.S. Government, people from the House and the Senate, and people from industry worked very hard to come up with an approach which focuses on outcomes to make sure that people with disabilities have access to information technology. We have come up with an approach that we think makes sense. We agreed not to focus on trying to dictate technologies. That is the wrong way to go.

Right now, however, the European Union has come to look at these issues, and frankly, as you will hear in more detail from some of the other witnesses, we are concerned about some of the directions the Europeans seem to be headed. The most important outcome, however, is that we cannot end up with two sets of standards. We cannot do this again, particularly in the context of this global competition.

The next area you also mentioned where you and Senator Wyden have played such a great leadership role is nanotechnology. We have a chance for incredible collaboration in this area. Also, we have a chance to avoid getting involved in making bad regulatory decisions that are not necessary or appropriate. But again, European and U.S. leaders must work together to avoid those kind of restrictions that could occur through overregulation and come up with useful ways of collaborating.

The next area is information security. The U.S. and Europe have more at stake than any other region in the world in terms of information security simply because we are the largest users of information security. But we need to collaborate even more in this area. Information security, cyber security, is the *sine qua non* of the information technology revolution. So we look forward to more close collaboration between the European Union and the U.S. to make this a higher priority.

Math and science education. Again, Senator Allen, you are one of the leaders on this issue. I am also very pleased to see that your colleague, Congressman Frank Wolf, has taken some very dramatic steps in the last few weeks in this area. But you know very well that our performance here in the U.S. unfortunately, as is the performance of many European countries, is quickly falling behind what is going on in China, India, and other developing countries. In 2001, for example, 39 percent of all undergraduate degrees in China went to engineers. In the U.S., 5 percent of undergraduates got engineering degrees.

So the U.S. and Europe again need to think about working together on collaborative efforts to increase student interest in the basic so-called STEM field, science, technology, engineering, and mathematics. We need to take advantage of our great educational systems and make sure that we turn out enough people to fuel the basic information technology revolution. People are the iron ore of this revolution. If we do not have skilled people, we cannot last on the battlefield.

The next topic is telecommunications reform. Next year the E.U. will consider its telecommunications framework and the implementation of some of its 2001 directives. Similarly you here in the Congress have begun to assess possible reforms of the 1996 Telecommunications Act. We hope that you and your colleagues in the Congress will keep in touch with your colleagues in the European Parliament and the regulators here in the U.S. will work with the European Regulators Group. We must figure out ways to collaborate on moving forward to next generation networks, getting beyond where we are now and make sure that all steps are taken to promote next generation networks, rather than getting involved in a heavy regulatory model, which unfortunately has held back telecommunications for, lo, these many years.

In conclusion, Mr. Chairman, we often hear China referred to as a waking giant. I would argue that we in the West perhaps are the slumbering giants. Perhaps we have been lulled into complacency by 60 years of unprecedented scientific and technological success. My simple message is we must stop arguing about how to build a better sand castle and focus on the economic tsunami headed our way from Asia, from Brazil, and other parts of the world which are now part of this information technology revolution.

While the challenges I outlined today are important, we dwell on them at a price. The leaders of the E.U. and the U.S. must lead the way over these obstacles and assure that all western firms have access to the world's fastest growing technology markets.

Thank you very much, and I would be glad to answer any questions you might have.

[The prepared statement of Mr. Miller follows:]

PREPARED STATEMENT OF HARRIS MILLER

INTRODUCTION

Chairman Allen, Senator Biden and other esteemed Subcommittee Members, I appreciate your taking time from your very busy schedules to hold this hearing today on the challenges facing the critical relationship between the United States and the European Union as it impacts emerging technologies, the global information economy, technology trade, and the overall regulatory environment for information technology.

I am Harris N. Miller, president of the Information Technology Association of America (ITAA), representing over 380 member companies in the information technology (IT) industry—the enablers of the information economy. Our members are located in every state in the United States, and range from the smallest IT start-ups to industry leaders in the software, services, systems integration, telecommunications, Internet, and computer consulting fields. These firms are listed on the ITAA website at www.itaa.org. Many of them operate on a truly global basis with offices, operations, and clients throughout the world, including Europe.

ITAA is also the secretariat for the world Information Technology and Services Alliance (WITSA), a consortium of information technology (IT) industry associations from 67 economies around the world, representing over 90 percent of the world's IT market. As the global voice of the IT industry, WITSA is dedicated to advocating policies that advance industry growth and development; facilitating international trade and investment in IT products and services; strengthening WITSA's national industry associations; providing members with a broad network of contacts; and overseeing the world Congress on Information Technology, the premier industry-sponsored global IT policy event, that will be held in May, 2006, in Austin, Texas.

Before I address the specific issues at hand, it is important to put them into context. The E.U. and the U.S. have become like children on a beach fighting over castles in the sand. We are so utterly focused on control over our own little sand castles that we cannot see that the tide is rising. Unless we can refocus on our common

interests and flee to higher ground, our sand castles, along with our future economic prospects in high technology, will be washed away in the surf.

In the 21st century, the rising tide represents the developing economies, primarily in Asia and Eastern Europe, and especially China and India. While the U.S. and Europe, along with Japan, represent the leading nations in today's global Information and Communications Technology (ICT) market, China and India are gaining market share rapidly. These nations represent two of the fastest growing information economies in the world today.

The primary reason for this rapid accession into IT global leadership is that unlike traditional industries, there is a relatively low cost of entry into the global ICT market. Along with the implicit efficiency and productivity afforded by technologies such as IP networking and high volume data storage, a commitment to leadership in ICT is nearly all that it takes for an emerging economy to rival established powers, as long as they prepare their workforce, the "iron ore" of the IT revolution.

Despite our differences, the U.S. and E.U. are bound by a common heritage and common values. We believe in the democratic process, in freedom of expression, and in free market economies. We also share common interests. We represent much of the developed world. We both currently spend more on ICT than any other global region. We depend more on information technology to "grease the gears" of every day life. We are first to enjoy the productivity benefits of automation and the value this productivity creates for customers and shareholders.

Similarly, the U.S. and the E.U. face many of the same challenges to our global leadership in information and communication technology. Our ICT markets are developed, and while they will continue to grow steadily, our companies must look to other geographies for rapid growth opportunities. Our comparative advantage in terms of technical know-how and quality performance is challenged by the developing economies cited above, which are anxious to use their rapidly expanding expertise in computers, software and networks to build larger and more sustainable middle class societies.

Our common trans-Atlantic dilemma is determining how to build these distant markets without tearing down our own. And our shared commitment to democracy and a civil society constantly pushes us to seek public policy solutions that balance the need to protect profits and privacy, national security and commercial practice, including, most often, keeping government out of the way.

Meanwhile some countries—and China, unfortunately, continues to be a prime example—seek to protect their domestic markets from potential trading partners and focus primarily on gaining access to other people's markets with little reciprocation. With that in mind the U.S. and the E.U. must resolve our minor differences—quickly.

What's at stake? Total ICT spending is expected to grow to more than $3.2 trillion by 2007, from $2.4 trillion in 2003, according to the latest study on global ICT spending published by WITSA, Digital Planet 2004. Asia, and China, in particular, represent a growing portion of that spend. Among the top ten nations in ICT spending, China is projected to be the fastest growing, with a compound annual growth rate of 13.9 percent during the years 2003 through 2007. They will be 6th fastest among all nations, including many in the developing world that are starting from near zero. India, meanwhile, ranks tenth in growth overall at 13.44 percent.

For the U.S., overall exports to China have increased dramatically since China joined the WTO in 2001.[1] U.S. exports to China totaled $35 billion in 2004, close to double the total for 2001. In fact, from 2001 to 2004, U.S. exports to China increased nearly 8 times faster than U.S. exports to the rest of the world. As a result, China rose from our ninth largest export market in 2001 to our fifth largest export market in 2004.

While the opportunity within Chinese borders is clear, it is hardly free to all corners. To put it succinctly, China is not playing by the rules of global trade, and in fact, may be trying to change the game entirely. For example, China's implementation of its WTO commitments has lagged in areas in which the U.S. and Europe have competitive advantage, particularly where innovation or technology plays a key role. Their recent proposal to have a "buy China" policy for software purchased by the Chinese government is one extremely unfortunate example.

With so much in common, the U.S. and must work together through our respective governments and industries to address what are—in the greater context—small problems. To that end ITAA, and its sister association in the United Kingdom, Intellect, along with the European American Business Council, recently hosted a conference in London between high-level industry and government officials. Ambas-

[1] Statement of Charles W. Freeman III Assistant U.S. Trade Representative of China Affairs, Office of the U.S. Trade Representative, Committee on House Ways and Means, April 14, 2005.

sador David Gross led the U.S. government delegation and did an excellent job explaining the challenges and opportunities from the U.S. government perspective. Officials from the European Union and from the U.K. government joined us.

Our objective was to discuss ways to advance our common interests and further what must be our common purpose: the delivery of information technology to solve the world's most pressing problems in security, healthcare, education, environmental protection, law enforcement, and economic development. At the end of those talks, we committed to continued cooperation in a public declaration, which I have attached to my statement. We will continue to work together and with our respective governments to contribute to resolving these issues. However, I would like to emphasize that, from industry's perspective, the list of troubling issues was much too long for comfort. Too many obstacles exist between the E.U. and U.S. to permit the full achievements possible.

Today's hearing comes at a particularly opportune time. President Bush will host European Council President Jean-Claude Juncker and European Commission President Jose Manuel Barroso at the annual U.S.-E.U. summit in Washington on June 20th. Among the many other important issues that they discussed that day, it is my hope that these challenges related to ICT will be discussed with timely resolutions in mind.

Now I would like to discuss several of the issues over which we can either continue to fuss and feud or form a more perfect foundation for global trade in information and communication technology.

TRADE

Technology trade is one area where the U.S. and the E.U. have much at stake. Though fundamentally allies, there are a number of vexing issues where we are at odds with one another to the detriment of advancing what should be our common interests. Various bilateral trade differences continue to hinder trade between the two economic powers and the liberalization of ICT services in other countries.

Aggressive efforts to resolve these differences in a timely manner would spur economic activity in both the U.S. and E.U., and in the rest of the world for E.U. and U.S. companies, Yet instead of joining forces and securing improved commitments from more countries, we are engaged in bilateral squabbling over a number of specifics.

For example, the Doha round of World Trade Organization negotiations appear to be poised to move forward, particularly in services. However, we disagree on the classification of software, the status of downloadable products, and how best to define telecommunication services. Movement of highly skilled people between the U.S. and E.U. remains difficult. And various labor laws frequently found in European countries—though not all member countries—continue to be major inhibitors to U.S. services companies expanding their operations in Europe.

INTERNET GOVERNANCE

Internet governance is an area of particular frustration, as the E.U. seems to support the hasty installation of an international governing body for the Internet, an ill-conceived idea, if ever I have heard one. The issues potentially in play represent international regulation of the Internet in areas that extend far beyond the technical coordination currently exerted by the Internet Corporation for Assigned Names and Numbers (ICANN). Mr. Chairman, given that so much Internet traffic travels through your home state, you know better than most what a truly bad idea it would be for regulators in Geneva or any other location to decide the future of one of the greatest inventions of humankind.

The Working Group on Internet Governance is currently considering recommendations for the second phase of the World Summit on the Information Society to be held in Tunis this November. In the Summit, the U.S. and the E.U. have adopted a common agenda to promote freedom of information internationally. But they should also jointly oppose efforts to move control of the Internet to government regulation from the global, collaborative, private sector-led approach that currently works so well.

However, the E.U. appears focused on the internationalization of Internet governance, calling it one of the core topics besides the "organization and administration of naming and numbering, including the operation of the root server system" and "the stability, dependability and robustness of the Internet, including the impact of spam."

Through this process, we should also agree to take steps to encourage the widespread deployment of broadband, RFID (radio frequency identification), and other innovative technologies to extend the economic and security benefits of ICT, again,

without heavy handed and unnecessary government interference. Instead, the E.U. has initiated a privacy review of RFID that, by its very nature, creates uncertainty and dampens the widespread adoption of this critical technology. Finally, we should redouble our efforts to promote telecommunications liberalization, which continues to produce positive results in countries that adopt it.

NANOTECHNOLOGY

Common technology policy interests and objectives are difficult enough to establish between global regions when technologies are well understood and their applications accepted. In many technical areas, however, we stand at the threshold. The possibilities are vast and the outcomes unknowable. Nanotechnology is one such area. Even as we struggle to understand the broad outlines of what this field entails, countries are rushing to claim leadership in nanotechnology expertise.

The Organization for Economic Cooperation and Development (OECD) estimates that over 30 nations have funded nanotechnology research programs. The OECD goes on to report that between 1997 and 2000, nanotech research and development (R&D) funding jumped from approximately $114 million to over $210 million in the E.U., $102 million to $293 million in this country, and from $93.5 million to $189 million in Japan.[2]

If we compare the relative positions of the U.S. and E.U. in nanotechnology with other regions of the world, the advantages of the West are enormous. We are the first movers in the marketplace. We are performing the bulk of the research. We have the history of productive collaboration between government agencies and research universities. We have the culture of risk capital and entrepreneur-driven innovation. We have the twin traditions of public domain knowledge and intellectual property protection. Nanotechnology is an interdisciplinary science, most prominently affecting industries like aerospace, biotechnology, defense, electronics, energy and other high tech fields. As home to many of the world-class corporations in these industries, the U.S. and E.U. have the critical mass of private sector firms with the ability and incentive to support both nanotechnology research and to provide investment capital.[3]

What is critical, again, is collaboration, particularly among leading researchers in academic institutions and laboratories, without unjustified interference from well-intentioned but ultimately interfering public officials.

INFORMATION SECURITY

The U.S. and E.U. share common concerns about information security. If we look across the globe, we quickly see that our respective regions represent the most mature ICT markets. We are, therefore, the most reliant on their unimpeded performance. Given this reliance, information security means national economic security. And in an era of global terrorism and the possibility of cyber warfare, information security may mean national security itself.

As a result, we share a common goal of protecting our information infrastructures from attack. This commonality of purpose entails best practice approaches to vulnerability assessment and intrusion detection, attack prevention and cyber hygiene, incident investigation and computer forensics and cybercrime prosecution. We advocate additional collaboration by U.S. and E.U. government agencies to achieve these goals, a process that should at a minimum incorporate law enforcement, intelligence, harmonized regulatory approaches, education, investment and appropriate statutory frameworks.

Encouraging people to keep their cyber doors locked remains one of our largest common challenges, whether at home or on the job. If it is impractical to export cyber security awareness campaigns, certainly we can share the good ideas, lessons learned and insights into what works can be pooled and exploited for the benefit of both societies.

Because the nature of the cyber threat is constantly changing, additional information security R&D by experts in both the U.S. and E.U. should be encouraged, funded and, where appropriate, shared.

And I must not miss this occasion to once again encourage this committee and the Senate to take favorable action at the earliest possible moment to ratify the Council of Europe Convention on Cybercrime that sets a solid framework for all countries around the world to fight cybercrime.

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[2] OECD Science, Technology and Industry Scoreboard 2003—Towards a knowledge-based economy.

[3] J.S.A. Bhat, "Concerns of New Technology Based Industries—the Case of Nanotechnology," Technovation, 2005.

RESEARCH & DEVELOPMENT

Information security is not the only arena for enhanced cooperation in research and development. In the U.S., federal government support for research and development has slipped substantially. In the aftermath of the Soviet Union's Sputnik launch, federal R&D funding of basic research swelled to 75 percent of all such spending. Seventy cents of every R&D dollar now comes from the private sector.[4] Federal R&D spending creates jobs for scientists and engineers directly and for professionals in business, law, accounting and many other fields indirectly. This support also underwrites the development of valuable intellectual property that, through a process of technology transfer from the public domain to the private sector, forms the basis of still more capital investment, job creation and wealth creation.

Federal funding for leading science and technology government agencies has also slipped. Increases in the federal R&D budget will fail to keep pace with inflation for the first time in ten years, up in FY 2006 a barely perceptible 0.1 percent. Most non-defense agencies performing R&D will see their budgets decline. National Science Foundation research grants will be reduced for the second consecutive year.[5]

To turn a blind eye to R&D is to turn a blind eye to the future. Less government R&D means less basic research; less basic research means a society with less potential for innovation, inspiration and commercial success. Less potential translates to fewer career opportunities for individuals to make a difference in science and technology. And fewer individuals striving for breakthroughs in fields like aerospace, energy, the environment, healthcare, nanotechnology, optics, robotics and more means fewer such breakthroughs are likely. We will not know what we do not know—and we will not even be asking the questions.

MATH AND SCIENCE EDUCATION

Cutbacks in R&D may already be having an impact on the science, technology, engineering and math education pipeline. While the number of undergraduate degrees awarded in the U.S. is rising, the number of degrees awarded to science and engineering students is falling. Between 1985 and 2000, bachelor's degrees awarded in engineering, math, computer sciences, physical sciences and geological sciences fell 18.6 percent.[6] Comparing the graduate enrollments of U.S. citizens and permanent residents in 1983 and 2001, totals have dropped in physical sciences; earth, atmospheric and ocean sciences; agricultural sciences; mathematics and engineering.

In China, the situation is just the reverse. In 2001, 39 percent of all undergraduate degrees awarded in China went to engineers; in the U.S., that percentage was five percent. Almost 220,000 Chinese students received engineering degrees in 2001, compared to just under 60,000 in the U.S.[7] India and China produce 125,000 computer science graduates annually, twice the number of the European Union.[8]

Collaborative efforts to increase student interest in the basic STEM fields—science, technology, engineering, and mathematics—is certainly a worthy topic of discussion between the U.S. and the E.U.

TELECOMMUNICATIONS REFORM

Both the U.S. and the E.U. find themselves at a fork in the road in terms of their overall telecommunications regulatory environment. Next year, the E.U. will consider its telecommunications framework and the implementation of the 2001 directives. Similarly, Congress has begun to assess the 1996 Telecommunications Act and consider possible revisions. We call on the Federal Communications Commission and the European Regulators Group to initiate a collaborative dialogue and work towards "light touch" regulatory approaches that emphasize competition, innovation, capital investment and market demand.

Sadly, instead of making common cause, the U.S. and E.U. appear to be at loggerheads over fine-grained aspects of telecommunications trade policy. The WTO Doha negotiations, particularly in the area of services, appear to be poised to move forward. Yet instead of joining forces and securing improved commitments from more

[4] John A. Douglass, R&D and the U.S. Economy: A Sputnik Reflection, University of California, Berkeley.

[5] American Association for the Advancement of Science, AAAS Analysis of R&D in the FY 2006 Budget, March 9, 2005.

[6] Ibid, page 16.

[7] President's Council of Advisers on Science and Technology, "Maintaining the Strength of Our Science & Engineering Capabilities," June 2004.

[8] Lachlan Carmichael, "Blair pledges to boost Britons' skills to compete with China, India," Agence France Presse, April 28, 2005.

countries, we are engaged in bilateral squabbling over a number of specifics. For example, the E.U. has proposed a new definition of telecommunications that many companies feel will allow countries to slide on previous commitments. Rather than introducing new, controversial mechanisms, the E.U. and the U.S. should jointly encourage new and better commitments from all countries.

DEVICE ACCESSIBILITY

If we are truly committed to building ICT markets that promote values like competition, innovation, and capital investment, the U.S. and E.U. should likewise avoid implementing disparate standards, particularly in the area of device accessibility. Technology should be used aggressively to help seniors and those with disabilities live fuller, richer lives. Government mandated technical specifications for device accessibility create rather than eliminate barriers to swift deployment.

ITAA is proud to have played a major role in the formation of the provisions incorporated in the "Electronic and Information Technology Accessibility Standards" in the U.S. Some of ITAA's member companies were represented on the Access Board's Electronic and Information Technology Accessibility Advisory Committee that formulated the standard that underlies section 508. ITAA consulted with members, drafted and submitted industry comments on the regulation during its development, and facilitated alignment between the positions of the government, industry, and the stakeholder organizations in the community of people with disabilities. We consider this alignment between the parties concerned with ICT accessibility to be of significant value. We hope that as Europe looks at the topic of ICT accessibility, they will consider the principles underlying the approach taken in the U.S. standard.

Unfortunately, however, they seem to be heading in a different direction, a direction that will end up with companies having to face two different worlds—one in the U.S. and one in Europe—and that will ultimately lessen the ability of companies to improve accessibility for individuals with disabilities.

We are pleased that the U.S. Commerce Department is currently participating in the U.S.-E.C. ICT Standards Dialogue in an effort to steer clear of mandated technical specifications. When governmental bodies adopt accessibility requirements for government ICT purchases, these requirements should strike an appropriate balance between encouraging the design, development, and provision of products and services that address accessibility on one hand, while ensuring that accessibility requirements do not impede the rapid advancement of information technology.

Thus, ITAA is a champion of performance-based, open standards intended to facilitate innovation and desired outcomes. We believe that the U.S. and E.U. must work towards a single, global standard that reflects these values and gives all users of information and communications technology the ability to enjoy its maximum benefits.

CONCLUSION: FROM COMMON GOALS TO COLLABORATIVE ACTION

We often hear China referred to as a waking giant. The commitment of the Chinese government to a national technology policy and to leverage comparative advantage in science and technology for global competitive advantage strongly suggests that the giant is not only awake but on the move. I would argue that we in the west are the slumbering giants, perhaps lulled into complacency by 60 years of unprecedented scientific and technological success.

The U.S. and E.U. need to assess systematically those aspects of their public policy that have nurtured high tech innovation and investment, and those which have lost effectiveness in light of the new competitive reality.

Instead of looking for areas to regulate, I strongly encourage governments on both sides of the Atlantic to look to areas to deregulate, to remove barriers to ICT growth.

With this knowledge, we must form a persistent collaboration dedicated to removing regulatory barriers, facilitating competition, promoting technology convergence and, through this process, accentuating the comparative advantages of the world's most developed ICT markets.

Most of all, we must stop arguing about how to build a better sand castle and set our collective sights on the economic tsunami headed in this direction. In recent times, the U.S. and E.U. countries have disagreed on privacy rights, the value added tax, the definition of telecommunications, how to classify software, the status of downloadable products and other issues. We have done a terrific job understanding individual trees; we have done a terrible job standing back and viewing the global forest.

The Information Technology Association of America is committed to working with counterpart organizations in the E.U. to achieve policies that foster growth, innovation and security. ITAA believes that U.S. and E.U. officials should develop a dialogue on high tech policy issues in keeping with these goals.

ATTACHMENT

CONCLUSIONS OF THE TRANSATLANTIC HIGH-TECH BUSINESS INITIATIVE—GOVERNMENTS LISTENING TO BUSINESS HELD ON MONDAY, APRIL 11, 2005 AT INTELLECT'S OFFICES IN LONDON.

There needs to be persistent collaboration between the E.U. and the U.S. on ICT issues. The meeting noted that the TABD (Trans Atlantic Business Dialogue) does not currently address ICT issues in sufficient detail. It was proposed that the group assembled by EABC, ITAA and Intellect should fulfill the function of a TABD for ICT issues (whether informal, or formally recognized). It was agreed that future meetings should be held alternately in Brussels and Washington. They must be held every six months if the goal of persistent collaboration is to be achieved. ITAA, Intellect and EABC will plan the next meeting for October 2005.

We seek to have included in the forthcoming E.U.-U.S. summit a declaration on Information and Communications Technology. A proposed draft is shown below.

Proposed Draft Declaration on ICT for the E.U./U.S. Summit.

The E.U./U.S. relationship on technology is a critical area of mutual importance that impacts economic security, national security and the interdependency of all critical sectors. U.S. and E.U. ICT policies must:

- stimulate investment and growth in the availability of the products and services of the ICT sectors;
- support the innovations that advance these technologies;
- seek commonality in their regulatory regimes;
- assure a secure environment for their use, and
- assure continued private sector leadership of the technical components of the Internet.

To achieve this ITAA and EABC will work through Ambassador David Gross and Intellect will work through Fabio Nasarre de Letosa, EICTA and the UK Government's DTI.

Further background on the above draft is contained in the sections below.

Telecommunications—The Infrastructure for a Knowledge Economy

There is a unique opportunity to bring together the overall regulatory climate in the E.U. and U.S. In 2006 the E.U. will be reviewing the telecommunications framework and the implementation of the 2001 directives. Concurrently the U.S. will be drafting new telecommunication legislation to account for new technologies. An over riding principle must be the need to stimulate investment and innovation.

Persistent co-operation is required between the U.S. and the Commission. The FCC and the ERG (European Regulators Group) need to link their work. There is a need for more formal and more frequent issue based communication. We need to decouple social and regulatory issues.

The meeting was concerned at the current state of VoIP regulation in the E.U. Maximum possible regulatory convergence between the E.U. and U.S. should be a goal. One specific example is the need for a common mobile handset conformance testing regime. (This can be treated as a trade or telecoms issue).

Information Technology (IT): Enabling the Innovation Ecosystem

The information technology environment:

- needs to have policy addressed on an urgent basis;
- is global in nature, with emerging new significant policy voices (China/India);
- depends on public-private collaboration;
- must focus on the role/impact on citizens/customers/consumers of IT services;
- is characterized by rapid commoditisation of its technologies, and
- needs to enhance role of sector as an effective employer.

Trade in ICT Goods and Services

The ICT Trade environment needs to:

- Resolve bilateral differences on telecommunications definition, software classification, inclusion of internet services, and status of downloadable products;
- Promote ICT services WTO commitments aggressively, and
- Address China and India trade issues uniformly as a single entity.

Further Background

Growth:

- Government must become educated on technology;
- Regulators should commence a deregulatory review and impact analysis, forbear from regulation unless clear need emerges, assure multilateral consistency in any regulatory measures;
- Non-tariff trade barriers (NTTBs) must be dismantled, and
- Government's role in affirmatively fostering technology innovation and investment must be expressed through tax policy, intellectual property protection, h/r policies that promote skilled worker mobility, role of government as customer, and adherence to industry led oversight of the technical co-ordination of the Internet.

Technology

- Emergence of Next Generation Networks (NGNs) as primary artifact (includes edge/access/mobile networks);
- Intellectual property (IP) protections must be maintained and consistent, and
- Research (R&D) is the source of innovation; investment in research must grow.

Security

- The *sine qua non* of the networked ecosystem;
- Law enforcement's role in maintaining security must be supported with education, investment and statutory frameworks that empower effective prosecution;
- Multilateral cooperation;
- Research investment for security must be encouraged, collaborative and supported by government investment (7th Framework Programme/U.S. R&D institutions), and
- Security education and awareness of all stakeholders must expand.

Senator ALLEN. Mr. Miller, thank you so much for your testimony. I am going to put your entire statement in the record. I know you summarized it. I would say this to all the witnesses. Your entire statement will be put in the record, if you so desire. I suspect you would not have spent time composing it if you did not want it as part of the record.

Thank you for this. There are so many things that you brought up, and I am, as you might guess, in complete agreement with you.

The education issue. Today there has been a strand of continuity, but just earlier today, sometime in the morning, we received a petition from 6,000 women concerned about the lack of women involved in science, engineering, and technology. It is just in the single digits really, maybe a little bit over 10 percent. And then you add to the concern as to African Americans and Latino citizens, one of the fastest growing part of our work force and will be 35 percent of the workforce in the next 15 to 20 years. You think, well, if we are not recruiting or encouraging women to get involved, that is half of our population. If Latinos and African Americans, for whatever reason—and a lot of it has to do with the Hispanic-serving institutions and historically black colleges and universities not having the technology infrastructure to get the faculty to impart the knowledge and skills to those students. Then they are not able to apply for and get the 60 percent of the jobs out there which require technological proficiency.

Meanwhile, our engineering schools—and thank you for these figures here—I understand in this country we are behind one-fourth to one-sixth of what India or China, respectively, are matriculating. And then about 40 percent of those students in our universities in these graduate studies in technology and science and engineering are from overseas, which is fine. I want this country—I have said this many times—to be a magnet for the best minds in the future. You are exactly correct. This is what is going to help us compete and lead in innovation in the future.

I want to work with you. Please, if there are any specific ideas that you have that you can share with us in this committee here this afternoon. Ideas on encouraging all Americans, regardless of their gender, their race, or their ethnicity, to get more involved, to get encouraged, to get into science and technology and engineering, please share them with us here or please stay in contact with me. I think this is one of the most absolutely essential challenges facing this country and our ability to compete and succeed in the future. I forgot what you called it. The gold mine?

Mr. MILLER. The iron ore.

Senator ALLEN. The iron ore. Well, I do not care to call humans anything but gold and diamonds. Regardless, the strength of our country is our people and their capability. They are the best asset of this country and we need to make sure they have that ability.

Do you have any specific ideas of what we can do to encourage young people in this country to engage in these key sciences of the future?

Mr. MILLER. Well, I certainly agree with the analysis of the current situation, Senator Allen. In fact, we did a study in 1997, before the Internet boom really took off, of women and minorities in the computer science field. We repeated that study in 2003, hoping that perhaps we would see some improvement, at least among women and minorities, in terms of percentages in the computer science field and in the profession of computer science. Unfortunately, there had been almost no change between 1997 and 2003. We are expecting to do that survey again either late this year or early next year. But the numbers are not good.

Since you opened the door, let me make a modest proposal, and I will tell you where the modest proposal came from. When I was in India last October for a cyber security conference, I was invited by the chief minister of Andhra Pradesh, the equivalent of a governor as you were, to meet with him. I thought it was a typical kind of meet and greet. Here is the U.S. IT guy coming to meet the chief minister. He was just newly elected. This is a gentleman named Dr. Reddi. He is a medical doctor. Well, it was more than just a meet and greet. He actually wanted to talk for over half an hour about this issue of how he increased his work force.

Now, in Andhra Pradesh is the City of Hyderabad, which is probably the second IT center in India after Bangalore. It is not quite as well known, but believe me, it is a huge and growing center.

All he wanted to talk about was the shortage. So the half hour was up, and I figured, well, now he is going to get rid of me. That is enough. He said, come with me to my next meeting. I said, where are we going, Chief Minister? He was going to meet with all the vice chancellors of all the universities in Andhra Pradesh,

which are like the presidents of our universities, the equivalent under the British or Indian system. I said, well, why do you want me to come along. He said, well, I am going to tell them that they have got to turn out more engineers and mathematicians and scientists, and I will fund every one of them. I said, why do you want me to come along? He said, because I want you to say the same thing, and they will believe you. They will not believe me.

He sees his competition in Shanghai and Beijing and Brasilia and places that have not taken off yet, Karachi and Manila and other places. So even though we may sit here saying how far the Indians are ahead of us, he is sitting there as a political leader saying, I am afraid of the future and falling behind. So I am going to invest even more. He said to the vice chancellors of the universities, for every student you enroll in the sciences and math, I will pay for it.

So I began to think. I said, now, we used to have a time like that in this country. It was called Sputnik in 1957. When the Soviets sent that little missile up into outer space, the country went into a full-fledged panic. It was part of the big Cold War attack, very unsettling to the American people, and we passed the National Higher Education Defense Act and basically said if you want to study science or math, the U.S. Government will pay for it. Many would argue that that really helped to grow the United States dramatically as we entered the engineering age, followed by the information technology age. But we have had nothing like that since. We had that one brief burst where the government stepped in and basically said we will educate everybody in science and math.

Well, my modest proposal, to be somewhat ironic about it, is we should do it again. We really need to think about something that dramatic. Now, your colleague, Congressman Wolf, has gone part of the way with his ideas of a loan forgiveness program, but I would be even more radical. I would say that we should have a goal of doubling the number of STEM graduates in this country within a 5-year period, and we as a government—I know this is tough in tough budget times, and I know you face these issues every day as a Senator making allocations—we should say we will fund anybody who will go into science and math in undergraduate education.

If my kids wanted to go school and one is studying English and one is studying music right now, it is on my nickel or they have to go get student loans or find some other way to pay for school. But if that student, no matter what socioeconomic income, no matter what race, whichever gender, wants to study science and math, the U.S. Government will pay for it.

We estimate the cost at probably a couple billion dollars a year, so it is not chicken feed. On the other hand, think about the return on the investment in terms of new products, new revenue, because these people will become higher wage earners. We have all the research that shows that. More research in universities.

The other thing I think that would happen, Senator—I know you come from a sports background, your father is a famous coach—is maybe the parent who is now spending all their time coaching their kids to play football or soccer or something else, because they hope they get a college scholarship in that area, will say, maybe I ought to coach Johnnie and Susie in math or science, and maybe instead

of sending them to summer basketball camp, I ought to send them to summer science camp. The secondary effects would be remarkable.

So that is my modest proposal. We are still working on trying to put it into more concrete terms, but I think we have to do something dramatic. There is no Sputnik right now, Mr. Chairman. There is no dramatic thing. Instead, we are kind of like the frog sitting in the boiling water. It is getting hotter and hotter, and before we know it, we are going to be dinner because these other countries, like the chief minister of Andhra Pradesh, are making those investments today. On a per capita basis, China is turning out two and a half times more engineers, not in absolute numbers, on a per capita basis. Within 3 years, they will be turning out three and a half times more engineers than we are in this country. We cannot compete with that kind of disadvantage in the global marketplace.

Senator ALLEN. Understood. The innovations of the future, the intellectual property, the inventions will come from many of those engineers. It makes it very difficult.

I do think kids like to be outside in the summer, though. Kids are kids.

There is a measure I am working with some of my colleagues on the Senate side on providing scholarship approaches in technology and science. I do think it is important that we give scholarships. Of course, they are funded in athletics, which is fine, and the universities make a ton of money off all the TV contracts.

Unfortunately, this country is reducing our R&D funding in aeronautics. The Europeans, our friends, whom we are talking about here, have a strategic plan to dominate the world by 2020 in aeronautics. They are on the way to doing it because last year they sold more aircraft than the United States. The funding proposals are to keep cutting on the next generation or new vehicle systems, hypersonic flight, and all the rest.

We do need to invest, and we do have to find ways to encourage students. Scholarships may very well be, the sort of incentive grants we need. It's the best way to go, and I appreciate your comments.

Let me ask you one other question here. The Europeans generally seem to have a more active regulatory instinct than the U.S. I know you are generally in the other party than I am, but we both seem to have this libertarian streak to leave free people and free enterprise minimally limited. I hate restrictions and limits unless they are harming someone else.

The Europeans seem to be more restrictive. Even the concept of the Internet is being somehow governed by the United Nations. To me this is just an abhorrent idea. This is not something for the United Nations or folks in Geneva need to be worrying about. Let individuals make those decisions. I think the Internet is the greatest invention since the Gutenberg press for the dissemination of information and ideas, and the last thing we need is regulatory reform.

You can take the example of Martin Luther in Germany, the Church at Wittenberg, where he nailed his 95 theses. People would not have read those but for the Gutenberg press getting it dissemi-

nated. So that is another reason, just historically, you do not want government regulations.

Some have viewed the European Commission position—and it ends up depending on the industry to thinking that the government is the best capable of setting parameters and standards. My general view is that I would like to have the industry, the people in the private sector, saying here is our standard. This applies not just to the U.S. and E.U. It ends up with China as well because if China comes up a different standard, that fouls all of us up.

How does the industry look at this approach, or the propensity of the Europeans to be looking at government setting standards, as opposed to those in private industry? Is that a legitimate concern?

Mr. MILLER. It is. While I think there are many people in the European Union who do understand the value of having the marketplace make these decisions, there are others in the European Union and some of the European Union member states which still do have a very regulatory approach. The implications for Europe are fairly clear.

When I was in London recently, for the meeting I mentioned, there was also a meeting hosted by my good friend, Mike Maibach, the head of the European-American Business Council. He brought in a research firm who had been studying the impact of the European approach versus the U.S. approach in terms of ICT, a firm called Indepen. They gave a report to the group at an event that he hosted. It showed that the European Union—this is counting the original 15 member states, before the accession of the additional 10—that ICT was only 5.8 percent of GDP, whereas in the U.S. it is 6.3 percent of GDP.

Senator ALLEN. Say that again. What are you measuring here?

Mr. MILLER. Gross domestic product. In the U.S., IT is 6.3 percent of GDP. It is 5.8 percent in Europe, half of a full percentage point, which is a huge amount.

In another metric, the ICT investment in terms of all investment in Europe is only 18 percent; whereas, in the U.S., it was 29 percent. So there is a lot more investment by customers of IT in the U.S. as opposed to what is going on in Europe.

And in terms of perhaps the most important economic factor that economists look at over time, which is labor productivity growth, because at the end of the day, you cannot grow an economy unless you get productivity growth, ICT contributed 42 percent of labor productivity growth in Europe during the last half of the last decade, while it contributed 80 percent of labor productivity growth in the U.S.

So, the short answer to your question is the European Union attitude is not just sometimes creating difficulties between Europe and the U.S.; it is actually, I would argue, even hurting Europe itself.

I will tell you, this is not a European policy, but some nation states in the European Union, as you know, have very, very restrictive labor mobility laws. It is very difficult to dismiss someone, to use the nice terminology, to downsize, to right size, whatever the terminology is. Well, the implication of that is if you are an IT services firm—and you have many of them headquartered with very, very significant operations in northern Virginia, and you

know them all very well, and some will be testifying on the next panel—you basically have to be out of your mind to open a facility in some of those countries in Europe because your whole business model is that when things are going well, you hire more people, and when things are not going quite so well, you have to have the flexibility to lay some people off. That is your whole business model. Your assets are those people. Sometimes business is good, sometimes business is not so good.

Another event I attended while I was in London, at an event hosted by our sister association, Intellect—I was very busy in London—was a presentation by a research group called Ovum. One of the speakers noted that he had clients in one particular country, France, where they were having to accept clients paying only 30 percent of their normal labor fee because they had to get some cash in the door because they could not fire these people. They could not lay them off. They could not do normal kind of business activity. Those clients, of course, were very seriously looking at pulling out of that country.

Now, that does not help the workers in that country. It does not help the users of IT in the country. It does not help the French economy to have leading IT companies, whether they are European or U.S., saying I do not want to do business here because of bad, restrictive, unnecessary labor mobility laws. We understand the need to protect the rights of workers. That is not the issue, but the issue is in a services economy, the IT economy, you have to have flexibility.

So having said all that, I would still say the European Union officials here in the U.S. and Europe are always willing to meet with us. We do have a lot of dialogue going on, Senator. So I do not want to claim that there is no dialogue going on, but I think we still have a long way to go to get on the same page.

Senator ALLEN. Let me finish with this question. We have to finish with something positive. Can you give me an example of where this cooperation has actually been beneficial? Every once in a while, if you find those sort of approaches, that can be the model for future discussions and cooperation.

Mr. MILLER. I think there are a lot of very positive conversations going on in the research and development area in various areas of IT between the U.S. and Europe, and more and more joint research projects are being set up. I think that has been an area that has been very, very positive and is moving forward.

Senator ALLEN. How about on standards?

Mr. MILLER. On standards we are making some progress, but again, the Europeans still tend to bend a little bit toward government knows best or locking in technologies as opposed to locking in outcomes and letting the industry come up with them.

Yes, there is some good dialogue going on. After all, the telecommunications system does work between here and Europe. Europe has, to a large extent, deregulated its telecommunications market, in some ways better than we have in some areas. They have moved ahead with some technology even faster than we have in some areas, but I still think there is a long way for us to go in partnership to do a lot more.

Senator ALLEN. Well, Mr. Miller, I very much appreciate you appearing, your insight, and I look forward to working with you in the years to come on these shared interests and ideas for the future of our country—working with the Europeans, but also making sure this country is competing and succeeding as well.

Mr. MILLER. Thank you very much, Senator.

Senator ALLEN. Thank you so much.

We are having votes this afternoon, and some members may not get here. Some may want to pose some questions in writing, and hopefully you will be willing, as always, to answer those questions.

Mr. MILLER. Absolutely.

Senator ALLEN. Thank you, Mr. Miller.

I would like to call forward now our second panel, if you would all approach.

Well, I want to thank our second panel for being here. We have Mr. Patton and Mr. Hassell to talk about the European collection. Correct?

Mr. HASSELL. Yes, Senator.

Senator ALLEN. All right, on nanotechnology we have Mr. Harper and Mr. Klaessig, and then on IT access we have Ms. West and Mr. Duffy.

What I would like to do is have everyone shift. We have not hiked the ball, so everyone still can shift so we have at least a coherence of going from nanotech, to IT, to Euro, then back to nanotech.

Let me briefly introduce our second panel. I am going to stick with this order; it will be close enough.

First, Mr. Harper. Steve Harper is the director of Environmental, Health and Safety Policy for Intel Corporation. Prior to being at Intel, he directed Amoco Petroleum's Fuel Regulatory Service Group and was a senior policy analyst at the United States EPA. Prior to his work at EPA, he was vice president in the consulting firm, ICF Consulting. Mr. Harper has an MBA from the University of Chicago and an MPA from Princeton. Welcome, Mr. Harper.

Dr. Klaessig is the technical director of Aerosil and Silanes Business Unit of Degussa Corporation, which is headquartered in Germany. Pertinent to his testimony is his work on fumed metal oxide powders, silica, titanium oxide, alumina, and others which are high surface area powders supplied by Degussa for more than 60 years. Though not fitting the dominant definition of nanoparticles, these materials have many attributes associated with nanomaterials. Prior to working at Degussa, Dr. Klaessig led the research department at Betz Laboratories. He has a Ph.D. from Rensselaer Polytechnic Institute and a bachelors of science from the University of California at Berkeley.

Thomas Patton is the vice president of government relations for Philips Electronics North America Corporation, Philips a Dutch company. He joined Philips in 1986 to open its first Washington office on federal government relations. He was elected vice president and corporate officer in January of 1989 for government relations for the NAFTA region and is a member of the Philips global government relations team. He had previously worked for the U.S. electronics industry and trade organizations and was a policy analyst for the Office of the Secretary of the U.S. Department of

Health and Human Services. Mr. Patton received his masters in public administration from American University in 1978 and his B.A. in political science from Stetson University in 1976.

John Hassell is the director of federal and state government affairs for Hewlett-Packard Company based in Washington, D.C. In the U.S., he helps lead the public policy and public sector business development at the federal and state government agency level. Hewlett-Packard is a wonderful international company, great technology company, and Mr. Hassell joined in January of 2000. He is a native of Newport News, Virginia, is a graduate of the College of William and Mary, and now reportedly lives in Washington, D.C. Is that correct?

Mr. HASSELL. My dad still lives in Richmond.

Senator ALLEN. All right. Well, you ought to get on the other side of the bridge.

At any rate, Ms. Frances West. Ms. West is the director of the Worldwide Accessibility Center at IBM. She is charged with the responsibility of establishing IBM's leadership and accessibility by promoting IBM technology through thought leadership, products, and solutions on a worldwide basis. Her team is based in the IBM research area but works across all divisions of IBM. She attended universities in Hong Kong and the United States, and earned her bachelors degree in marketing. Welcome, Ms. West.

Finally, Joseph Duffy. Mr. Duffy is the vice president of SAP Public Services, where he has responsibility for a number of key strategic initiatives and customer relationships. Mr. Duffy is the spokesperson for SAP's efforts in accessibility and the executive sponsor of numerous customer relationships in federal, state, and local government and utilities as well. Prior to joining SAP, he spent 17 years at their rival, Oracle, in a variety of executive and sales management positions. He received his bachelors degree from the University of Maryland and he has attended numerous business and trade education forums. He is a member of the board of directors of Plato Learning, which is the NASDAQ symbol TUTR, if you want to check it out. He resides with his family in Potomac, Maryland.

Welcome to you all. I thank you all for coming. What I would suggest we do—I assume you all have this agenda—Mr. Patton and Mr. Hassell will talk on the European collection. Then if we could have Mr. Harper and Mr. Klaessig talk about nanotechnology, and then Ms. West and Mr. Duffy on IT access. If there is no objection, I would like to proceed that way. We would like to hear first from Mr. Patton.

STATEMENT OF THOMAS B. PATTON, VICE PRESIDENT, GOVERNMENT RELATIONS, PHILIPS ELECTRONICS NORTH AMERICA, WASHINGTON, D.C.

Mr. PATTON. Thank you very much, Chairman Allen.

First, a couple of very quick reactions to the excellent testimony of Mr. Miller. If being a Virginian gets you your own panel, I deserve one too. I was born in Winchester, Virginia.

Senator ALLEN. Oh, great. Did you go to Apple Blossom last weekend?

Mr. PATTON. I did not get out there. Others in my family were there, though. I do reside in the District.

Senator ALLEN. Are you related to General Patton?

Mr. PATTON. No, sir.

Senator ALLEN. He went to VMI, you know.

Mr. PATTON. Yes, and my dad did as well.

Senator ALLEN. Great.

Mr. PATTON. Secondly, my son takes off for 6 weeks for biology camp this summer in Sanibel Island in the Keys. It is all outdoors, and it should be a lot of fun.

Senator ALLEN. See, that is the way to do it: incent it so it is fun.

Mr. PATTON. And thirdly, if you have to run for President to launch a bold initiative in the math and science area, there would be a few that would support that idea.

Senator ALLEN. All right. We have got to stay to relevant subjects here.

Mr. PATTON. Thank you for this opportunity. I appreciate being here. My name is Tom Patton, vice president for government relations with Philips Electronics North America Corporation, a subsidiary of Royal Philips Electronics.

As a health care, lifestyle, and technology company, Philips is a world leading manufacturer of medical devices, lighting products, consumer electronics, semiconductors, and domestic appliances. We employ more than 160,000 people worldwide, more than 30,000 in the United States. It invests more than $1 billion annually in research and development and we are proud to hold more than 115,000 patents.

I am testifying on behalf of Philips, of course, as well as the European-American Business Council, which is committed to fortifying U.S.-E.U. economic integration, growth and competitiveness by establishing an open transatlantic market that stimulates innovation, investment, economic growth, and job creation.

My testimony today addresses a matter of serious consequence for the transatlantic relationship and, indeed, to global economic growth and the future of technological innovation, especially innovation in digital content protection technologies, an area of great importance in the new digital era. Specifically, I speak of the urgent need to harmonize, rationalize, and modernize Europe's myriad national copyright levy regimes. These levies, which are administered on a country-by-country basis throughout the E.U. by national entities known as collecting societies, are remnants of a bygone era of the analog time and are, indeed, intended to provide remuneration to authors, artists, and other intellectual property rights holders for certain uses of copyrighted works. As these levies are being imposed in today's digital world, however, they threaten to stifle otherwise robust consumer demand for new digital products and services and perversely undermine innovation in technologies that promise to provide genuine intellectual property rights protection.

Absent swift and sweeping reform, technology companies such as Philips face an unacceptable array of risks and potential liability, all of which deter investment in new digital rights management and other advanced digital content protection systems needed to

prevent mass, indiscriminate, unauthorized redistribution of digital video and audio content over the Internet. The amount of levies imposed upon new high tech products, often based upon storage capacity, creates a lack of predictability and may artificially constrain consumer functionality because the levies militate against incorporating greater storage capacity.

Today a company seeking to introduce a new digital device or media to European consumers, including PC hard drives, MP3 players, DVD players and recorders, blank DVD's and CD's, faces a gauntlet of as many as 20 different national copyright levy regimes, all of which vary considerably in terms of the rate, the scope, complexity, structure, and payment processes.

For example, in France, levies imposed by that country's collecting society, SACEM, on blank DVD's now represent more than 47 percent of the final price for the consumer. In Germany, where their levy is on PC hard drives, as disk drive sizes expand to terabytes in notebooks and petabytes in home DVR's, the tax will far outweigh not just the cost of the drive, but the cost of the entire device. In Austria, the exorbitant levy imposed upon MP3 players has caused Philips to delay introduction of its Jukebox product in that country.

This creates nothing less than a toxic environment for investment and stands in marked contrast to that of the United States which has chosen, quite wisely—and thanks in large part to your leadership, Senator Allen—to promote innovation and economic growth in Internet-based services by shielding them from these very types of redundant and excessive taxes.

Philips suggests that there are three areas most in need of reform. The first is harmonization. Despite the continued best efforts of the European Commission to foster a uniform, rational European system of copyright levies, uneven and incomplete implementation of these objectives has, unfortunately, resulted in a patchwork quilt of outmoded, inefficient, and excessive levies, dramatically increasing the final sales price to consumers of many products or impeding their market introduction altogether. Potential reforms in this area might include standardized levies on agreed-upon products throughout Europe or eliminating the individual levies collected directly by collecting societies in favor of a payment of a fixed amount from a VAT tax.

The second area is better governance and increased transparency. There is a need to address the severe lack of basic good governance, transparency, and accountability in the way that national collecting societies operate. In particular, the arbitrary and discriminatory manner in which these levies are enforced is a major problem and has resulted in competitively disadvantaging the larger leading manufacturing companies, the ones most engaged in innovation, while virtually ignoring smaller competitors.

Philips supports efforts being undertaken by the EC to impose good governance rules on collecting societies and agrees that such rules are crucial. In particular, processes should be open, transparent, and nondiscriminatory, both to the manufacturers paying in and the rights owners being compensated.

Finally is the area of modernization. Technology companies such as Philips and major copyright owners agree that levies-based copy-

right protection systems are nothing less than archaic in light of the digital technology alternatives. Technology-based solutions make it easier for content owners to identify authors and articulate terms of usage, to establish prices and collect payment, and to determine, among other things, how content is delivered, accessed, and copied. As these technologies evolve, content providers are discovering new ways to use them, developing exciting new business models that allow them to better satisfy a broad spectrum of user requirements. The ultimate beneficiaries of these developments, of course, are consumers who can enjoy greater and more user-friendly opportunities to access and interact with digitally distributed content.

In this new digital environment, it is more important than ever that intellectual property laws and regulations strike an appropriate balance between a consumer's right to copy for personal and noncommercial use and content owners' right to protect their works from unauthorized redistribution, especially over the Internet.

In light of this need for a modern and balanced approach, Philips is particularly disturbed by the finding of a French court that recently ruled that DRM-based security features on DVD's are actually illegal, as they violate that country's private copying right. By outlawing DRM solutions for DVD's, the French court's decision does not appear to recognize or respect the need for such a balance, and unless overturned, that decision could harm innovation and uptake of similar technology solutions that offer much needed relief from that and other E.U. countries' oppressive system of levies.

In conclusion, Senator Allen, the current system of balkanized, excessive, and secretive national copyright levies in Europe is so flawed and so potentially harmful to global economic growth and technological innovation that it demands immediate, high level transatlantic cooperation. It would be most productive if this topic and the reforms we suggest could be given high priority at the United States-European Union summit next month.

Again, I thank you for the opportunity to appear before this subcommittee and would be pleased to answer any questions. Thank you.

[The prepared statement of Mr. Patton follows:]

PREPARED STATEMENT OF THOMAS B. PATTON

Thank you, Chairman Allen, ranking member Biden and members of the subcommittee. My name is Tom Patton, and I am Vice President for Government Relations with Philips Electronics North America Corporation, a subsidiary of Royal Philips Electronics headquartered in Amsterdam, The Netherlands. On behalf of the European-American Business Council, Philips welcomes the opportunity to participate in this subcommittee's hearing on U.S. and European regulations affecting emerging technologies.

Philips is a diversified global technology company employing more than 160,000 employees in over 60 countries worldwide, roughly 30,000 of whom work in the United States. Philips is a company focused on the physical and emotional well-being of its customers, manufacturing products as varied as defibrillators and medical diagnostic equipment, electric toothbrushes, electric shavers, and a full range of video and audio entertainment products from digital televisions to the Jukebox MP3 player. Philips is currently number 1 in the global markets for lighting, electric shavers, and DVD recorders, and we're number 2 in medical diagnostic imaging worldwide. Philips Consumer Electronics is the third largest consumer electronics company in the world and the largest in Europe. Together with Sony, Philips invented the technology that enabled the development of the CD and DVD industries.

Our company invests more than a billion dollars annually in research and development and holds more than 115,000 patents.

The transatlantic economic relationship is one of most important in the world. Bilateral trade and investment are powerful forces that have fostered prosperity and stability between the U.S. and Europe, as well as much of the world. In 2003, total transatlantic commercial exchanges reached $2.5 trillion, generating $77.1 billion in earnings for U.S. affiliates in Europe and $46.4 billion for European affiliates in the U.S. In that same period, total U.S. investment in Europe was $800 billion and total European investment in the U.S. was more than $1 trillion. Not surprisingly, this investment is a major engine for job growth, with 4.2 million people employed in the U.S. by European affiliates and 3.2 million people employed in the E.U. by U.S. affiliates. With eleven percent of the world's population and forty percent of its GDP, the U.S. and E.U. together are both an engine for global growth and leaders in standards-setting for the world. The European-American Business Council is committed to fortifying U.S.-E.U. economic integration, growth and competitiveness through regulatory convergence and free exchange of goods, services and capital. EABC pursues mutually beneficial solutions to U.S-E.U. trade barriers through enhanced government-to-industry dialogue across the Atlantic.

THE NATIONAL COPYRIGHT LEVY SYSTEM IN EUROPE IS BROKEN

My testimony today addresses a matter of real consequence to global economic growth and future technological innovation, and in particular, to the development and introduction of new and effective digital content protection technologies, exciting consumer digital entertainment devices and IT services. There is an urgent need to harmonize, rationalize, and modernize the laws and regulations that govern how intellectual property rights are protected and compensated in the European market.

Currently, throughout Europe, there exists a system of copyright levies, collected and distributed on a country-by-country basis throughout the E.U. by national entities known as "collecting societies." The purpose of these levies, which originated in the analog era, is to provide remuneration to authors, artists, and other intellectual property rights holders for certain uses of copyrighted works, some of which, such as certain home copying, are not subject to copyright control in the U.S. As these levies are being imposed in today's digital world, however, they are causing serious market distortions, threaten to stifle otherwise robust consumer demand for new digital products and services, and perversely undermine the very intellectual property rights protection that they are intended to promote.

Absent swift and sweeping reform of the myriad national copyright levy regimes operating in Europe, technology companies such as Philips face an unacceptable array of risks and potential liability, all of which deter investment in new digital rights management and other advanced digital content protection systems needed to prevent mass, indiscriminate, unauthorized redistribution of digital video and audio content over the Internet. The amount of levies imposed upon new high-tech products, often based upon storage capacity, creates a lack of predictability and may artificially constrain consumer functionality because the levies militate against incorporating greater storage capacity. The balance of trade deficit for the United States will worsen because both the American entertainment and high-tech industries stand to lose significant revenues under the current levy system.

The negative consequences of this increasingly out-of-control system of levies on global economic growth and technological innovation are so serious and immediate that reform of the system should be accorded real priority in next month's U.S.-E.U. summit.

Of particular concern to Philips is the evolution of these copyright levies—functionally consumer taxes—on the sale of virtually anything capable of storing or recording digital data. Today, a company seeking to introduce a new digital device or media to European consumers, including PC hard drives, MP3 players, DVD player/recorders, blank DVDs, and CDs, faces a gauntlet of as many as 20 different national copyright levy regimes, all of which vary considerably in terms of rate (as well as the metrics used to assess that rate), scope, complexity, structure, and payment processes.

For example, in France, levies imposed by SACEM on blank DVDs now represent more than 47 percent of the final price for the consumer. In Germany, where there is a levy on PC hard drives, as disk drive sizes expands to terabytes in notebooks and petabytes in home DVRs, the tax will far outweigh not just the cost of the drive, but the cost of the entire device! In Spain, a multi-function copier/fax/printer costs around €79 (approx. $102) (including 16% VAT). Spain's collecting society, SGAE, imposes a levy on that device of slightly more than €45, which is also subject to a 16% VAT, thus increasing the final price to the consumer by 66 percent, to €131

(approx. $170). In Austria, the exorbitant levy imposed upon MP3 players has caused Philips to delay introduction of its "Jukebox" product in that country.

The trend line is clear. Ever-increasing levy rates are being exacted by national collecting societies across Europe without any semblance of uniformity on an ever-increasing number of digital consumer electronics devices and blank media. To make matters worse, the irregular manner in which these levies are imposed and enforced disproportionately harms the most innovative technology companies, often ignoring entirely lesser-known "copy-cat" manufacturers. Indeed, in a perverse twist, the more modern the product, the more cutting-edge the technology, and the earlier its introduction to the market, the greater is the risk. In short, the national levy system in Europe turns all of the fundamental laws of capitalism on their heads.

The net effect of these disparate, unevenly enforced and unreasonably high copyright levies is nothing less than a toxic investment environment for U.S. and European companies, including Philips, that are at the forefront of digital technology innovation. How can technology companies justify the enormous initial investments required for innovation, including innovation in the very types of technologies that offer a better solution to protecting digital content, if they cannot even plan new products because of the unpredictable effect of ever-increasing and redundant copyright levies? The answer is they cannot.

It's important to point out that the current approach in many E.U. Member Countries to tax emerging technologies as much as possible stands in marked contrast to that of the U.S., particularly this country's decision—thanks in large part to your leadership, Mr. Chairman—to promote innovation and economic growth in Internet-based services by shielding them from these very types of redundant and excessive taxes. Thank you. We hope you will agree that, for the sake of preserving and promoting a vibrant and healthy transatlantic economy, and the enormous benefits that clearly flow from that, a similar approach is desperately needed in Europe.

NEEDED REFORMS

There are three distinct areas of reform that need to be undertaken immediately: harmonization, vastly increased transparency, and, most importantly, a fundamental re-examination leading to modernization.

1. Harmonization

Despite the continued best efforts of the European Commission (initially through its adoption its 2001 Copyright Directive (implementing its obligations under the WIPO Treaty) and today in its pending review of Member Countries' implementation of that Directive) to attempt to foster a more harmonized and rational system of laws to protect intellectual property and preserve and promote technology innovation and competition, uneven and incomplete implementation of these objectives by E.U. Member Countries has unfortunately resulted in a patchwork quilt of outmoded, inefficient and excessive levies—either increasing the final sales price to consumers of many products or impeding their introduction into the market altogether. This maze of disparate copyright levies distorts cross-border trade and creates massive inefficiencies and costly administrative burdens. It competitively disadvantages leading manufacturing companies which bear the brunt of the levies. Potential reforms in this area might include standardized levies on agreed upon products throughout Europe or eliminating the individual levies collected directly by collecting societies in favor of payment of a fixed amount from a VAT tax.

2. Governance and transparency

There also is a need to address the severe lack of basic "good governance," transparency and accountability in the way that national collecting societies operate. Incredibly, the manner in which these quasi-governmental, quasi-private entities operate and set levies is closed to public scrutiny with little meaningful opportunity for stakeholders to participate in the levy-setting or distribution processes or to object to these levies once established. The arbitrary and discriminatory manner in which these levies are enforced is contrary to every basic tenet of fairness. Moreover, even most of the largest and most creative content owners, whose intellectual property rights these levies are supposed to protect, strongly oppose the current system because it does not serve the core purpose of protecting their digital content; instead it simply favors a select group of domestic rights holders or other pet parochial projects.

Philips supports efforts being undertaken by the E.C. to impose "good governance" rules on collecting societies, and agrees that such rules are crucial. In particular, processes should be open, transparent and nondiscriminatory. Stakeholders should be able to contest tariffs through efficient, open and cost-effective procedures con-

ducted by an independent third party, with appeal to the E.U. as necessary and appropriate. Similarly, collection societies should be required to publish detailed information on the amounts they collect and the distributions they make.

3. Modernization that emphasizes digital content protection technology solutions

The problems with the national system of copyright levies are so acute today that these first two major areas of reforms must be implemented right away. They are not, however, substitutes for a fundamental re-examination of the levy system and development of a modernized system that reflects the realities—and responds to the imperatives—of the digital era in which we now live.

Technology companies such as Philips and major copyright owners such as U.S. motion picture studios and record companies stand united in the belief that the advent of digital technology demands a new paradigm in which digital content protection technologies and digital rights management systems—not taxes—play a paramount role in ensuring that rights owners are appropriately and adequately compensated for their works and that those works are better protected from indiscriminate, unauthorized redistribution.

In fact, levies-based copyright protection systems are nothing less than archaic in light of the digital technology alternatives. Technology-based solutions make it easier for content owners to identify authors and articulate terms of usage, to establish prices and collect payment, and to determine, among other things, how content is delivered, accessed and copied. As these technologies evolve, content providers are discovering new ways to use them, developing exciting new business models that allow them to better satisfy a broad spectrum of user requirements. The ultimate beneficiaries of these developments, of course, are consumers, who can enjoy greater and more user-friendly opportunities to access and interact with digitally-distributed content.

It is no wonder that the content industry prefers DRM-based solutions over private copy levies. As one major content industry association executive recently stated, "Private copy levies impose a cost on all consumers, whether or not they copy, and distribute the proceeds imprecisely and with high overhead."

For these reasons, Philips and the EABC agree with the European Commission that DRM solutions represent ". . . an important, if not the most important, tool for rights management in the [European] market of the new digital services." Indeed, we urge that copyright regimes must be modernized not only to reflect the availability and effectiveness of these technologies, but to promote their development and use.

The outlook for technology alternatives in the European context, however, is not particularly good. Just last month, a French court, reversing a lower court ruling in the *Que Choisir* case, ruled that DRM-based security features on DVDs are actually illegal, as they violate that country's private copying right. In this new digital environment, it is more important than ever that intellectual property laws and regulations strike an appropriate balance between a consumer's right to copy for personal and non-commercial use, and content owners' right to protect their works from unauthorized redistribution especially over the Internet. By outlawing DRM solutions for DVDs, the French court's decision does not appear to recognize or respect the need for such a balance, and, unless overturned, that decision could harm innovation and uptake of similar technologies solutions that offer much needed relief from that and other E.U. countries' oppressive system of levies.

CONCLUSION

The current system of balkanized, excessive and secretive national copyright levies in Europe is so flawed and so potentially harmful to global economic growth and technological innovation that it demands immediate, high level transatlantic cooperation. It would be most productive if this topic could be given high priority at the United States-European Union Summit next month.

Again, I thank you for the opportunity to appear before this subcommittee and would be pleased to answer any questions.

Senator ALLEN. Thank you for your testimony, Mr. Patton.

I want to actually ask questions at the end, but there are some that just hit me. With these balkanized approaches, what people do in this country is they just trade over the borders. If certain things are cheaper on one side of the border in different States, they go over there and buy it. Does, say, a French person—or whatever that was that cost so much there—go over to Switzerland or to Ger-

many or Belgium and buy it, or does somebody from Germany go to Austria. Or does somebody from Austria where you were not putting in the MP3, I think you were saying, just go to Hungary or to Germany and buy them there where the levies are less?

Mr. PATTON. Yes, Senator. It is hard to know what exact numbers to attribute to that kind of reaction by the consumer in the marketplace. Because the marketplace is so distorted by these various collecting societies and the levies that they produce, it is not clear where one would go to avoid these. But it is definitely changing the consumers' behavior in these markets.

The distortion leads to a variety of other problems as well. A great market for products that are not paying the levies is a very lucrative market for these products. It is changing the business behavior. You would think that you would come to the point where you might ignore these arbitrary and discriminatory kinds of programs, but then you find yourself at the place such as in the French courts where your DRM solutions, for example, are deemed illegal. So it is a system in much need of repair.

Senator ALLEN. Thank you, Mr. Patton. And it should be made a priority. That is one of the reasons we held this hearing at this time before that meeting. Thank you.

Mr. Hassell.

STATEMENT OF JOHN D. HASSELL, DIRECTOR OF FEDERAL AND STATE GOVERNMENT AFFAIRS, HEWLETT-PACKARD COMPANY, WASHINGTON, D.C.

Mr. HASSELL. Good afternoon, Senator Allen. Thank you. My name is John Hassell. I am director of federal and state government affairs for Hewlett-Packard Company. I thank you, Mr. Chairman, and the committee for hosting this hearing on several issues of importance to HP.

Senator ALLEN. By the way, let me interrupt briefly. Your entire testimony, just for time—and I do not know when we are going to get another vote. If you could summarize your statements and your key points, that would be appreciated. Your whole statement will be made a part of the record. I just do not want folks getting cut off. So if each of you all could summarize your statement in 5 to 7 minutes, that might be helpful just in the caution of votes and time. Excuse me, Mr. Hassell.

Mr. HASSELL. Thank you. I will be brief.

As you are well aware, the world is experiencing a digital entertainment revolution where the consumer is in charge. Using new technologies, consumers are now able to have a digital mobile, virtual, and personal experience with content in ways never before imagined. As the largest consumer IT company, HP stands firmly at the center of this revolution. We are striving to build every one of our consumer devices to ensure an exciting and rewarding experience for consumers, while at the same time respecting and supporting intellectual property.

HP is committed to three principles to support digital rights management: one, to emphasize the consumer experience; two, to build reasonable content protection solutions; and three, to respect intellectual property and copyright.

Unfortunately, our efforts and the efforts of others in the tech industry to give consumers these exciting opportunities are being undermined by private copyright levies. Tax-like levies were developed almost 50 years ago at a time when it was impossible to ensure that authors received fair compensation for uses of their works. Today, however, technologies like digital rights management systems make it possible for consumers to fully enjoy works while preventing unauthorized uses.

While DRM's are complex in their workings, what they mean at a practical level is that content creators, the right holders, are able to control how their works are enjoyed and to set license fees accordingly. At the same time, DRM's enhance the consumer experience as well by offering new and simpler ways for users to enjoy copyrighted works.

HP is active in this space. One of our products includes the HP DVD movie writer, the first system in the industry to respect digital rights, informing the consumer only when content cannot be legally copied.

Despite the development of tools like this one, we continue to see the virtual unfettered expansion of tax-like levy regimes throughout Europe. HP is currently paying levies on CD and DVD burners, as well as multi-functional devices such as copies and scanners. In Germany, a recent court judgment now under appeal upheld the extension of levies to PC's. HP is engaged in separate litigation regarding the application of these levies to printers. In some instances, proposed levies have even exceeded the cost of the product being levied. In others, competing collecting societies are seeking levies on the same products.

We seek the subcommittee's support to address the challenges brought on by copyright levies. At the outset, I want to stress the E.U.'s constructive role in this issue. It is important to note that the expansion of levies, without regard to DRM's, is happening in spite of E.U. law to the contrary. Indeed, the E.U. has worked closely with HP and other companies in an effort to ensure these limitations are respected in practice. For this, we are grateful.

We ask you to do two things, Mr. Chairman. We respectfully urge the subcommittee to express its support to the E.U. in these efforts. As the E.U. currently considers broad-based legislation on collective rights management, the IT industry has called upon it to take this opportunity to review the functioning of national levies regimes. We ask the E.U. to impose clear parameters to limit efforts to expand those regimes into the digital arena. Specifically, Mr. Chairman, we request that you communicate support for this position to Commissioner McGreevy, the commissioner for internal market and services, and other counterparts in Europe.

At the same time, secondly, countries outside of Europe are studying whether they should expand levies regimes to cover digital products. We believe U.S. free trade agreements should include language opposing the establishment of new levy systems and calling for the phase-out of existing levies. We ask for your support in this effort as well.

Thank you again for your leadership on this issue and for holding this hearing. I stand ready to answer any questions you may have.

[The prepared statement of Mr. Hassell follows:]

PREPARED STATEMENT OF JOHN HASSELL

Good afternoon. My name is John Hassell. I am the Director for Federal and State Government Affairs for the Hewlett-Packard Company. HP is a technology solutions provider to consumers, businesses and institutions globally. The company's offerings span IT infrastructure, global services, business and home computing, and imaging and printing, with annual revenue exceeding $81 billion.

I thank the committee for hosting this hearing and for giving me the opportunity to testify today. We applaud that you have chosen for consideration three issues of critical importance to HP. In my testimony, intend to address the increasingly important issue of European "private copy levies."

As my testimony will demonstrate, levies are now outdated and pose a significant threat to the interests of authors, consumers and technology developers. They were developed almost 50 years ago, at a time when it was impossible to ensure that authors received fair compensation for uses of their music or movies. Today, technologies like digital rights management make it possible for both the consumer to fully enjoy the work while preventing unauthorized uses. The tax-like levy raises costs to all, and creates the misimpression that piracy is sanctioned. This was never the goal of levies, and it constitutes bad public policy.

We believe that circumstances have evolved to the point where the rough justice that justified levies in the first place is no longer good policy. E.U. law recognizes this change. But many European countries persist not only in maintaining their levies regimes, but in expanding them to new areas. The net result is increased costs to consumers, who end up paying two or three times for the music and movies they acquire.

We seek your support in addressing this challenge. More specifically, we ask that the subcommittee support the E.U.'s efforts to address national levies regimes through its upcoming directive on collective rights management. We also recommend that U.S. trade agreements include language opposing the establishment of new levy systems and calling for the phase-out of existing levies.

ORIGIN OF COPYRIGHT-RELATED LEVIES

I would like to start my testimony by offering a brief explanation of the origins of the levy system in Europe for those of you unfamiliar with this system.

Many European Union member states have what is known as a "private copy exception" in their copyright laws. This exception permits users in certain situations to reproduce copyrighted works such as music and movies for personal use. (Notably, there is no private copy exception for software).

This exception raised a problem of remuneration for authors, however. In the days of analog works, it was extremely difficult for authors and right holders to monitor or administer the private copy exception. There was no effective way for right holders to control how and when private copies of their copyrighted works were made. Similarly, there was no effective way for them to track the number of private copies being made or to be remunerated directly for those copies.

The levies system emerged in the 1960s as a response to those challenges. In essence, a levy is similar to a tax added to the purchase price of blank media and recording and reproduction devices. Many European states now have legislation that allows national "collecting societies" (independent and quasi-governmental associations responsible for administering levies regimes) to set the amount of the levy, determine the media and devices that would be covered by the levy and handle distribution of the funds collected. As a general matter, a percentage of the levy collected is distributed to authors and right holders; a percentage is used for the cost of administering the levy; and, in some instances, an amount is also set aside to support national cultural funds or projects.

Although so-called "private copy" levies have never been able to accurately reflect the actual value and use of any particular work, they were deemed to be the only practical method to compensate right holders for private copy exceptions in the analog era. In short, levies reflected a compromise solution in a world where the technology did not exist to manage particular uses of works.

LEVIES TODAY: THE DIGITAL DIMENSION

In today's digital world, the fundamental premise that underlies levy regimes—the author's inability to control private uses of his or her work—has been eroded dramatically. Indeed, technology now enables right holders to exercise far greater control over the use of their works and to be compensated accurately for such uses.

These technologies are commonly referred to as "digital rights management" technologies or "DRMs." DRMs are among the most important and most exciting emerging technologies. While these technologies are complex in their workings, what they mean at a practical level is that authors and right holders are able to control how their works are enjoyed and to set license fees accordingly. Authors, composers, recording companies and even collecting societies are now using DRM systems to identify content and authors, to set forth acceptable uses, to establish prices and to grant licenses directly and automatically to individual users. At the same time, DRMs enhance the consumer experience as well, by offering new and simpler ways for users to enjoy copyrighted works.

HP is very active in the DRM space. Our activities in this area, which are focused on enhancing the consumer experience, building reasonable solutions for respecting creative content, and respecting copyright, include the following:

- HP created HP DVD Movie Writer, the first system in the industry to respect digital rights, informing the consumer only when content cannot be legally copied;
- HP allied with Apple on iTunes and iPod to deliver the best music experience possible;
- HP developed VCPS with Philips, and licensed other industry leading DRM technologies;
- HP collaborates with numerous standards bodies and industry consortia to further next generation technologies, such as the Advanced Access Copyright System, Open Mobile Alliance DRM, Content Management Licensing Administrator, and DVD Copy Control Association;
- HP is a founding member of the Coral Consortium, a cross-industry group to promote interoperability between DRM technologies used in the consumer media market.

The above are only a few examples of HP's commitment to ensuring a simple, affordable and enjoyable entertainment experience that is supported by a fair business model for content providers.

Tools like the ones described above are enabling right holders to manage their works directly and thus are eliminating the need for traditional levies. In light of these developments, one would anticipate that levies would be scaled back. This has not been the case, however. Instead, we have consistently seen the expansion of levies regimes throughout Europe—including the systematic extension of levies to digital media and equipment and an ongoing increase in the amount of levies demanded by collecting societies.

It is important to note that the expansion of levies is happening despite a 200 law adopted by the European Union that instructs Member States to the contrary. The "Copyright Directive"—which brings European copyright law into the digital age—makes clear that levy regimes must be adjusted to reflect the application of DRMs. The majority of Member States and national collecting societies have yet to implement this obligation in practice, however.

Instead, despite the increasing usage of DRMs, national collecting societies are applying levies to an expanded universe of products. Depending on national legislation, levies are being extended to digital equipment such as PCs, printers, mobilephones, personal video recorders and portable music players, fax machines, copiers, scanners as well as to a wide variety of media (hard disks, memory cards, CM, DVD-R). In some Member States, proposed levies have exceeded the cost of the product being levied. In others, competing collecting societies are seeking levies on the same products.

To take just one example of particular significance to HP, in Germany, a high-profile case brought by the collecting society VG Wort against Fujitsu Siemens has extended the levies regime to PCs, notebooks and servers. After unsuccessful negotiations with industry, VG Wort chose to bring a test case against Fujitsu Siemens, arguing that its products could be used for copying and therefore should be subject to levies. Earlier this year, its claim was successful and in fact, the court initially declared that the levy should be applied retroactively to include all machines sold since 2001, when the claim was first made. (The court did rule, however, that the levy should be 12 Euros for each new PC sold rather than 30 Euros as originally sought by the collecting society.) Fujitsu Siemens was supported during the proceedings by other hardware manufacturers, including HP, and has filed an appeal against the decision. The ultimate decision will apply to other manufacturers as well.

The German levy would be in spite of the fact that PCs are used for many other purposes than making private copies of copyrighted works. (As noted, there is no

private copy exception for software and thus no levy applicable to software reproductions). Similar litigation is under way between VG Wort and HP and Lexmark, concerning attempted levies sought on printers. Applying levies to multi-functional products necessarily opens the door to the application of levies to all sorts of other hardware equipped with memory chips: radio and television sets, digital cameras, digital video units, telephones, car stereos, automobile information systems, watches—the possibilities are endless. If this path is followed, an increasingly large number of users will end up subsidizing the activities of a small group of private copiers.

THE IMPACT OF LEVIES ON DIGITAL PRODUCTS

Before reviewing the broad and often detrimental effects of digital private copy levies, let me begin by saying that HP is committed to fair and full remuneration for rights owners for the use of their products. What we question is whether levies are the best way to attain this end—especially in light of digital developments which call into question the necessity of levies. HP hopes to partner with interested stakeholders in the transition away from a levies-based system to a world of reasonable, consumer-friendly solutions for respecting creative content.

The Impact on Consumers

Levies as a general rule are paid by IT product manufacturers and importers. Ultimately, however, the consumer shares this burden.

Where DRMs are in place, a levy on digital products means a consumer may pay two or more times for private copies. For example, when a consumer purchases her favorite song through a DRM-enabled on-line music store for use on her MP3 player, the artist receives a direct payment for her use of the song and for a specified number of "private" copies. If collecting societies have their way, that consumer will also pay a levy on the device. If she stores the song in her PC, she might pay a levy on the PC, on the CD-burner embedded in the PC and on the blank CD used to hold the song.

The increasing popularity of on-line music and movies services that employ DRM technologies and the increasing number of digital devices covered by the levy system can only mean that more and more consumers will be charged multiple times for the right to make a copy. This decreases consumer enthusiasm for DRMs. It also means right holders have little incentive to apply DRMs to their works.

At a more general level, levies are a tax on digital products. As such they raise the cost of technology to a country's citizens. When a collecting society establishes a levy on a new product or raises the price of a levy on an existing product, the increased price necessarily results in a lower demand for such products. The result of this "tax" is that fewer people possess the newest technological products, slowing the uptake of new technologies and widening the digital divide.This tax also suppresses sales by U.S. information and communication technology (ICT) companies in Europe and reduces investment in, and the development of, DRM-enabled businesses like those that have flourished in the United States.

Impact on Industry

Two major studies have been conducted to calculate the significant costs to industry that levies impose. The first study, undertaken by Rightscom and commissioned by the Business Software Alliance in September 2003,[1] examined the impact of levies in France, Germany, Italy, the Netherlands and Spain. The study predicted. that between 2002 and 2006 the total amounts of levies collected in these five countries would increase by threefold—from $380 million in 2003 to over one billion U.S. dollars in 2006. This analysis was based on the fact that levies now cover more products and that levy rates are increasing. If proposed levies on additional products, such as the German levy on PCs, continue to be enforced, the study estimated that the total amount collected in 2006 could increase to over $1.5 billion.

A second study sought to assess lost sales (of PCs, portable music players, and printers) as a result of increased prices brought-about by the private copy levies. This study from Nathan Associates,[2] concludes that the cost of levies to the technology industry, depending on the elasticity of the price of the product, could range from $808 million to $8.8 billion per year.

These costs are staggering. Few but the largest technology providers can bear them. And faced with demands that can be both arbitrary and unpredictable and that differ from one Member State to another, levies also impair industry's ability

[1] http://www.bsa.org

[2] Presentation delivered in Maryland, USA "Impact of Content Rights Compensation Levies: Lost Sales Revenue Worldwide." April 28, 2003, Robert Damuth, Vice President Nathan Associates, www.nathaninc.com

to develop coherent, E.U.-wide business strategies. Add to this the fact that levies on digital products suppress demand for those products and hinder the roll-out of DRM-enabled content delivery systems and the reason for the concern of the technology industries becomes evident.

Impact on Authors and Right Holders

Even authors and right holders—the intended beneficiaries of levy systems—have significant concerns with how these systems are operated. Many of these revolve around the transparency of the system and the way in which levies are distributed. At present, it can be difficult for authors (and consumers and manufacturers as well) to understand how levy rates are assessed, on what products they apply and how they are distributed.

In a number of countries, for example, an artist will only receive compensation if he or she is a member of a particular collecting society—leaving non-members with little recourse. Because a portion of the funds collected are used to pay the collecting societies' administrative expenses, right holders often receive distributions that represent only a fraction of what they would receive if they were compensated directly.

Contribution to Piracy

As this Committee knows well, right holders suffer significant harm as a result of copyright piracy. Users of digital audio and audio-visual works can and do mistake private copy levies—which are intended to compensate right holders for lawful private copying only—for an "open-license" to copy content freely. Levies quickly become a "license to pirate." At the same time, the presence of levies in a market can also hamper or undermine investment in DRM-enabled products and services that would seem to offer the best avenue for curtailing rampant illegal file-sharing.

Recommendations to the Subcommittee

Before making any recommendations, I want to stress the E.U.'s constructive role on this issue. As I noted above, European law includes many important safeguards to avoid the unfettered expansion of levies regimes. The ELI has worked closely with HP and other companies in an effort to ensure these limitations are respected in practice. For this, we are grateful.

I also want to reiterate HP's commitment to DRM technologies and to ensuring regulatory systems that enable, rather than obstruct, these technologies. It is part of HP's core mission to ensure and advance the consumer's ability to easily enjoy entertainment on any device, in any format, while making new business models possible. Levies, improperly considered, can and do stand in the way of this mission.

This is why HP and other technology providers have been extremely active on the levies issue in Europe both independently and through trade associations including the Business Software Alliance and EICTA, the European ICT industry association.

We respectfully request the committee's support in our efforts:

- First, we urge the committee to express its support for E.U. efforts to rationalize national levies regimes. Led by its Directorate on the Internal Market, the E.U. is currently considering broad-based legislation on collective rights management. The ICT industry in Europe has called upon the E.U. to take this opportunity to review the functioning of national levies regimes and impose clear parameters on national efforts to expand those regimes into the digital arena. We ask that you communicate support for our request to your counterparts in Europe. We understand that there is an E.U.-U.S. Ministerial Summit scheduled for June 2005. This might be an appropriate opportunity to express the U.S. Government's interest and concerns surrounding this issue.
- At the same time, countries outside of Europe are studying whether they should expand levies regimes to cover digital products. We believe U.S. trade agreements should include language opposing the establishment of new levy systems and calling for the phase-out of existing levies. We ask for your support in this effort.

I thank you for your time today and stand ready to answer any questions you may have.

Senator ALLEN. Thank you, Mr. Hassell. As I stated to all of you all here, one of the reasons we are having this hearing is the timeliness of it. To the extent we get your information, it is actually great to get it from a U.S. company, as well as a Dutch company,

that does business not just in Europe and the U.S. but throughout the world. We thank you for your testimony. We will act on that.

Now I would like to shift to our two panelists concerning nanotechnology. We will first hear from Mr. Harper.

STATEMENT OF STEPHEN F. HARPER, DIRECTOR, ENVIRONMENTAL, HEALTH AND SAFETY POLICY, INTEL CORPORATION, WASHINGTON, D.C.

Mr. HARPER. Thank you, Senator. I direct Intel's global environmental, health, and safety policy activity and nanotechnology, in part, falls underneath that umbrella.

I want to express our appreciation, as was mentioned earlier, for your leadership in establishing the congressional Nanotechnology Caucus, which we think is a great development.

I am here representing Intel and EABC. Tom Patton already introduced EABC. Hopefully you are familiar with Intel.

I think the critical data point here is that we are a global company with operations throughout the world. We have very significant manufacturing and other operations in Europe, as well as the United States and Asia. I am going to really basically focus on one key issue with several different dimensions of it. That issue is the need for cooperation in addition to competition between the United States and Europe with respect both to the science of nanotechnology but also with respect to the environmental, health, and safety regulation of nanotechnology moving forward.

Intel's interest in nanotechnology is multifaceted. In the immediate term, we are today creating devices that feature transistors that are smaller than 100 nanometers in width. That is the classic definition of nanotechnology. These nano features are the reason why our current Pentium IV processors have more than 100 million transistors on them and why we just prototyped a new Itanium II processor that has 17 billion transistors in it. We cannot do that without the small feature of the nanotechnology.

In terms of dollar value of product, advanced semiconductors currently represent by far the biggest slice of the current nanotechnology marketplace.

The size of our current transistors and circuits are so small that they are difficult to fathom, at least for this political scientist, as opposed to a physical scientist. The best way to appreciate their size is in relation to more familiar objects. Later this year, we are going to introduce chips that have transistor gates that measure less than 35 nanometers across. At that size, approximately 100 of these transistor gates—and that is the switch that flips the transistor on and off—can fit within the diameter of a human red blood cell.

For the foreseeable future, semiconductors will continue to rely on traditional silicon-based technology, what we have used for many years. But perhaps approaching around 2020, we anticipate running up against physical limitations that will hamper the ability to continue to use silicon-based approaches. At that point chip manufacturing may rely on new nanomaterials such as carbon nanotubes and nanowires to continue along the progress of Moore's Law.

The year 2020 sounds like a long time away, but because of the complexity of the technical work that must be done to invent and implement the nanotechnology future, Intel and the semiconductor industry have begun investing in a major way in the research and development to bridge to that future. Much of this work takes place in the context of what is called the International Technology Roadmap for Semiconductors, or ITRS. The ITRS lays out the priority scientific and environmental challenges that must be met in order to continue progress along the trajectory of Moore's Law. It is important to emphasize that the ITRS and much of the current nanotechnology research and development work being done in our industry is viewed as pre-competitive. Companies from across the industry from around the world are pursuing a common basic research agenda, working through cooperative institutions like Sematech and the Semiconductor Research Corporation to solve some of the important physical issues associated with continuing along Moore's Law.

I have referred now several times to Moore's Law. It is the 40th anniversary of Moore's Law last month and hopefully most people have at least heard of it. But why care? Why does Moore's Law matter?

Forty years ago Gordon Moore, one of the founders of Intel, predicted that the number of transistors and integrated circuits would double every year. That was later extended to every 2 years. Moore's observation—it really is an observation rather than a law—really focuses on two phenomena: increasing density of transistors on semiconductors and a radical decrease in the cost per transistor. Although it is not a law—it is an observation—it has functioned as a law in our industry because it has driven the pace of innovation, research, and development.

So who cares about Moore's Law? Maybe that is something interesting to semiconductor geeks or IT technologists only, but progress along the trajectory of Moore's Law has translated into cost decreases for a wide range of products that depend on semiconductors: computers, telecommunications equipment, automobiles, scientific equipment, and the like. Falling prices for information technology products have driven the rapid proliferation of IT throughout the world's economy, and the diffusion of IT has been the biggest single reason for the recent historic acceleration of U.S. economic productivity growth which, as Harris Miller pointed out at the beginning of the hearing, is key to the advancement and improvement of our standard of living.

Pre-competitive research and development in our industry has been essential to continuing along Moore's Law. We believe it will be even more important as we continue further into the realm of nanomaterials. This cooperation needs to be international in scope, combining the best research minds in the industry and government, as well as university labs, no matter where those best minds are. This is somewhat at odds with the spirit of numerous government reports and communications on nanotechnology from the U.S. Government, from Europe and Japan that portray nanotechnology as the next space race, as the proverbial goose that may lay the golden economic egg down the road.

My message today is we need a balance, a balance of competition and cooperation, when it comes to the applications of nanotechnology. International cooperation is also critical in the realm of the implications of nanotechnology, especially the environmental, health, and safety implications of this new magic. Research initiatives launched pursuant to the National Nanotechnology Initiative need to be undertaken in cognizance of and, where appropriate, in cooperation with parallel activities in Europe and elsewhere.

At this point I want to stress the value we place in the NNI, and your nanotechnology bill of 2003 was critical in helping to establish a statutory basis for that program, and we appreciate that. In a very short period of time, the NNI staff, with support from the agencies that participate in the NNI and support from Congress, have developed a very robust program of activities. In the semiconductor industry, we are active in a series of NNI/Semiconductor Research Corporation, or SRC, joint work groups focusing on a variety of nanotechnology technical issues, including environmental, health, and safety.

The NNI/SRC focus on the EHS dimensions of nanotechnology is part of a broader trend of NNI focusing on the implications of this technology. We support these activities. Indeed, we believe more attention and resources need to be devoted to this important task of identifying and reducing the EHS risks of nanotechnology.

Intel's own EHS management activities in the nanotechnology realm have two primary focal points. In the immediate term, we are committed to ensuring the safety of our own workers in the research and development operations where we work with nanomaterials. Longer-term we have an interest in the responsible development and deployment of nanotechnology, ensuring that attention is paid to the implications, as well as the applications. What we want to avoid is for the trajectory of nanotechnology to follow that of genetically-modified organisms, or GMO's. In the case of GMO's, which has been a hot button issue between the U.S. and the E.U., in our view the deployment of the applications outpaced attention to the environmental, health, and safety implications of the technology. Public concerns that arose because of this phenomenon have significantly retarded the realization of GMO's great commercial potential.

Finally, I want to focus on the issue of government regulation of the EHS aspects of nanotechnology. Drawing lessons once again from the precedent of GMO's, government regulation of nanotechnology may be essential to long-term public acceptance of new technologies like nano. This probably is especially true in the European Union where the precautionary approach underlies their basic approach to these issues. But I want to caution—and this is the difficult aspect of the issue—that while we think governmental oversight of this new technology is important to public acceptance, we very much want to avoid overregulation that does have the potential, as you alluded to in the previous context, of killing this golden goose.

While the two governments, U.S. and E.U., are beginning to sort out how they want to regulate nano, there is need for cooperation across the Atlantic. Because progress on the scientific aspects of

nanotechnology will depend in part on international cooperation, there is a parallel need for cooperation in assessing and addressing the environmental implications. The emergence of significant differences in the regulatory approaches across the Atlantic does have the potential in the future to undercut the cooperation on the science. So the two are interrelated.

Specifically what is called for is open cooperation and sharing in the generation of data concerning the risks, as well as the benefits, of nanotechnology. Sensible regulations need to be based on good science and accumulating data from credible scientific studies. We need an international research strategy focused on the potential environmental, health, and safety risks of nanotechnology, as well as the benefits, with a very broad sharing of research results and coordination of research efforts.

With that I will end and be glad to answer any questions. Thank you.

[The prepared statement of Mr. Harper follows:]

PREPARED STATEMENT OF STEPHEN HARPER

Thank you, Senator Allen and committee members, for this opportunity to discuss an important topic—nanotechnology in the context of U.S.-European relations. I am Stephen Harper, director of environmental, health and safety policy at Intel Corporation. I am here representing Intel as well as the European-American Business Council (EABC).

EABC is a trans-Atlantic, trans-sectoral alliance network of 43 U.S.- and European-based global companies. EABC's mission is to enhance U.S. and European economic competitiveness through government-to-government and government-to-industry policy collaboration. The EABC believes that smart trans-Atlantic regulatory alignment can truly add to productivity gains. Today I want to emphasize several key themes:

- First, innovation in the semiconductor industry has been a principal driver of recent U.S. gains in economic productivity and significant improvements in health care and other fields benefiting humanity.
- Second, looking into the not-too-distant future, continued progress in the semiconductor industry will depend on progress in the development of nanotechnology. Just as semiconductor technology is the competitive edge of the Information Age, so nanotechnology will be the competitive edge of semiconductor technology in the future.
- Third, continued progress in the development of nanotechnology depends in significant measure on international cooperation in key areas of research and development. The opportunities and challenges simply are too great for one nation, or a national industry, to try to tackle them in isolation.
- Fourth, the evolution of an appropriate environmental, health, and safety (EHS) regulatory framework for addressing potential nanotechnology risks will be critical to the ultimate public acceptance of this new technology. International cooperation, especially between the U.S. and Europe, will be key here as well.
- The U.S. government, focused through the National Nanotechnology Initiative, can help ensure international cooperation regarding EHS regulation of nanotechnology.

Before I delve into each of these themes, let me first focus on Intel—who we are and why we care about nanotechnology.

Intel, as you know, is the largest and leading semiconductor company in the world. Founded in 1968, Intel today employs 87,000 employees worldwide, with 2004 revenue of approximately $34 billion. Although known primarily for our Pentium® and Centrino® products, Intel markets over 450 products and services.

Intel also is a global company, with 294 offices and facilities in 48 countries. Intel has a major manufacturing presence in the United States, with 49,000 U.S.-based employees and major production facilities in Oregon, Arizona, New Mexico, Colorado, Washington, and Massachusetts. We continue to have major research, design, and other facilities in California, in addition to our corporate headquarters.

Importantly in the context of today's hearing, Intel also has a major investment in Europe. Leixlip, Ireland, in the suburbs of Dublin, is home to two Intel factories or "fabs," employing 3,300. In addition to Ireland, we have significant design and research facilities in the UK, Denmark, and Germany. Specifically focused on nanotechnology, we participate in the Irish Nanotechnology Research Center as well as a research center in Belgium. Reflecting our production, design, and research investments in the European Union, we also participate in a number of industry trade associations and coalitions, including the European-American Business Council. The important thing to stress is that our facilities in the U.S. and Europe, and in Asia for that matter, are all part of an integrated enterprise. The success of each is important to the success of the overall company.

Intel's interest in nanotechnology is multi-faceted. In the immediate term, Intel today is creating devices that feature transistors that are smaller than 100 nanometers wide. These nano-sized features are why Intel's current Pentium 4® processors are packed with more than 100 million transistors and our Itanium 2® server processor family includes a recently-prototyped chip that includes more than 17 billion transistors, a product we expect to launch commercially early next year. In terms of dollar value of product, advanced semiconductors represent the biggest slice of the current nanotechnology marketplace. We refer to our current nanotechnology as "nano-electronics."

The width of our current transistors and circuits is so small they are difficult to fathom. The best way to appreciate their size is in relation to more familiar objects. Later this year, Intel will introduce chips that have 65 nanometer-sized transistors. The gates of the transistors—the switch that turns them on and off—measure only 35 nanometers across. At this size, approximately 100 of these transistor gates could fit inside the diameter of a human red blood cell. Another comparison: approximately 10 million of these transistors could fit in the area of the tip of a ball-point pen.

Looking ahead we believe that we can continue to evolve and improve current materials and technologies to drive transistor sizes down to approximately the 10 nanometer size range. For the foreseeable future, semiconductors will continue to rely on traditional silicon-based technology. But perhaps approaching 2020, we anticipate running up against the physical limitations of silicon-based approaches. At that point, chip manufacturing may rely on new nanomaterials such as carbon nanotubes and nanowires to continue progress in accordance with Moore's Law.

The year 2020 sounds like a long time away. But because of the complexity of the technical work that must be done to invent and implement the nanomaterial future, Intel and the semiconductor industry have begun investing in significant research and development to bridge to the nanomaterial future. Much of this work takes place within the context of the International Technology Roadmap for Semiconductors (ITRS). The ITRS lays out the key scientific and environmental challenges that must be met in order to continue progress along the path predicted by Moore's Law. It is important to emphasize that the ITRS, and much of the current nanotechnology R&D being undertaken in the semiconductor industry, is viewed as "pre-competitive"—companies from across the industry, from around the world, are pursuing a common basic research agenda, working through cooperative institutions like Sematech and the Semiconductor Research Corporation. The economic promise and technical challenges of nanotechnology require effective international collaboration.

Within Europe, Intel has been active in the Belgium-based Interuniversity Micro-Electronics Center (IMEC), the European Nanoelectronics Initiative Advisory Council (ENIAC), and other industry-government cooperative ventures. We will also play a major role in the upcoming First International Nanotechnology Conference on Communication and Cooperation, scheduled for early June in San Francisco.

I have referred several times to "Moore's Law." What is Moore's Law and why does it matter? Forty years ago, Gordon Moore, one of the founders of Intel, predicted in an industry magazine that the number of transistors in integrated circuits would double every year. Moore later updated his projection to a doubling every two years, accounting for the increased complexity of semiconductors. Moore's observation really focuses on two phenomena—increasing density of transistors on semiconductors and radically decreasing cost per transistor. It describes the phenomenon in our industry whereby we etch ever smaller-sized features in silicon. Moore's Law was a prediction based on an observation, not a true "law." But it has functioned as a law in the sense that it has driven the pace of change and innovation in our industry, as we seek to continue the trend of past advances.

So who cares? As described, Moore's Law perhaps is something interesting to semiconductor industry technologists only. But progress along the trajectory of Moore's Law has translated into cost decreases for a wide range of products that depend on semiconductors—computers, telecommunications equipment, automobiles,

scientific equipment, and many other devices. Falling prices for information technology products have driven the rapid proliferation of information technology. The diffusion of information technology has been the biggest reason for the recent, historic acceleration of U.S. economic productivity growth. And productivity growth is the secret to improving our standard of living. In the words of Harvard Economics Professor Dale W. Jorgenson, "A consensus has emerged that the development and deployment of information technology (IT) is the foundation of the American growth resurgence. The mantra of the 'new economy'—faster, better, cheaper—characterizes the speed of technological change and product improvement in semiconductors, the key enabling technology," (2005 Semiconductor Industry Association Annual Report).

Pre-competitive R&D cooperation has been central to keeping up with Moore's Law in the past. We believe it will continue to be critical as we move further into the realm of nanomaterials. And this cooperation needs to be international in scope, combining the best research minds in the industry, and in government and university labs, wherever they are located. This is somewhat at odds with the spirit of numerous governmental reports and communications—from the U.S., Europe, and Japan—that portray nanotechnology as the next "space race," as the proverbial "goose" that will lay the future economic "golden egg." Clearly, governments in many geographies view nanotechnology as a foundation of future economic growth.

My message today is that what we need is a balance of competition and cooperation. And international cooperation is critical in areas such as semiconductors, where the challenges are great and the cost of meeting those challenges is excessive. International cooperation is also critical in the realm of the implications of nanotechnology—especially the environmental, health, and safety (EHS) implications of this new "magic." Research initiatives launched pursuant to the National Nanotechnology Initiative (NM) need to be undertaken in cognizance of and, where appropriate, in cooperation with parallel activities in Europe and elsewhere.

At this point I want to stress the value we place on the activities of the NNI. In a very short period of time, the NNI, with support from participating agencies and funding from the Congress, has developed a very robust program of activities. And we are confident that the ongoing National Academy of Sciences review, mandated by Congress, will confirm this and make suggestions for the continued success of the NNI. In the semiconductor industry, we are participating in a series of joint NNI/Semiconductor Research Cooperation (SRC) workgroups under the auspices of the NNI's Consultative Board on Advancing Nanotechnology (CBAN). These issues range from meeting priority technology challenges to identifying and addressing environmental, health, and safety (EHS) research needs related to semiconductor applications of nanotechnology. NNI funding related to semiconductor nanotechnology research goes to many universities in numerous states across the U.S.

The NNI/SRC focus on the EHS dimensions of nanotechnology is part of a broader NNI trend of focusing on the "implications" of nanotechnology, not just "applications." We support those activities; indeed, we believe that more attention and resources need to be devoted to identifying and reducing the EHS risks of nanotechnology.

Intel has proud record of accomplishment in our own EHS programs and activities. Our guiding EHS management principles commit us to preventing all injuries in the workplace, being an EHS leader in our industry and our communities, and reducing the environmental "footprint" of our products, processes, and operations. But "talk is cheap"; we have translated these principles into a world-class record of performance. Our worker safety record is among the best of any company in any industry. Across both safety and environmental realms, Intel has earned dozens of awards for leadership in the U.S., Israel, the Philippines, and many other geographies. Within the industry, Intel has been a leader in the development of the EHS element of the International Technology Roadmap for Semiconductors.

Intel's EHS management activities in the nanotechnology realm have two primary focal points. In the immediate term, we are committed to ensuring the safety of our own employees as they work with innovative nanomaterials in our research labs. Longer-term, we have an interest in the responsible development and deployment of nanotechnology, ensuring that attention is paid to the "implications" as well as the "applications." What we want to avoid is for the trajectory of nanotechnology to follow that of genetically-modified organisms (GMOs), the most recent "magic" technology. In the case of GMOs, in our view, deployment of applications outpaced attention to the environmental, health, and safety implications of the technology. Public concerns that arose because of this have significantly retarded the realization of GMO's great commercial potential.

With this concern in mind, Intel has been an active participant in the CBAN NNUSRC Workgroup 5 activities, focused on EHS research. Intel also has assumed

a role in a nascent activity under the auspices of the International Standardization Organization (ISO) focused on developing international standards related to the EHS aspects of nanotech. We also are one of the founding supporters of the International Council on Nanotechnology (ICON), a multi-stakeholder initiative of Rice University's Center for Biological and Environmental Nanotechnology (CBEN). ICON is focused on advancing and coordinating nanotechnology ENS research. In addition, we are engaged in formal "benchmarking" activities with other companies to identify "best known methods" in the measurement and safe handling of nanomaterials in the research laboratory environment.

As a result of our engagement in these nanotechnology EHS initiatives, we believe there are two broad categories of research needs. First, much more needs to be known about the toxicity of nanomaterials. Second, there is a need for the development of standardized meterology techniques and EHS controls for application in both the laboratory and production environments. These needs are not unique to the semiconductor industry—they are common to a broad range of industries with an interest in the responsible deployment of nanotechnology.

Finally, I want to focus on governmental regulation of the EHS aspects of nanotechnology. Drawing lessons once again from the precedent of CMOs, governmental regulation of nanotechnology may be essential to the long-term public acceptance of new technologies like nano. This probably is especially true in the European Union, where the "precautionary approach" increasingly defines the governmental, and societal, approach to new technologies.

Here in the U.S., the Environmental Protection Agency is in the early stages of wrestling with some difficult questions concerning the applicability to nanotechnology of their regulatory authority under the Toxic Substances Control Act (TSCA). We understand that the Agency intends to convene a public workshop on this issue later this year.

In the European Union, we anticipate that regulation of nanotechnology will proceed under the broad umbrella of the REACH Directive. REACH is a fundamental revision of the E.U.'s approach to regulating new and existing chemicals. Because the REACH Directive is still in the legislative process, it is not entirely clear what the new chemical regulatory regime will look like, much less how it will address nanotechnology.

While the two governments—U.S. and E.U.—are beginning to sort out how they want to regulate nanotechnology, there is a need for cooperation across the Atlantic. Because progress on the scientific aspects of nanotechnology—at least in the semiconductor industry—will depend in part on international cooperation, there is a parallel need for cooperation in assessing and addressing the EHS implications of nanotechnology. The emergence of significant differences in regulatory approaches across the Atlantic could undercut cooperation on the science.

Specifically what is called for is open cooperation and sharing in the generation of data concerning the risks as well as the benefits of nanotechnology. Sensible regulations need to be based on good science and accumulating data from credible scientific studies. We need an international research strategy focused on the potential EHS risks of nanotechnology, with broad sharing of research results and the coordination of future efforts. The U.S. Government can provide a significant service in this regard. The NNI, working with CBEN, ICON, and others, should clearly identify all past, current, and proposed nanotechnology research focused on human health risks and safety issues. Overtures should be made to the Europeans and Japanese to encourage them to add to this database. A collective, international effort of this kind will help to identify key research gaps and spur the development of an international EHS research strategy for nanotechnology. Execution of this strategy will inform responsible regulation of nanotechnology and, in our view, increase the prospects of public acceptance and commercial realization of nanotechnology's great promise.

Thank you again for this opportunity to testify. I will be happy to answer any questions.

Senator ALLEN. Thank you, Mr. Harper, for your insight. Part of what you were saying about the concerns about GMO's and others is exactly one of the salient reasons why Senator Wyden and I have created the Nanotech Caucus. I would venture to say there are not many Senators who understand this subject. And if people are not knowledgeable, if there are charges or frightening unknowns brought forward, the reactions can be exaggerated and then be harmful. But on the other hand, there should be certain standards

that will help that credibility whether here or in Europe, in fact, an international standard. But I thank you for your insight on this.

Now we would like to hear from Mr. Klaessig.

STATEMENT OF DR. FREDERICK C. KLAESSIG, TECHNOLOGY DIRECTOR, AEROSIL AND SILANES BUSINESS UNIT, DEGUSSA CORPORATION, PISCATAWAY, NEW JERSEY

Dr. KLAESSIG. Good afternoon, Senator.

Senator ALLEN. Good afternoon.

Dr. KLAESSIG. I appreciate very much the opportunity from you and your subcommittee to appear today on a very important topic for Degussa.

I represent the Degussa Corporation, plus a number of chemical firms in the United States and in Europe that have organized under the American Chemistry Council to come together and bring industry's view to the regulatory agencies and also the counterparts of the American Chemistry Council over in Europe, the CEFIC, VCI, and similar organizations.

I am the technology director for a product that comes under the definition of nanotechnology. My responsibilities are customer support, introduce new products, and liaison between our research department in Germany, as well as with emerging American marketplace opportunities.

The material that we do manufacture, as you mentioned earlier, is a fumed metal oxide. It does not fit the standard definition of nanotechnology, but that is one of the issues that we do deal with, that there is no definition of nanotechnology. Steve just referred to the classical definition, but there are a number of definitions. Each agency seems to have a definition that is associated with its mission statement. Therefore, we accept that our knowledge of the chemistry of our materials, other chemistry that people are discussing in the nanotechnology area—and in some applications our materials are found in the nano size of 100 nanometers that Steve mentioned.

We have been manufacturing those materials for about 60 years. In fact, our materials have been in commerce longer than the word "nano" has been in the English language, if you believe the Oxford English Dictionary. So we have a rather historical perspective, shall we say. We are bemused sometimes with the scientific facts that others find surprising in physical chemistry, but they are learning what we have known for a while, and there are new innovations definitely there too.

We are concerned about the different definitions that are occurring and feel that there may be shifting burdens, but as a supplier of existing materials, we are prepared for that. That is also the reason that we are working with other firms.

We have a higher concern when the issue comes to that of a finding of safety. There are many new novel materials being introduced or being examined. All materials, to get into commerce, have to go through the regulatory review. In this area, concerns about public safety or public confidence in safety may arise.

The last area of our concern, but one that is less that we can influence and one of the reasons that I am here today, is the issue that others have mentioned, harmonization, avoiding patchwork

quilts of regulations around the world. Here we have less immediate influence, but we are trying to be participatory and ask for help there.

We have three essential items that we would like to bring your attention to. One is that nanotechnology is real and here today. You change the definitions, you just change the volumes of what you are quoting in terms of what is in commerce.

Steve mentioned the Moore's Law. One of the enabling technologies for semiconductor chip manufacture involves silica particles and a water slurry being used to planerize the chips. That is an example of something that has been around and is contributing to innovation in other fields.

We also have examples in inkjet paper where the coating for glossy inkjet paper often has nanomaterials or materials that can become nano under processing conditions.

So it is here. It is real, and we believe that the regulatory TSCA procedures by the EPA are robust enough to incorporate them because they have been incorporating them for some time if ongoing science is introduced into the process.

Our second point is that I have mentioned science and we have had a number of mentions here today about science. This topic is a global science topic with a global opportunity, and the area of environmental, health, and safety, the level of effort, the priority in the nano initiative has not been as prominent either here or in Europe or other locations, and it does go to public trust. That will extend itself into other areas such as customs duties and identification of materials. It will also go into other areas such as FDA. But since every firm has to go through this process, we need the best evaluatory tools in order to proceed.

The last item is the harmonization item. This topic is emerging. It is becoming more prominent. There will be meetings here by the EPA on June 23rd, a public meeting. There will be a meeting by the OECD on June 7th on the same topic. As this rises in priority or in visibility to the governments, the strong voice that both groups or of all groups respond to the science in their way but to have a harmonized version would be appreciated.

The final comment is for those who do not know. Degussa is a multinational firm based in Germany, about 6,000 employees in the United States with major facilities in Alabama, Virginia, New Jersey, and other States. We appreciate very much the opportunity to speak to you. Thank you.

[The prepared statement of Dr. Klaessig follows:]

PREPARED STATEMENT OF FREDERICK C. KLAESSIG

Thank you, Senator Allen and committee members and staff, for the opportunity to address nanotechnology and regulatory issues from the standpoints of U.S. and European firms. I am Dr. Frederick C. Klaessig, technology director for the Aerosil & Silanes Business Unit of Degussa Corporation. I am here representing Degussa plus several U.S. and European member firms of the American Chemistry Council (ACC) that are actively involved with nanotechnology issues. Some of these firms are also active in the ACC's European and German counterparts, CEFIC and VCI, respectively.

If I am effective in my testimony today, I will be leaving you with three concepts:

1. The existing regulatory frameworks in Europe and the U.S. are robust enough to evaluate newer nanomaterials if on-going scientific advances are taken into consideration;

Congressional support would be most effective in encouraging global coordination and harmonization of regulatory activities, so that newer materials do not face a patchwork of regulations; and

3. Congressional support is also crucial in encouraging federal agencies to increase funds for environmental, health and safety (EHS) research.

Degussa Corporation is a wholly-owned subsidiary of Degussa AG, the third largest German chemical firm, based in Duesseldorf, Germany. Degussa AG's roots go back to the mid-nineteenth century and we are presently the world's largest specialty chemical firm with revenues of €13 billion, employing 45,000 people globally. In the United States, Degussa employs 6,000 workers at over 60 manufacturing sites, with major facilities in Alabama, Virginia, New jersey, New York, Ohio, Georgia, and Texas.

Nanotechnology is regarded as one of the key technologies of the 21st century, Degussa regards this new technology as an opportunity to help develop new products and efficient scientific and technological solutions, and so make essential contributions towards environmental protection, health, and product quality. The company's responsible approach to nanotechnology is described in the policies recently approved by Degussa's Management Board; according to these policies, Degussa produces and markets nanomaterials only if, according to the latest available research, they can be manufactured and applied in a safe and environmentally compatible manner.

Degussa specializes in manufacturing fine scale powders. During these manufacturing processes, intermediates form that are nanoscale in part, which are smaller than one ten-thousandth of a millimeter and which immediately coalesce into much larger, micron-sized agglomerates. For special applications, formulations such as dispersions are selectively manufactured that contain these nanomaterials. In the research, production, and application of nanomaterials, Degussa is guided by informed prudent practices and the findings of scientific studies on hazard and risk assessment. These findings determine the measures necessary to protect employees, customers, and consumers when manufacturing and using nanoscale materials. Degussa works closely with leading European and U.S. research institutes for this purpose. Moreover, Degussa explicitly supports the establishment of new research methods, specially tailored to the specific effects of nanoscale materials, which permit refinement of risk assessment.

Unlike other "new" technologies, there is a long history of nanomaterials being safely used in commerce when following good industrial hygiene practice. As a manufacturer for more than 60 years of products that have nano-scaled features, we are in a position to bring an historical perspective to the current R&D initiatives taking place in the U.S., Europe, and Japan. We have actively participated in the general trend of utilizing finer and finer materials (smaller and smaller features) and narrower and narrower particle size distributions, which taken together are termed the top down avenue to nanotechnology. The decades long trend to smaller particles has led to a dramatic improvement in physical properties in such applications as reinforcement of silicone rubber, paint theology control, fillers in general, glossy inkjet paper coatings and chemical mechanical planarization of semiconductor wafers.

From the broader historical perspective, we note the following tipping points when viewing the current nanotechnology initiative in the United States (expressed in the traditional stasis categories):

Comment on Current Situation

Fact.—Traditional concepts of surface and bulk chemistry are being confused when physical and life science disciplines participate in the dialog.

Definition.—There are a multitude of definitions for materials that have been in commerce safely for decades, while there is a lack of definition for newer materials and novel functionality.

Quality.—The safety of existing materials, as well as future innovative substances, is put into question when there are gaps in scientific knowledge and toxicity test methodology that are being actively pursued.

Venue.—The science and uses of nanotechnology are global in nature, but the research initiatives and regulatory schemes are potentially regional.

Overall.—The various branches of technology development are operating at different speeds, causing confusion regarding the science, safety, and utilization of nano-scaled materials.

For those firms having existing nano-scaled products, like Degussa, there is a concern that new, naive definitions will undermine existing patents, trade secrets, and TSCA registrations. The same would be true for our customers who have relied on our technology in developing their own products. For those firms that are contemplating entering the field of nanomaterials with new "engineered" substances with novel functionality, there is uncertainty regarding evolving definitions that do not capture the essence of their innovative concepts in manufacturing, characterizing, and evaluating these materials. For some firms, especially those that are small, innovative and inexperienced, there is the greater likelihood that they are unaware of the regulatory issues they must address in order to achieve a finding of safety for their product(s). All categories of firms, no matter size or resources, will encounter the same regulatory issues during the commercialization process, However, it is not clear that regulatory agencies are viewing the development of nanotechnology with the same priority or coordinating with each other. Placing these concerns under the common heading of "regulatory risk," all categories of firms must now add an additional risk to the standard business risk of the marketplace.

Several member firms of the American Chemistry Council have established working groups with the purposes of coordinating a collective response to our concerns about both existing materials and those in the R&D pipeline.

It is our firm belief that the current regulatory frameworks in the U.S. and Europe are capable of addressing the development of new nanomaterials, if scientific results are taken into consideration as they arise. Certainly, emerging scientific results will need to be taken into consideration as they arise, but the regulatory frameworks are in place to deal with them. The firms participating in the ACC forums are committed to Responsible Care® principles and are prepared to respond to new and on-going EHS studies. The same is true for industrial hygiene issues, where an industry consortium is already planning efficacy evaluations of face mask, gloves, and other materials when exposed to nanoparticles.

Governmental initiatives in both the U.S. and Europe are to be congratulated in fostering the development of applications in nanotechnology. As society has experienced in other emerging fields, meshing science, technology, funding, and patents does not guarantee success in the global marketplace with new products. We (Degussa and the like-minded firms at ACC, CEFIC, etc.) are most concerned with EHS issues, and we would ask the Senator and his colleagues to consider this issue in their future deliberations.

All new substances require EPA review before being introduced to the commercial market, yet to date, the global initiatives for nanotechnology have not emphasized EHS in their priority programs. Generating the body of knowledge needed to make findings of safety, the process inherent to being TSCA listed, are considered to be the domain of the commercial firm and not of the academic laboratory. Yet, too, the new nanomaterials can exhibit unique properties in both their physical performance as well as in their toxicological, environmental attributes. The novel materials are challenging to the field of toxicology as they are unique in their performance. A gap is forming where we as a society are generating nanotechnology more rapidly than we are creating the tools to measure the EHS impact of this same technology. We understand that public confidence in both the safety of the novel products of nanotechnology and in the methods and processes used to assess them are essential; both must be vigorously pursued. Existing materials may point the way to both health concerns and the product stewardship practices needed to eliminate those concerns.

The unknown, especially the unseen material with an uncertain toxicity, can lead to a sudden loss in public confidence about safety. Our concern, being global companies, regarding the developing gap between generating nanotechnology and evaluating its EHS attributes, is that it may lead the different regions of the world to have separate and restrictive EHS regulations. If a competitive race between regions in generating nanotechnology should lead to a commensurate race in regulating these same materials, then our common desire for benefiting from nanotechnology will be undermined.

It is our firm belief at Degussa that nanotechnology is a global opportunity to be based on a global reservoir of scientific facts. We would urge the Congress to encourage the U.S. agencies to work cooperatively with their European and Japanese counterparts. For example, we commend the Environmental Protection Agency's staff for their active involvement with the upcoming OECD meeting on 7 June. The public meetings the EPA plans in the U.S. will parallel the public meetings to be held by the OECD in 2006. Efforts such as these should be encouraged.

It would help the research innovation cycle greatly if the Congress would encourage the funding agencies involved with the NNI to redirect money from the fundamental research of nanomaterials to the fundamental research for potential toxicity

of nanomaterials, as well as their relevant exposure scenarios. It is currently assumed that industry should be responsible for generating the database needed to gain a TSCA listing, but the newer nanomaterials pose a challenge to existing testing methodology. However, test methodologies, structure activity relationships, and analytical techniques are not standardized in this field, and federal funding here would guide the regulatory agencies and responsible firms towards proper testing and evaluation of new materials. Industry and the EPA will look for some guidance to federally funded academic studies, which is preferable to case-by-case studies protected by trade secret status.

Many states have nanotechnology initiatives, which is true in Europe as well. These efforts are closely tied to job creation and often use local university and college resources in these efforts. Successful, state-funded firms will encounter EHS hurdles when commercializing their products at the point of regulatory review at the EPA level or when exporting to Europe or Asia. In fact, there is a range of trade-related issues, such as customs duties, that are similar to EHS concerns and are susceptible to confusing, isolated interpretations when viewed on the global perspective. Again, global coordination of Federal agency activities and research funding of EHS-related evaluation techniques are areas where Congressional encouragement would be most helpful.

I wish to join my other colleagues from industry in expressing our appreciation of the time you are giving to this topic.

Senator ALLEN. Thank you, Dr. Klaessig, for your testimony and insight from a company that has been involved for a long time.

Generally you say 100 nanometers and all that. Of course, it is so small no one understands it. I always explain it as one one-hundredth of the width of the human hair, if you would agree with that definition. You have got to scale it to something people could understand. Obviously, one one-hundredth of the width of the human hair is microscopic. That is at least one way I try to explain it.

It is profoundly changing the way that we do a lot of things. Microelectronics is one that is fully understood. The materials engineering I think will have the earlier applications, and ultimately some of those in the life sciences, health sciences, and energy have great potential as well.

I appreciate your comments.

We would now like to hear from Ms. West and then Mr. Duffy. Ms. West.

STATEMENT OF FRANCES W. WEST, WORLDWIDE DIRECTOR OF ACCESSIBILITY CENTER, IBM CORPORATION, CAMBRIDGE, MASSACHUSETTS

Ms. WEST. Thank you. Before I start my formal testimony, I would like to follow Mr. Patton's example to make a Virginia connection. The first school I attended in the United States was Washington Lee University.

Senator ALLEN. Oh, great.

Ms. WEST. And my son is a sophomore at the University of Virginia. So I feel like I am half Virginian too.

Senator ALLEN. Certainly paying tuition.

Ms. WEST. That is right.

So let me start. Thank you, Senator Allen. I appreciate the opportunity to share with you the importance of furthering the development of IT accessibility. I thank you for your work on this subject and for recognizing the importance of this topic and your willingness to take a leadership position in this area.

You have my written testimony that I submitted for the record, and I would like to highlight what I think are the most relevant and important concepts in my oral remarks.

My name is Frances West, and I am the worldwide director of IBM's Accessibility Center. I have been with IBM for 25 years and have been the director of the center for the past two years.

Accessibility has traditionally been viewed as a people with disabilities issue. It is not. It is really every man's and woman's issue because we are all aging. According to recent AARP statistics, one in every four people will acquire a functional disability by age 50; one in two people by age 65. So the topic of accessibility is not really about them. It is about all of us.

Given that accessibility is an emerging technology, we do need government policies that raise the awareness and set in motion actions that can be taken by industry. For example, IBM has always viewed accessibility as a key part of our work force core values, and we hired the first disabled employee in 1914, some 76 years before the Americans with Disabilities Act.

In 1999, section 508 was passed into law which was the impetus for corporate action. IBM set up its Accessibility Center in the year 2000 and issued internal corporate instruction 162 on this topic, which is an example of how Government policy can be a catalyst for institutional changes in a private enterprise.

Section 508 promoted focus and growth, but if there are too many competing standards, it could cause corporations to spend precious resources not on innovation but on compliance-related decisions or actions.

We see accessibility product compliance as an initial building block on a journey towards usable access and societal access. What do I mean by that? Let me explain.

Usable access is about not just enabling a person to have access but to have the access in a meaningful way. For example, a web page can be accessible to a blind person, but it may take 20 minutes for a screen reader to read through all the information on the screen. Or you can build in navigational tools to skip around so that the blind user can accomplish the same task in 5 minutes. That is the difference between compliant access and usable access.

Societal access is about integrating private and governmental infrastructure to provide citizens of all capabilities with seamless support. For example, a returning soldier from Iraq with a disability or a hard-of-hearing grandmother can have all their transportation, medical, and financial services coordinated in such a way that it is efficient, effective, and personalized to their needs. The benefit of such an environment is a more citizen-centric government and a much better allocation of both governmental and private resources.

To achieve this desired state, much innovation is needed. Industry resources should be focused on innovation to solve these complex issues and technical challenges instead of diverting these resources to support enforcement proposals such as third party certification or mark and labeling.

The European Union just issued a procurement directive for information technology, and this is very exciting. We see this as a potential next step in extending what section 508 has started. We

would like the opportunity to collaborate with the E.U. government and other stakeholders in the development of the next generation of accessibility policies so that we can continue to promote innovative products, best practices, and new approaches.

With strong endorsement from government leaders such as yourself and supporting policies from the E.U. and the U.S., private enterprises like IBM will embrace the challenge to deliver innovative solutions to people at large and especially to people with disabilities.

We in IBM truly believe in a vision and environment in which all people can fulfill their highest capacity regardless of their ability or disability. Currently all lines of the business within IBM are involved in inventing and developing technologies, products, services, and solutions that will benefit people with diverse capabilities. We are engaged with governments and the private sector in first-of-a-kind enterprise transformation initiatives that will result in a more inclusive society, a society where human and societal potential can be optimized. In essence, we are striving to deliver not just innovation, but innovation that matters to the world, a corporate core value of IBM, and we think that enhancing human capacity through accessible technology and solutions is an innovation that matters.

But this vision can only be achieved through active collaboration between industry, government, and the citizenry. We therefore appreciate opportunities, such as today's hearing, for advancing this dialogue.

I thank you very much for your time and your interest in this topic.

[The prepared statement of Ms. West follows:]

PREPARED STATEMENT OF FRANCES WEST

Good afternoon. I am Frances west with the IBM Corporation. It is my pleasure to appear today before you on behalf of the European-American Business Council (EABC) and the Information Technology Industry Council (ITI), two organizations with whom IBM has a longstanding relationship.

We appreciate the opportunity to speak to the Senate European Affairs Subcommittee on the topic of accessibility—a subject we believe is strongly tied to enhancing human capacity in the transatlantic region. Specifically, we will share our views on the impact information technology (IT) accessibility policy can have on the transatlantic market, how certification and labeling proposals can negatively impact the current growth and development of accessibility initiatives, and our recommendations for the U.S. government to work with the European Union towards the same goal of a global accessibility standard for technology.

INTRODUCTION

IT Accessibility, until recently seen as an emerging market and technology issue, is going mainstream, fueled by powerful demographic and social trends.

Between 750 million and one billion of the world's six billion people have a speech, vision, mobility, hearing or cognitive impairment, according to the World Health Organization. And accessible information technology is one solution to assist all these people in connecting to the world around them.

In the U.S., more than 54 million people have disabilities. These numbers are increasing, in part, because while people are living longer and health care is continually improving, this has not fully ameliorated the incidence of acquired disabilities as a natural part of the aging process. According to AARP, one in every four people will acquire a functional disability by age 50, one in two people by age 65.

According to the Center for Strategic and International Studies in a 2003 report, the rapid aging of the populations of developed countries poses major challenges for

global prosperity and stability during first half of the 21st century. In countries like Italy, Spain and Japan, by year 2040, 45% of the population will be over the age of 60. This changing demographic further elevates the importance of accessibility.

The impact of accessibility affects society as whole, As this emerging trend continues, society and industry can realize economic returns if individuals are allowed to benefit from product, services and solution innovation and if this innovation is enabled by governmental policies.

IBM, for example, is taking a holistic approach to accessibility. Our focus on accessibility encompasses our roles as a developer and manufacture of IT products, a service provider in the IT industry, a buyer of components, products and services and an employer of over 330,000 people worldwide, looking to attract and retain the best talent in a competitive industry. To each of these roles, we bring a philosophy that strives to enhance human capacity by enabling and easing information access for the largest number of people—especially those whose disabilities restrict direct access. Frequently, this involves the creation of special products or modifications of the products that we design and manufacture. But, to achieve the greatest benefit requires more than just products.

We believe that making technology accessible to all is a need that is best met by technologies and solutions that are committed to interoperability based on open standards, and have been developed via collaborative processes. Accessibility is enhanced by open standards that permit the free exchange of information, encourage innovation and give businesses, governments, schools and social agencies more flexibility to customize solutions and meet their own individual requirements.

IBM workforce diversity is a core commitment and we have long viewed accessibility as part of this corporate belief. For example, IBM hired its first disabled employee in 1914, fully 76 years before the ADA was enacted. We accelerated accessibility related investments, however, when the U.S. government took a leadership role in establishing section 508. We believe that section 508 is a comprehensive and meaningful framework to support the industry's work in this area. We, along with ITI, EABC and our industry colleagues like SAP applaud the U.S. Government's foresight in this issue.

BACKGROUND

The need for accessible information technology is acute across the globe. The global number of people with disabilities is expected to grow as the population ages. In response to this reality, the U.S. led the world in developing a policy for IT accessibility when it passed section 508 of the Rehabilitation Act in 1998, a procurement law mandating that all IT purchased by the federal government be accessible. This law, with technical specifications defined within it, has had an impact far beyond the U.S. federal government and in fact, has global reach.

However, we have a concern that the positive impact of section 508 may be disrupted or side tracked. Governments in Europe are currently exploring or actually establishing national or regional, IT accessibility policies. Some of these policies are similar to section 508, but many of them are different. These governments are considering procurement policy now to help develop accessible e-government systems. This is good for the technology sector, for the people who need accessibility and for the marketplace. But without a harmonized approach to accessible IT procurement, each government could decide to adopt a different technical standard, thereby fragmenting markets, limiting accessible choices, reducing incentive for research and innovation by companies, but most importantly, undercutting the very real contributions we need persons with disabilities to make.

Section 508 has been important not only to those requiring accessibility but to the whole technology sector. Since the passing of section 508 into law, the technology industry has invested significant technical and human resources in bringing products into compliance. IBM, for example, has made significant investments in our internal infrastructure as well as our design and testing processes.

- We have developed an extensive set of techniques that guide our development teams in implementing section 508 requirements and our test teams in validating that the requirements have been properly met.
- We have integrated accessibility tasks into all phases of our mainstream development processes. Accessibility requirements are considered from the very beginning during the concept phase of product development.
- We have developed an extensive reporting and tracking system for the accessibility of all our products. Once a product is ready for announcement, a section 508 Voluntary Product Accessibility Template (VPAT) is created.

Fulfilling the true mandate of section 508 is not easily accomplished—it takes systematic and corporate wide effort in order to be realized. Industry has made much progress but there is more to do. Given the broad implications accessibility has on society and the population in general, industry is looking to move beyond compliance and bring innovative solutions to the marketplace. This is where we can use your help.

U.S.-E.U. REGULATORY HARMONIZATION IS NEEDED

If you are blind and use a screen reader to surf the Web, it should read sites from the U.S. government as easily as it reads ones posted by the government of Sweden. This can only be done if there is agreement among governments on the policy for accessibility.

Without transatlantic harmonization of global IT accessibility approaches in policy and standards, all consumers—or more importantly the people who need the technology most—lose. If differing regional or country technical requirements are mandated, industry is forced to focus on multiple compliance developments rather than pushing beyond and investing in new technologies and solutions.

Take just Web site accessibility and compliance as an example. IBM has approximately 5 million internal and external Web pages. If it had to bring all of its Web pages into compliance with multiple accessibility mandates, it would be economically and practically impossible.

If different standards are enforced, as one can see in the example just cited, the cost of implementation would be astronomical. Companies would be forced to choose whether they have the resources to develop unique products and services to meet varying specifications. Or, more likely, they might choose not compete in certain markets at all. If, on the other hand, the European technical specifications for accessibility are harmonized with those globally, it would more than double the market for conforming IT products and would create an even greater incentive for manufacturers to compete on the basis of accessibility. Ultimately, society will reap the greatest benefits in the form of more involved citizens, more contributing workers and more enabled individuals.

What the technology sector seeks is for the U.S. government to work with the European Commission to ensure that any new accessibility policy removes existing barriers and does not create any new barriers to the accessibility market.

THIRD PARTY TESTING OR CERTIFICATION

The European Commission will publish its Communication on e-Accessibility in the autumn of this year; it is expected to discuss the introduction of accessibility compliance testing or certification by a third party. Based on the technology sector's experience with third party testing over the years in other venues, and given the resources involved in accessible product design, development, marketing, and support, third party certifications present significant problems and draw backs:

- Third party certification tends to freeze innovation by driving manufacturers to focus their attention and resources on passing certification tests rather than on new research and development that can lead to new and innovative ways to incorporate accessibility features into IT.
- Only the manufacturer has the flexibility to test and evaluate components as they are developed in-cycle, whereas third-party testing is usually performed at the end of the development cycle, thereby increasing the costs of product modifications or redesigns. External certification increases manufacturing costs considerably; it would lengthen the product development cycle; and can not only delay the introduction of new products into the market, but also potentially slow the procurement process. This benefits no one, especially the end user.
- Third-party testing across the range of accessibility products is impractical due to the inherent subjectivity, ambiguities, and complexity of the technical accessibility standards. In some cases it is technically infeasible, like trying to measure "equivalent facilitation" or difficult to be objective when determining if a web page uses simple language to convey a concept.
- This method of testing demands that a certifying organization rely on open, transparent and recognized objective technical criteria and testing protocols, yet these criteria and protocols do not exist. For example, there are no established section 508 objective conformance criteria, and it is highly unlikely that they could be developed in light of the broad range and multifaceted functionality of IT products currently in the marketplace.
- An additional complexity is that third party testing organizations, in using any such objective conformance criteria and testing protocols required for IT prod-

ucts, would also have to account for IT interoperability with assistive technologies. The assistive technology issue is particularly problematic, as there are many different assistive technology products, and they are not all designed to work on all systems.

- Another problem with this approach is the scope and depth of technical expertise that would be needed by external testing organizations.

In light of the significant technological and operational complexity in this area, and the negative impact it would have ultimately on the user, third party testing is not an approach that will increase IT accessibility or add value to products or services. For whether or not a testing organization successfully evaluates a product's accessibility, the manufacturer in either case remains responsible and liable for the accessibility of the product.

We do support, however, a voluntary system of self certification that strengthens the incentive to address accessibility early in the product design phase, and enables innovative products to be brought to the marketplace more quickly. Evaluation of products in-house encourages interoperability and collaborative problem solving between hardware, software, and assistive technology vendors, and also reinforces a corporate commitment to accessibility. This self-declaration approach has been implemented successfully in Europe and elsewhere on such critical matters as product safety and environmental attributes (e.g. electrical shock, flammability standards). In the U.S., the Voluntary Product Accessibility Template or VPAT has been a successful part of the procurement process to report compliance with the technical requirements of section 508.

PRODUCT LABELING

There is discussion in the E.U. about developing a quality mark or labeling for accessibility on IT products and services. We have concerns regarding potential requirements for accessibility labeling or an accessibility mark and the effect it will have on the development of IT products.

Given the enormous range of functional limitations that exist, even within a single disability or impairment type, it would be nearly impossible to create a label or mark that could provide sufficient information to buyers regarding a product's conformance with evolving accessibility technical and procurement standards. Indeed, it could raise false expectations for consumers and thereby generate significant legal and practical concerns for manufacturers. We see labeling as having the following drawbacks:

- Consumers and users can misperceive labeling proposals as a simplistic and complete solution to a complicated technology issue that only due diligence by the developers can resolve. A quality mark can never replace the in-depth work that site developers and owners should be doing in their creation of pages.
- Labeling proposals would not provide sufficient information regarding conformance with developing accessibility standards given the various differences among disabilities and even within a single disability or impairment.
- Labeling proposals run the risk of setting false expectations for consumers. For example, with websites, most consumers do not recognize that an accessible web page is only part of a comprehensive solution to deliver an accessible experience to the end-user. Support is also needed in the web browser and the assistive technology. Labeling a web page as accessible may not give the consumer accessibility if the assistive technology does not perform as expected. False expectations from labels may give rise to significant legal and practical concerns for manufacturers and employers.
- Labeling proposals would be difficult to organize and implement for most products, but especially for web pages that are updated frequently—some as often as many times an hour.

Finally, product labeling is expensive. If a government entity were to embrace unique accessibility labeling requirements for products sold in a specific marketplace, the business case for selling in that marketplace would be lessened, reducing competition and consumer choice. And again, the people most in need of this technology would lose.

CONCLUSION

IBM, on behalf of the IT industry, requests the assistance of this committee in ensuring that all who need accessible technology get the best our industry has to offer. We have three specific requests:

First, given the broad reach of the technology and potential impact on all citizens, IT accessibility policy demands attention from the highest levels of government. We hope that the profile and importance of IT accessibility can be raised whenever there are discussions between U.S. andleaders.

Second, we suggest establishing an early warning process where Congressional and Parliament members can work in tandem to examine regulatory convergence issues such as IT accessibility. We believe that with increased attention from the leadership and proper oversight, transatlantic agency activities with regard to accessibility standardization can be accelerated.

And third, we request that the U.S. government work with the European Commission to continue the pursuit of a harmonized approach to accessibility.

In closing, IBM shares the belief with EABC and ITI that IT accessibility is a topic that touches not just people with disabilities, but increasingly the population at large, as we all will experience some type of disability the older we get and the longer we live. We therefore need to work towards a global standard that is open, harmonized to existing approaches, and promotes an IT environment that enables interoperability. This would foster innovation, unite the market place, and create a border free and barrier free information society.

Finally, at IBM, we envision an environment in which all people can fulfill their highest capacity, regardless of ability or disability. Currently, all lines of business within IBM are involved in inventing and developing technologies, products, services, solutions that will benefit people with diverse capabilities. We are engaged with governments and the private sector in first-of-a-kind enterprise transformation initiatives that will result in a more inclusive society; a society where human and societal potential can be optimized. In essence, we are striving to deliver "innovation that matters to the world," a corporate wide value. And we think enhancing human capacity through accessible technology and solutions is an innovation that matters.

But, this vision can only be achieved through active collaboration between industry, government and the citizenry. We therefore appreciate opportunities such as today's hearing for advancing this dialogue.

Thank you for your attention and I look forward to answering your questions.

Senator ALLEN. Thank you, Ms. West, for your testimony and insight.

Now we would like to hear from Mr. Duffy.

STATEMENT OF JOSEPH E. DUFFY, VICE PRESIDENT, SAP PUBLIC SERVICES, INC., WASHINGTON, D.C.

Mr. DUFFY. Thank you very much, Mr. Chairman, and thank you for the opportunity to testify before you today.

We appreciate the role that Congress has played in creating a favorable policy environment for accessible information technologies. We commend you today for seeking to encourage greater harmony on this issue between the United States and Europe because only harmonized international accessibility standards will produce the best results for the disabled community.

For background, SAP is the world's leading provider of business applications software. More than 26,000 companies and government agencies run on SAP business software, and an estimated 12 million individuals who work for these organizations are SAP users. SAP has a strong presence in the U.S., employing more than 5,500 people in 18 locations. SAP America has enjoyed substantial growth in the last 2 years, and we anticipate growing further this year. Our CEO, Bill McDermott, recently stated that SAP created 1,500 new jobs in the United States in the last 18 months. In addition, SAP provides more than 50,000 U.S.-based students with SAP training at 115 universities across the Nation.

At SAP we feel strongly that barriers faced by individuals with disabilities in the work place must be eliminated. We support poli-

cies that protect a person with disabilities' right to participate in the work force, including section 508.

Through our Accessibility Competence Center and our industry-leading research and development, we are working to make sure that our software solutions are accessible and meet the needs of people with disabilities around the globe. Today we are implementing a very detailed program with specific goals and milestones to meet the needs of the disabled community. Our plan is designed to address sensory and motor-skill disabilities and to focus on the needs of end users first, making accessible software available to the largest number of users as rapidly as possible.

Making information technology, or IT, more accessible to people with disabilities is not an easy task. First, there are many kinds of physical disabilities. Each type poses unique challenges to IT product developers. Second, the degree of IT accessibility depends on the complex interaction of multiple technologies produced by multiple vendors, including operating systems, keyboards, terminal screens, mouse pointers, and business applications. On top of this, people with disabilities usually use a combination of assistive technologies such as screen readers, Braille displays, and mouse alternatives. As you can imagine, designing and producing accessible products is an ongoing and complex challenge for all IT providers, while the very definition of accessibility is a moving target.

To put this into context, one of our products, mySAP ERP, contains more than 150,000 screen views. Updating each one of them with accessibility features is really a daunting task.

As we pursue this mission, we strongly support efforts to achieve harmonized global accessibility standards. Simply put, accessibility standards are specifications that product manufacturers must meet to serve the needs of the disabled user. International standards development organizations, or SDO's, are one source of such standards, but government entities in the U.S. and Europe also provide such specifications. If we get into a situation where there are multiple standards for a given technology, then IT developers must either choose one set of standards and forego certain markets or go to the trouble of implementing multiple standards and hope they do not come into conflict with each other. As you can imagine, the difficulty of avoiding such conflicts increases as more and more standards are created.

Before moving on to solutions, let us just take a moment to examine how fragmented accessibility standards can negatively impact people with disabilities.

To cite the most obvious effect, fragmented standards impose extra cost and delay on technology providers which has a spill-over effect on consumers. This extra effort delays the availability of new technologies, and even worse, it raises the price of such products for consumers, imposing additional burdens on the very people we are trying to help, many of whom are financially disadvantaged.

Another impact of fragmented standards is to recreate the geographic barriers that IT otherwise does so much to remove. Imagine the frustration of a disabled consumer who cannot access a web site because the designed lived in another country and followed a different accessibility standard. In short, the needs of disabled consumers are essentially identical whether they live in the United

States or Europe and we should not impose new barriers based on fragmented standards.

Lastly, it must be noted that fragmented information technology accessibility standards also create trade barriers and discourage global competition. The negative impact is particularly damaging to small companies which can ill-afford the smaller markets and extra development costs of complying with divergent standards.

With regard to ongoing work to establish accessibility standards in Europe, the IT industry encourages policy makers there to consider the flexible, market-oriented approach taken in the United States under section 508 of the Rehabilitation Act. The applicable requirements have already been incorporated into the product development process at SAP and many other companies. As a result, section 508 has already generated significant innovation and benefits all disabled users in the public and private sectors all over the world.

As the U.S. Access Board is now considering an update to section 508, we see this as a great opportunity for transatlantic cooperation. Ideally we would like to see a single set of rules governing the accessibility requirements in both regions and have them be performance- and outcome-oriented. The specific technical requirements should be generated and managed by SDO's.

As a company with a strong presence in Europe, we have committed to supporting and working closely with our U.S.-based peers, including IBM, Microsoft, Oracle, HP, and others to promote global harmonized standards within the European Commission. We all believe that only harmonized international accessibility standards can produce the best results for the disabled community, businesses, and the economy.

We would like to thank ITI and EABC for their support to industry and thank you for the opportunity to submit these comments. We look forward to further discussion, and I will be happy to answer any questions.

[The prepared statement of Mr. Duffy follows:]

PREPARED STATEMENT OF JOSEPH DUFFY

Mr. Chairman, Senator Allen, and members of the subcommittee, thank you for the invitation to be with you today for this important discussion. I know I speak for many in our industry when I say we appreciate the role that Congress has played in creating a favorable policy environment for accessible information technologies (IT). We applaud you again today for seeking to encourage greater harmony on this issue between the United States and Europe, because only harmonized international accessibility standards will produce the best results for consumers, businesses and the economy.

Mr. Chairman, my company, SAP, is the world's leading provider of business application software. Our products and services are relied upon by more than 12 million users at 26,000 companies and public sector agencies to manage such crucial functions as financials, operations, supply chains, and human resources. We are a global company with a strong presence in the United States, employing more than 5,500 people in 18 U.S. offices and labs. We are also an active partner of many Federal and state agencies, which use our software to improve efficiency and accountability in agencies like the departments of Defense, Homeland Security, Treasury, Interior and Energy, and GSA.

SAP also donates more than $60 million a year to help improve math, science and engineering curriculum in U.S. secondary and post-secondary educational institutions. Over the last few years, we have provided almost half a million dollars to schools and programs in the U.S. that serve thousands of disabled adults and children.

Mr. Chairman, our commitment to serving our customers and communities includes making our products accessible to users with physical disabilities. We are doing this not only because it's the right thing to do, but also because there is a strong and growing market for it. According to the U.S. Census Bureau, the United States is home to about 30 million working-age people with disabilities,[1] while the European Commission estimates an additional 17 to 24 million live in the European Union.[2] The World Health Organization estimates about 600 million people of all ages live with disabilities worldwide.[3] Obviously, there are large markets to be addressed and many social and economic benefits to be gained by working together to make IT products more accessible.

Making IT more accessible to people with disabilities is not an easy task. First, there are many kinds of physical disabilities, and each type poses unique challenges to IT product developers. Second, the degree of IT accessibility depends on the complex interaction of multiple technologies produced by multiple vendors: operating systems, keyboards, terminal screens, mouse pointers, business applications, and so forth. On top of this, people with disabilities usually use a combination of assistive technologies such as screen readers, Braille display, and mouse alternatives. As you can imagine, designing and producing accessible products is an ongoing and complex challenge for all IT providers, and the very definition of accessibility is a moving target.

At SAP, through our Accessibility Competence Center and our industry-leading research and development, we are working to make our software solutions more accessible. Accessibility requirements are incorporated into our product design, development, and quality control processes. We are taking additional steps to add accessibility features into existing products. For example, one of our products, *mySAP ERP,* contains more than 150,000 screen views, and updating them is a serious undertaking. In addition, our partners and customers can also take advantage of our technology advancement to enhance the accessibility of their software applications. Indeed, we are implementing a very detailed program with specific goals and milestones to meet the needs of the disabled community. Our plan is designed to address sensory and motor skill disabilities and to focus on the needs of end users first, making accessible software available to the largest number of users as rapidly as possible.

As we pursue this mission, we strongly support efforts to achieve harmonized global accessibility standards.

Simply put, accessibility standards are specifications that product manufacturers must meet to serve the needs of disabled users. International standards development organizations are one source of such standards, but government entities in the U.S. and Europe also provide such specifications. If we get into a situation where there are multiple standards for a given technology, then IT developers must either choose one set of standards and forgo certain markets, or go to the trouble of implementing multiple standards and hope they do not come into conflict with each other. As you can imagine, the difficulty of avoiding such conflicts increases as more and more standards are created.

Before moving on to solutions, let's take a moment to examine how fragmented accessibility standards can negatively impact people with disabilities.

To cite the most obvious effect, fragmented standards impose extra costs and delays on technology providers, which then have spill-over impacts on consumers. In the best-case scenario, divergent standards do not create irreconcilable conflicts but merely require extra time and expense to design, development, test, and deploy. This extra effort delays the introduction of new technologies. Even worse, it raises the prices of such products for consumers, imposing additional burdens on the very people we are trying to help, many of whom are financially disadvantaged.

Another impact of fragmented standards is to re-create the geographic barriers that IT otherwise does so much to remove. Overcoming such barriers is particularly relevant to those with physical disabilities because they have greater difficulties in traveling. Imagine the frustration of a disabled consumer who might be unable to access an important web site because the site designer lived in another country and followed a different standard. In short, the needs of disabled consumers are essen-

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[1] U.S. Census Bureau, fact sheet dated 12 July 2002 and posted at http://www.census.gov/Press-Release/www/2002/cb02ffl.html.

[2] European Commission Directorate-General for Employment and Social Affairs, report entitled "Active Labour Market Programmes for People with Disabilities," dated August 2002 and posted at http://europa.eu.int/comm/employment_social/index/active_labour_market.

[3] World Health Organization, fact sheet dated 3 December 2003 and posted at http://who.int/ncd/disability/index.htm.

tially identical whether they live in United States or Europe, and we shouldn't impose new barriers based on fragmented standards.

Lastly, it must be noted that fragmented information technology accessibility standards also creates trade barriers and discourage global competition. The negative impact is particular damaging to small companies, which can ill-afford the extra development cost of complying with divergent standards.

For all of the forgoing reasons, SAP strongly supports efforts to achieve harmonized global IT accessibility standards. Harmonized standards offer the greatest opportunities for consumers, business, and society by reducing costs, improving time to market, widening the availability of accessible products, and increasing the quality of life of people with disabilities. So how can we achieve harmonized standards?

Global standards development organizations (SDOs) are in the best position to maintain global standards and resolve conflicts among competing standards. Let's face it, the pace of technological innovation is so fast that even SDOs have a hard time keeping up. But writing technical standards into law or regulation makes the problem even worse. Typical lawmaking processes cannot keep up with the speed of information technology advancements.

We encourage legislators and regulators in the United States and abroad to reference the work of international SDOs in domestic regulations instead of trying to fine-tune those standards and set them in law in their own countries. If specific requirements must be written into law, we encourage the lawmakers to specify the requirements based on outcome and performance instead of technical methods. Methods often change due to technological advances.

With regard to ongoing work to establish accessibility standards in Europe, the IT industry encourages policy makers there to consider the flexible, market-oriented approach taken in the United States under section 508 of the Federal Rehabilitation Act. Section 508 requires the U.S. Government to purchase the most accessible products on the market. Because the U.S. Government is the leading purchaser of IT in the world, section 508 has spurred extraordinary cooperation among public sector buyers, industry and consumers to meet that demand, which in turn has led to rapid progress in the development of accessible products.

The applicable requirements of section 508 have already been incorporated into the product-development process at SAP and many other companies. As a result, section 508 has already generated significant innovation and benefits for all disabled users in the public and private sectors all over the world.

Depending on how the rules are implemented by the European Commission and Member States, addressing accessibility through global SDOs and a public procurement approach could provide many advantages for European consumers. For example, if European requirements are harmonized with those of the United States, it would more than double the market for conforming IT products and create an even greater incentive for manufacturers to develop accessible products. Consumers will reap the ultimate benefits in the form of lower costs, greater choices, and better quality of life—and it will all occur sooner rather than later.

As the U.S. Access Board is now considering an update of section 508, we see this as a great opportunity for trans-Atlantic cooperation. Ideally, we would like to see a single set of rules governing the accessibility requirements in both regions. We would also prefer to see that specific requirements refer to designated SDOs' work or that the requirements be performance and outcome-oriented.

This does not mean ignoring difference of language and culture; these are important and must be addressed in standards-setting processes. As global standards are adopted, they must be published and promoted in multiple languages to facilitate adoption by local authorities and to avoid misinterpretations. But language and cultural differences affect all people regardless of disabilities. Thus, there is no need to create additional international trade barriers for the alleged benefit of accessibility. Instead, global SDOs should obtain inputs from regional experts and create standards that are applicable in all geographic locations. This is of particular importance when we examine the complexity involved in Asian languages.

Mr. Chairman, I am pleased to report that early efforts to harmonize global accessibility standards are promising. The Special Working Group on Accessibility of the Joint Technical Committee 1 (JTC 1) of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) have already begun the work of gathering user requirements, taking inventory of existing standards, and tracking laws and policy. Section 508 will be influential in that process. SAP, IBM, many of our peer companies, and the U.S. Access Board are supporting the working group's efforts. We are eagerly anticipating the positive results that it promises to deliver.

Within Europe, the European Commission has issued a Communication on "e-Accessibility" that recognizes the risk of a fragmented disability market and cites as

its "main" objective "to promote harmonization on a voluntary basis and to help self-regulation." Industry applauds this emphasis and urges deference to the international, consensus-based standards development process, which will be the most efficient and effective way to advance IT accessibility.

Mr. Chairman, to summarize, developing harmonized global standards through SDOs and cooperative inter-governmental initiatives will enable IT vendors to focus on innovating and competing in the global market, rather than on responding to a patchwork quilt of redundant and contradictory requirements. Close cooperation between the United State and Europe is essential to making progress on this topic. Failure to achieve cooperation would cause significant harm to the IT industry, the economy, and, most importantly, people with disabilities.

Thank you for the opportunity to submit these comments. We look forward to further discussion and would be happy to answer any questions.

Senator ALLEN. Thank you, Mr. Duffy and Ms. West. Thank you to both of you all on the IT accessibility issue. Let me first start with you all to try to get a gist of what we can do here.

When you all are developing the IT accessibility products, services, clearly that is a smaller market. It is not a larger market. I do not know if your companies, IBM or SAP, actually make any money. Do you even make money? I do not want to get into proprietary information.

The reason I am asking this question is to the extent you end up with a fragmented market, it makes it all the more costly as an investment for IBM or SAP, wonderful companies that want to be making sure people with a variety of different disabilities have access to technology and information. If you do not make any profit off of it, if you are doing this as a service or as a cost of doing business, how would this fragmentation and regulations that are unnecessarily burdensome affect the ability of folks with a variety of disabilities to actually have access to your programs, so to speak?

Either one of you all or both can speak to that. If somehow this is a violation of Sarbanes-Oxley to answer this question, you can cite that as a reason for not answering it.

Mr. DUFFY. I will take a shot at it, sir. I do not believe we do not track down to that level whether we make money or not. But clearly we invest a tremendous amount of money to serve that community, and we think it is good corporate citizen policy, in fact, to do so.

But if we do have to get into many, many different fragmented regulations, it really just kind of spreads the peanut butter a little too far. When you want to go out and you want to get products to market quicker and you want to give availability to folks with disabilities, because a computer is the lifeblood to a lot of folks with disabilities, the more we can concentrate on a standard set of standards, the more we can focus those resources on that.

Senator ALLEN. Ms. West.

Ms. WEST. From IBM's standpoint, we actually started looking at this market, and we actually foresee a tremendous business advantage of addressing accessibility. Like I mentioned earlier, the aging trend is becoming a global issue. We already have seen industries like the retail industry and the banking industry viewing people with disabilities and the aging population as the target market. So there is actually money to be had or business to be made in that under-served market segment.

Secondly, with a self-declaration kind of a process that section 508 has introduced, it really helped IBM to focus building accessi-

bility requirements into the front end of our products. This is not actually a very difficult thing to solve if you think about it ahead of time. So by engaging our development team at the concept stage of development, the cost of production actually has gone down significantly. And then the application of that accessible solution can be broad-based to everybody who is experiencing aging. So then again, the average return on the investment actually is quite substantial. So this is not an issue in our view of just kind of a social responsibility issue. We actually view it as a tremendous economic benefit.

Senator ALLEN. Well, thanks for that insight.

Now, both your companies have invested a great deal since 508 was adopted and enforced on companies. Obviously both you have invested heavily, and maybe it is a good market share, maybe it is good corporate citizenship to make your products accessible to meet the 508 requirements. Briefly, if each of you could share with me and obviously the committee—and, Ms. West, I just want to close the loop on this. You in your testimony talked about if the E.U. decides to adopt an accessibility standard which deviates from 508—and it may actually be a better standard. I do not know if it is better or worse. But regardless, I was trying to follow that. What impact would that have, for example, on IBM to meet a different standard or a different set of requirements?

Ms. WEST. The section 508—I think from the accessibility standards standpoint, there actually has been very good dialogue between the U.S. committee and also the European Union community. We actually applaud the E.U. looking at 508 as a base because this is a new area and many extensions should be had. As long as the E.U. does not go down a path that completely deviates from the section 508 base, then I think it is definitely a very good scenario because we too would like to participate in that second generation of defining the accessibility standards. We just do not want to start having differing standards, for example, by countries or by regions. That will create a problem for us.

Senator ALLEN. Thank you, Ms. West.

Mr. Duffy, do you have anything you want to add to it? I just wanted to clarify something in Ms. West's testimony in that regard.

Mr. DUFFY. That is fine.

Senator ALLEN. Thank you.

Let me talk to our nanotechnologists here and ask you some questions. As far as the regulatory agencies, whether they are here in the U.S. or in the European Union, do you feel in either area, whether it is U.S. or the E.U., that any of them headed in the wrong direction in the development of regulations, environmental regulations, for example, for nanotechnology? If so, let us know how.

Mr. HARPER. Yes, Senator. I think it is a somewhat asymmetric situation. Governments on both sides are just beginning to look. Agencies are just beginning to look at how to regulate nanotechnology. U.S. EPA I think has taken a very good first step in the right direction. They are holding a meeting in late June where they are bringing in stakeholders from all sides to look at developing a pilot program for how you apply the Toxic Substances Control Act, the primary chemical regulatory authority that Con-

gress has provided EPA, to nanotechnology. Fred had alluded to that earlier.

We think that the tools of TSCA and the authorities of TSCA can be made to apply quite well to nanotechnology, but there are some unique issues and there are some unique science, and we think that the pilot project approach is a good way for the agency and everyone else to work their way through that process. I think there is a good deal of goodwill on all sides, including industry and the environmental community, to try and make this work.

In Europe, it is a very different situation. They are even earlier in their stage of looking at nanotechnology, and I think it will be a longer time before they get around to it simply because they are in the midst of rewriting their entire chemical regulatory legislative framework. They have something called the REACH regulation which is working its way through parliament, as we speak. I think it is clear that nanotechnology will be handled under the umbrella of the REACH regulation. How that will occur I think is still very much up in the air because a lot of the details of the REACH regulation are still very much up in the air.

But right now, at least in the United States, we think things are headed in the right direction. EPA in our view has shown the right amount of attention to this, and the jury is still out on how it is going to turn out, as it is in Europe as well. But because both sides are in the early stages of looking at this issue and how to apply their existing or future tools in the case of Europe, we think there is great opportunity for the two sides to collaborate and share their thoughts to maximize the chances that the two regulatory regimes will be very similar going forward in time.

I do not know what Fred thinks.

Dr. KLAESSIG. I agree with Steve. Overall, the issue I think that will come up in terms of the science, both groups have the goodwill to use the best science and global science. When there are difficulties, especially with the newer and more novel materials that are being generated in the laboratories today, I think the issue will come up of evaluation tools, toxicity mechanisms, the type of issues that normally are assumed to be carried by industry when it has a product in hand and a market to go after. But when you do not know what the right test is or if the definition of the material does not cause you to go to the EPA or other agency for proper review, that will be the area where I think—call it a gap, call it a developing issue might arise. And then, of course, individual groups will start having definitions of what precaution really means.

I agree with Steve on the issue of the E.U.. The group that seems to becoming prominent on this topic is OECD, which I do not know how to rank it in all the different discussions here, but the OECD is working on this. They do get involved with standardized tests and test methodologies. So what may happen in this case is the United States EPA takes the lead. The OECD takes the energy and the effort over in Europe, while the E.U. is involved with Project REACH. So it may be a plight of the Parisian OECD.

Senator ALLEN. Thank you.

Let me ask you this one last question on nanotechnology. Are there any types of commercial products that are currently in use and in what way? And are there any differences that you foresee

at this time between the U.S. and Europe marketplaces, if there are any of these differences?

Dr. KLAESSIG. From existing materials, the marketplaces are very similar. From future marketplaces, I think the main issue for me would be that the United States has been more encouraging of smaller firms, start-up firms, university type of offshoots, and no matter what size a firm is, you have to go through this regulatory stage to commercialize your product. So I would think that just as the EPA has taken the lead on trying to incorporate these issues into their TSCA scheme, we will also be the first that will be involved with a start-up firm not being aware of the topic, and just when they want to go to commercialization and when their investors are insisting on quick commercialization, finding out that they did not even know they had to register, did not even take the underlying tests, and had difficulty finding out what the right test methodologies were. So I think that sort of an issue will also arise here in the United States first.

Mr. HARPER. Yes. I would just like to add to that. The uses for the nanomaterials that are now out on the marketplace, sun block, nanomaterials that harden tennis balls, harden tennis rackets—I mean, there are a number of applications. The real interesting areas of exploration are still, by and large, in the R&D labs.

While the U.S. and the E.U. governments are trying to figure out how to make their existing or, in the case of Europe, new regulatory regimes apply to nano, a lot of folks in industry, including Fred's company and my own, are active in industry and in some cases industry and environmental group collaborations and academic collaborations to try and develop, for lack of a better term, best known methods for handling these materials in our facilities so that we make sure that issues do not arise between now and when EPA has fully figured out, for example, how to regulate nanotechnology in the workplace or the marketplace.

One of the concerns I think Fred and I both share is that a lot of this work is being done in start-up companies that do not have environmental management teams like Intel or Degussa has or academic research labs. One of the challenges for companies like ours is in the development of these approaches in the labs particularly but also in the manufacturing environment, that we share those approaches with these smaller companies and with these academic research institutions that, as I say, do not have the capability to develop these approaches themselves. We are working on that. That is really an obligation I think on industry's end.

Senator ALLEN. What is your motivation to do that? You do not want to have some small company cause some problem and have an overreaction?

Mr. HARPER. I will speak for Intel. In our case, there is a long tradition in our company of not making environmental, health, and safety practices a competitive issue. So we will share our environmental, health, and safety practices, which have been widely recognized as leadership practices, with anybody, including our fiercest competitors. We feel like that is the right thing to do.

In addition, through one of our subsidiaries, Intel Capital, we have venture capital investments in several of the principal start-up companies that are developing these new applications. We feel

a stewardship responsibility there because we are part owner of that enterprise.

Then I think, finally, you touched on the other aspect that I mentioned in my testimony. If these materials are deployed in the wrong way, even if it is only in the research and development environment, there is a possibility that these technologies—and it is plural, not singular—could get held up in regulation or in public oversight or public lack of acceptance, much like in the GMO environment, and we want to avoid that.

Dr. KLAESSIG. Yes. Loss of public confidence in both the materials and also the system by which we make findings of safety, leading to a chilling effect on innovation even by those who are following responsible procedures. Again, if there is an incident or something that causes great public alarm, then the precautionary principle, which is more resident in Europe than it is here in the United States, will be used everywhere as opposed to in a reasonable and consistent fashion.

Senator ALLEN. Thank you, Dr. Klaessig. Thank you both, gentlemen.

Finally, on the European collection societies, Mr. Patton and Mr. Hassell, you are talking about our approach versus the Europeans. The Europeans have multiple, apparently redundant, often extremely excessive levels of levies and taxation; whereas, as far as we are concerned in this country, I have always felt like it's better to leave it free. Let innovation go forward and let the consumers, the marketplace make a decision, particularly on not taxing Internet services.

Clearly, I assume you all, regardless of Europe or the U.S., feel the U.S. approach, keeping Internet services free of taxation and regulation is a preferable approach for consumers, not just for businesses. Would you agree with that assertion or statement?

Mr. HASSELL. Yes, Mr. Chairman, we would. I think the United States' approach is we trust the market. We trust the market to help solve this problem. I think there are lots of companies that are producing great technologies to balance the need to protect intellectual property. We want to protect our intellectual property at HP. We are against stealing. However, we do not think having this tax-like levy system is going to encourage any solution to this problem.

So we appreciate your leadership. You, I think, understand in your gut that you do not tax the Internet, and we have had one of the biggest economic booms in our country's history. So we certainly support that position.

Mr. PATTON. I think it is fair to ask whether an ebay or a Google or an iTune service could have really flourished if we had a practice here in the United States to go after it and tax it because it is an available and growing source of revenue.

The way the European collecting societies focus on innovation I think has an absolutely detrimental effect on innovation, and it stifles it. It works this way: If there is an innovation of a new category of products, such as there is beginning to be in Europe in flash memory devices and personal digital systems and PC's and everything else in the digital age, these collection societies are viewing those as sources of revenue. They are developing these excessive levels of levies. You do not know, as they meet to determine

what level of tax they are going to put on, what that is going to be.

We currently are reserving about $8 for a DVD recorder in Spain for putting in reserve to wait to find out what the levy is going to be. It may be $8; it may be $10; it may be $15; it could be $20. When they finally decide what to apply to this DVD recorder in Spain, we could find that we have been selling it in the market for 9 months, 12 months, 18 months, 2 years at a loss, and we will not know it until it is applied.

This is not a way to enter a market. We can deal with normal market conditions and market forces. We can deal with regulations when they are appropriate. We can deal with all of the legal framework for what you sell in a marketplace, but you cannot enter a market that is so intensively competitive around the globe, as it is today in the new digital era, and wait to find out what kind of margin you might be able to squeak out based on the excessiveness of the tax.

Senator ALLEN. Well, it strikes me in that market—you were mentioning Austria—in a market like that, if you had a world market like that—if the United States was like that and Europe is the way they are, as you describe it—it would strike me that you would reduce research and development into some of these new innovations with that uncertainty. You would not even know what your market would be. You would expect out of European countries that share much of our heritage and similar values that they would understand these just basic economic principles of predictability. If you are going to go in a market, you need to know what your risks are, what your costs are.

I would hope that as we have this meeting, conference, summit, whatever you want to call it, next month, that just these basic things—you are Philips, of course, a Dutch company, and hopefully they will listen to you. They ought to listen, of course, to Hewlett-Packard and IBM and Intel. But it would seem to me that the European companies, in particular, might have the greatest influence on our partners or potential partners in Europe on such matters. It just does not make sense to have to face that sort of a situation or to try to get in the market and, therefore, harm those consumers' ability to have the most advanced technologies, whether it is for commerce, whether it is for information, or whether it is for entertainment.

Mr. PATTON. It is an appropriate moment to suggest that our voices in unison perhaps are more powerful than us speaking singularly, and we had the opportunity with HP to collaborate on lots of exciting and innovative new technologies.

But it is also important to point out that we do commend the European Commission for trying to push member states to implement the E.U. copyright directive in ways that do recognize the new reality of the digital era in the marketplace in Europe. They have certainly made great strides since the introduction of the single market, and it is a single market that consumers are benefiting from.

Your first question about looking around for other places to buy a product so that they do not have to pay the excessive taxes is absolutely spot-on in terms of one of the distortions. Never underesti-

mate the consumers' ability to go find a better deal. And Europe will make strides, I am sure.

Mr. HASSELL. If I may, Mr. Chairman. I just want to emphasize that the E.U. is very receptive to our position. We have been working together with other companies, and I think they share our position that we need to somehow address the spread of levies. So they are receptive at the E.U. level. We just need to apply that directive and make sure it is enforced.

Senator ALLEN. Thank you both.

There was a reason that you all were selected here on these three large topics, whether it is accessibility, whether it is the technology standards, or whether it was the taxes, levies, or nanotechnology and one from a European company and a U.S. company. There was a group made up of business leaders on both sides of the Atlantic—and it is still in existence—called *The Atlantik Brüecke* (The Atlantic Bridge). I find that the business leaders from European companies and U.S. companies have much more compatibility, on a one-on-one basis. As far as governmental officials, we do not have good personality agreements and friendliness, but sometimes the governments need to listen. I think it makes a great deal of sense to listen to people in the free enterprise system, listen to the innovators, the inventors as we are making policy so we are making the right policy. And all of your companies are international in scope. But to the extent you find U.S.- and E.U.-based businesses and business leaders saying the same thing, that does have an influence on us, and I think it would also have a positive influence on the representative democracies of Europe as well.

So I thank you all for taking time from your busy schedules, sharing with us your insight on these important subjects. As this meeting takes place next month, there will be certain things as you requested. We will follow up on it. So I thank everyone here, Mr. Harper, Dr. Klaessig, Ms. West, Mr. Duffy, Mr. Patton, a good Virginian, Mr. Hassell, a wayward Virginian who I know will come back before too long.

Thank you all so much, and we will keep innovating and we will keep leading. Thank you all so much.

Hearing adjourned.

[Whereupon, at 4:45 p.m., the subcommittee was adjourned.]

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