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HIGH-TECH SUMMIT THREE: REMOVING BARRIERS TO THE NEW ECONOMY—DAY ONE

HEARING

before the

JOINT ECONOMIC COMMITTEE CONGRESS OF THE UNITED STATES

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

Part I

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HIGH-TECH SUMMIT THREE: REMOVING BARRIERS TO THE NEW ECONOMY – DAY ONE

June 6, 2000

Congress of the United States,
Joint Economic Committee,
Washington, D.C.

The Committee met at 9:30 a.m., in Room SH-216 of the Hart Senate Office Building, the Honorable Connie Mack, Chairman of the Committee, presiding.

Senators present: Senators Mack, Bennett, Allard, Frist, Abraham, Bingaman, Burns, Gorton, Murray, Lieberman, Robb, Sessions, Hutchison, Grams, and Stevens.

Representatives present: Representatives Davis, Watt, and Dooley.

Staff Present: Shelley S. Hymes, James Gwartney, Colleen J. Healy, Kerry Fennelly, Kevin Doyle, Lori Hodo, Steve Schultz, Chris Edwards, Angela Ritzert, Howard Rosen, Leah Liston, and Daphne Clones.

OPENING STATEMENT OF SENATOR CONNIE MACK, CHAIRMAN

Senator Mack. Good morning, everyone. I want to welcome everyone to our Joint Economic Committee hearing this morning, for two days of hearings.

I appreciate the members being here. Dr. Grove, we welcome you as well.

Let me just make a couple of announcements.

Over the next two days, the summit will be livestreamed over the Internet. It can be accessed from our website address, which is jec.senate.gov. And people will be able to link to this event.

Second, time permitting, we will also be accepting questions via e-mail.

Our e-mail address is techsummit—that's one word—techsummit@jec.senate.gov.

Lastly, because of the relatively tight timeframe, I'm going to try to keep us on schedule, which will mean that in some cases, I may have to not recognize everybody that is here, but will, in the order in which they came, recognize them first on the next panel.

So I will try to see that everybody has an opportunity to participate.

And before I have Senator Stevens introduce our first panelist, let me just include the statement of my own here.

As has been indicated, this High-Tech Summit concerns removing barriers to the new economy.

Anyone who doubts the importance of the high-tech industry to our economy need look no further than the following facts.

The high technology sector has been responsible for about one-third of real U.S. economic growth in recent years.

The number of high-tech manufacturing jobs has soared 32 percent during the past six years, twice the overall U.S. growth rate in jobs.

Over half of U.S. households are now plugged into the Internet.

Workers in high-tech industries earn 82 percent more than the average for all private workers.

High-tech trade is surging with the value of U.S. high-tech exports, more than doubling since 1990.

And over the next two days, we will be focusing on education, trade, and deregulation issues.

How must our education system change to prepare the work force of the 21st century?

What will opening China's markets mean to the high-tech sector?

How will new technology change the way we teach our children?

And how will the actions Congress takes regarding these issues affect the health of the high technology industry?

Our hearing— "Removing Barriers To The New Economy"— will give us the opportunity to continue our dialogue at the JEC and in the Congress on what Washington can do and what it should avoid doing to make sure that high technology continues to play such an important role in the health of our economy.

With so much of the legislation being considered in Congress having a direct effect on the high-tech industry, we need to make sure we maintain policies that give the strongest possible support to innovation and entrepreneurial spirit that turns innovation into jobs and GDP.

I look forward to listening to our participants today. It is with your guidance that we hope to ensure a continued healthy environment for the high technology industry and a continued healthy economy.

And at this point, I would ask Senator Stevens, if you would, to introduce Dr. Grove.

[The prepared statement of Senator Mack can be found in the Submissions to the Record.]

OPENING STATEMENT OF SENATOR TED STEVENS

Senator Stevens. Thank you very much, Mr. Chairman.

I'm delighted that you and Senator Bennett and Senator Frist are proceeding with these hearings, and I'm honored that you would give me the opportunity to introduce my friend who is chairman of Intel Corporation.

I was privileged to present Dr. Grove with the first John Heinz Family Award for Technology and the Economy here in the Capitol in 1995.

It seems like a lot longer than that, Andy. Lots has taken place since then.

I believe our country's economic expansion is a direct result of Dr. Grove's innovations and his creations. As you said, that economic growth has created millions of jobs and positioned our country as the leader in the high-tech field. And if nothing else, it's raised a lot more money than I'm able to spend as one of the appropriators.

So nice to see you here, Dr. Grove.

Dr. Grove is a graduate of City College of New York. He has a PhD from the University of California at Berkeley.

He has been, as we all know, the leader of Intel and he has participated in the founding of that corporation, became its CEO and then its chairman and CEO. He's now the chairman.

He's the author of a great many articles in many of our media—Fortune, The Wall Street Journal, New York Times. He writes a weekly column on management. It's carried by several newspapers.

I think that the awards that he's received over the years have been extremely distinguished throughout the world. He was the keynote speaker at the World Economic Forum. He was presented with the Cinema Digital Technology Award at Cannes, at the film festival in May. He's been the CEO of the year and received an award as the technology leader of the year from Industry Week.

I'm really delighted that he would come and talk to us about the twin engines of the economy.

Thank you very much for joining us, Dr. Grove. We appreciate it and look forward to hearing from you.

PANEL I
STATEMENT OF ANDY GROVE, CHAIRMAN, INTEL CORPORATION

Dr. Grove. Thank you very much, Senator Stevens. Thank you very much, Senator Mack, for the invitation.

I will try to go through some prepared remarks as fast as possible to cooperate with your desire to stay on schedule.

The twin engines of the economy that the title refers to deal with trade and technology, the two pillars. What has fueled us going forward was the international nature of our business and the fact that technology and technology development has been very important in nontechnological sectors of the economy and allowed us to grow productivity and consequently, allowed us to grow the economy without igniting inflation.

I would like to take this construction of trade and technology, and comment a bit about what has worked and what needs further work in the future.

Reflecting back on what has worked on trade, my experience in calling on several of you and several of your colleagues goes back to the mid-'80s when those of us in the semiconductor industry came in on our knees trying to ask for some trade intervention, especially having to do with opening up the Japanese market from which, for all practical purposes, U.S.-based producers were kept out.

My experience of government policy in the trade field that has worked dates back to exactly that situation in the mid-'80s.

After 20 years.

Senator Mack. Dr. Grove, if you would move that microphone up a little higher.

There you go.

Dr. Grove. That actually helps me because I can read my notes better, also.

(Laughter.)

After 20 years of, for all practical purposes, being shut out of the Japanese market, the following ten years have seen American producers' share of the Japanese semi-conductor market rise to over 30 percent.

Similarly, what shows signs of working in much more recent times is the information technology agreement that allows 52 countries representing almost the totality of $600 billion worth of information technology trade in the world, to do so without IT tariffs by the current year.

This has not only saved tariffs, but raised the number of non-tariff barriers for our products around the world, which is very important for future growth.

I'm encouraged by the agreement of China to join the WTO as of last year. And I hope for further actions in the Senate having to do with giving China Permanent Normal Trading Rights which will allow the negotiations that have taken place in getting them into the WTO to take full effect.

I'm looking in the category of next steps for your help in making that possible.

The trade work doesn't stop. Increasingly, the battles of trade will go from the barriers and rules involving the trade of physical goods to trade involving electronic commerce.

One particular way of looking at it is that the Internet and the fact that the whole universe is connected with interconnected computers allows a pathway for software to flow from computer to computer without any physical shipments of product taking place.

With this transition comes a variety of opportunities for problems.

The WTO classifies shrink-wrapped software, packaged software, as goods. Some proposals that have been floated in the European Union propose that e-commerce, and software shipped around the Internet, because it is in the form of bits, should be regarded as service.

The consequences of those two classifications are very significant. I would like to propose the adoption of the principle that bits or atoms all represent goods when they represent the same product.

And therefore, I'm advocating that we take a position that software shipped on the Internet should be classified as goods.

Anything different will allow e-protectionism to stay with the habit of sticking an "E" in front of everything, to rise up and protect the perceived short-term interests of individual trading nations by impeding the commerce as it transitions or as a large part of it transitions into electronic forums.

Another factor that we have to continue to work on has to do with export controls dealing with high technology goods.

Reasonable people can have different opinions on the pros and cons of the commercial and security aspects of this. But it is very difficult for me to see any position where a high-tech good that has reached the state of mass production and mass availability can be effectively controlled as if it was a high-performance computer of the time and ilk when these could be numbered one at a time.

There is a qualitative distinction between high-performance personal computers that are manufactured by the millions each month and computers exemplified by IBM, Deep Blue, of which there is one or two or three of a kind.

Once high technology goods reach the state of mass production, the only defense that we have that allows us to differentially take advantage of these technologies in our security work is to employ them and deploy them faster than competing countries.

And I'm very encouraged that recently, the Department of Defense has started to show signs of thinking along this line, that instead of trying to protect, keep high-tech goods from reaching other countries, their philosophy is that we will use the benefits of that high technology faster ourselves.

That is the only practical defense that we have to maintain an advantage of our own high-tech power.

I don't quite know where to classify the next item. I classified it under trade, but it is really not trade.

The world of information technology and the world of science and technology altogether is a world in which companies and countries compete for human resources, for skilled human resources.

We are not doing as well in this as we could, and as we should.

The United States, and particularly the United States high-tech industry, is the magnet for talented individuals and highly-skilled individuals around the world.

We have that advantage to such an extent that we are the envy of other developed countries. At a time when Germany, for instance, is reported to be competing for the attention and the immigration of Indian scientists, we educate them in our universities and ship them back home.

I'm very thankful for the short-term relief that H-1B visa provision has been given, but it is basically bailing out a boat with a little cup.

The problem is much deeper than that and much longer lasting. It is not a year-by-year problem.

The U.S., as a high-tech leader, has demands for high-tech personnel. And as we will talk about later in our educational system, our educational systems are not producing the right number.

The world's educational systems are producing the right number. It behooves us to look at this in a more systematic fashion and review our immigration policies from an economic standpoint.

How can we modify our immigration policies in a systematic and permanent fashion to allow individuals who are very eager to become part of the U.S. economy to do so?

Actually, the way that I look at this problem, it really needs to be parsed into three parts.

There's the near-term, temporary relief that can be given by the various liberalization of the H-1B legislation.

The intermediate term relief could only come from a systematic review of the immigration policies and immigration philosophies.

And the long-term answer has to come from making substantial changes to our scientific and technical education system, and I will talk about that in a minute.

Shifting over to technology, there are various acts that have taken place.

I will climb onto a fairly precarious limb and compliment you for the passage of the Telecom Act of 1996. I realize that this is a work in progress and the results are not all in. But basically, given an era in which everything that we are talking about has to do with the Internet, the Internet being about communicating commuters, at just the right time, in the nick of time, that law has encouraged and allowed increased competition and providing high band-width connections between computers.

Through a variety of mergers and acquisitions, some of which will turn out to be beneficial to the economy and some of which probably won't, enough of them have created critical mass among companies allowing them to step up their investment level to start deploying band widths at a decent rate.

We are beginning to see the bandwidth deployed in the backbone of the Internet in a very major way. We are beginning to see the band width deployed to corporations.

We are still waiting to see the full effect of deregulation to bring high bandwidth to individual consumers.

But I'm encouraged, and at the bottom of that chart is a three-step way that I like to look at developments. We have gone from talking about this problem to the point where we talk and have begun to act.

And I hope that in the next several years, we'll progress to the point where action will be automatic and a matter of course and a matter of the economic benefits to the participants and this will no longer be a subject.

I think we are making progress here.

Moving on to an area where we are not making progress— we are in fact regressing— it has to do with federal information technology research funding.

Not to put too fine a point on it, but total federal R&D is declining. Information technology R&D is declining. Ten years ago, the Federal Government spent $75 billion on precompetitive basic R&D.

By last year, this number went down to $62 billion.

During this period of time, the high-tech industry has grown ten to 30 percent per year. And along with that growth, actually exceeding that growth rate, private investments in R&D have grown at least at that rate— and actually, at a little higher rate than that.

I don't have the chart in your package, but I have a chart here that shows that ten years ago, about 50 percent of total IT R&D was spent by the government, 50 percent by private industry.

As the decade ends, 75 percent of the spending is spent by private industry and only 25 percent by the government, aided by the opposing trends of very heavy ramping, private investments in R&D, and very slowly declining, absolute declines of R&D spending by the Federal Government.

The problem with this is not just those numbers, but also the quality of the nature of the research that these dollars spawned.

Private industry funds product development with near-term, predictable results. Federal R&D funds basic precompetitive scientific and fundamental developments.

It is the spending of 20 years ago and 30 years ago on basic technology that has made today's product development possible.

What we don't spend on basic R&D today is going to be hurting us ten years, 20 years from now. And increases in product development spending cannot make up for what has not been developed then.

So I would like to suggest, as a benchmark, spending a corresponding percentage of federal R&D on information technology. Information technology represents the U.S. economy, which is 11 to 12 percent today, and federal spending of R&D is more like five or six percent.

So without any further economic growth, we need to think in terms of doubling R&D spending over the last five years.

Senator Mack. Dr. Grove, if I could get you to wrap up now.

Dr. Grove. I will do so very rapidly.

Basically, I would like to end up on the subject of education, which is very akin to the R&D issue.

World-class math and science education is key to continuing the miracle of technology and the impact of technology on the U.S. economy.

All the indicators are going the wrong direction. Electrical engineering, computer science, and computer engineering degrees declined from 40,000 to 35,000 in the last ten-year period of time. Specifically, electrical engineers who are the fundamental workers of the information technology period, went from 25,000 to 14,000.

Education, as basic R&D, are long-term developments. The people that we educate today cannot help but be productive for 20 years.

So, again, we are dealing with the problems a decade or two away.

The status of U.S. scientific and technical education has reached an emergency proportion. And if we acted, if we knew exactly what to do and we acted very aggressively today, relief would not come for ten or 20 years after this.

This is an extremely important area. It is important in a perception way. Scientific and technically-educated young people are not looking for that kind of education as a matter of desire, and we are not doing a whole lot to encourage them.

It is the area where my company has taken the single most significant step. We are spending $100 million on addressing these problems by educating half a million teachers around the world in science and math principles and bringing them up to date and by supporting programs that highlight the desirability of scientific and technical education.

To sum up, the general principles that I would like to leave with you is continuing in the process of minimalist programs in regulating matters.

The fact that we have avoided having a department of the Internet has been a blessing to this industry. The light hand of regulation has worked well and is going to continue to work well.

Keep in mind, however, that consistency, avoiding reactions to the problems of the last week or the last month are very important to industry because consistency is the territory in which we make our own investment decisions.

Adopt the principle of atom to bit neutrality.

And lastly, realize that the digital economy is all about human resources. Federal R&D spending and federal educational support and actions that spur science and math education, are very necessary for the continuation of the trends that we have enjoyed. Thank you for bearing with me.

[The prepared statement of Mr. Grove can be found in the Submissions to the Record.]

Senator Mack. Dr. Grove, thank you very much. You have raised a number of issues that we will address throughout the next two days, and that the Congress will be addressing over time.

I must say to you, when you raised the issue of the GATT classification of off-the-shelf software, items as goods, I wonder if you might take just another moment to expand on that.

I'm not familiar with that issue. And yet, you made a rather significant point about it.

So maybe you might just expand on, if there is a role for the Congress, what that role would be.

Dr. Grove. I think, principally, the role that I would be looking for is giving support to the Administration, to the U.S. Trade Representative in negotiating parity in rules in which foreign countries, particularly the European Union, look at that issue with us.

Inside the United States, there is no problem. Inside the United States, the implications of shipping software on the Internet, delivering software on the Internet, as compared to delivering the physical goods, draws no distinction.

There are attempts to draw such distinctions by the European Union. We ought to be very alert to that because it can result in each trading partner of ours, each country coming to a different conclusion, providing they are treating this as a service rather than as a physical good.

Wherever this equivalence can be made, we should go back to first base and our home base should be, if it's atoms— if you deliver it as atoms in a package, or if it's delivered as electrons on a network, it's the same thing.

Senator Mack. Okay. Well, very good.

Again, because of time, I'm going to just now recognize Representative Davis for a question.

OPENING STATEMENT OF REPRESENTATIVE JIM DAVIS

Representative Davis. Thank you, Mr. Chairman.

Dr. Grove, you briefly touched upon public education. As you're probably aware, we're going to have about 2.2 million new teachers we need to hire over the next decade.

Is there anything that you would recommend to us as federal elected officials that we ought to be looking to do to begin to shape that work force to try to develop a body of students that will be more equipped to deal with some of the work you described?

Dr. Grove. Whenever in the past we have had a serious shortage of critical manpower, the Federal Government has come with the incentives— training programs, scholarship support, everything ranging from— and this is kind of a far-fetched analogy— ranging from the GI bill onward, to motivate people to go into a particular field.

I think the educational situation is reaching, has reached a state of emergency, particularly when it comes to science and math education.

Federal assistance to teacher training, teacher certification, teacher retraining, would be absolutely appropriate, in my opinion.

Representative Davis. Thank you, Mr. Chairman.

Senator Mack. Senator Stevens?

Senator Stevens. Thank you very much.

Dr. Grove, we're going to face here very soon two basic issues that you sort of skipped over.

Could I ask you to go back and tell us your views on the Internet taxation and Internet privacy issues?

Dr. Grove. I skipped over them because I'm kind of in a minority position and I'm afraid of being hit by my colleagues from the back.

(Laughter.)

I thought, since I had to save time, that was a good place to save time.

(Laughter.)

Sorry about that.

(Laughter.)

My feeling is that our industry or those parts of our industry that are asking for tax advantaged treatment on commerce on the Internet are ill-advised.

The atom to bit neutrality principle applies there also. I don't think electronic commerce needs federal or state subsidies in terms of tax-advantaged delivery.

Now I also realize that the problems associated with developing a fair and legally appropriate system of levying taxes on Internet goods is complicated. But as a matter of public policy, I just don't see any justification for not moving in that direction.

That's point one.

Before I move on—

Senator Stevens. Privacy.

Dr. Grove. Pardon?

Senator Stevens. The privacy issue.

Dr. Grove. Privacy issue. A person's individual data, whether it's financial data or health data or whatever, is the currency of the Internet.

People trade it. People covet it. It is a variable good, as variable a good as the money in my pocket.

History shows that property rights have not been left to voluntary action and voluntary treatment. Governments at all levels have regulated dealing with properties.

I think individual rights are properties and it is inevitable, in my opinion, that various levels of governments are going to get into the act and regulate dealing with individual's data.

I would prefer to recognize this trend and get ahead of the possibility that localities and states will take matters in their own hands and we're going to be dealing with 50 different approaches in the United States alone, and hundreds of different approaches world-wide.

I would strive before the problems are acute, to establish government-sanctioned rules, property rights extended again using the atoms to bits neutrality to electronic data that is so much the value that the people fuel the Internet with.

Senator Stevens. Thank you very much.

Thank you, Mr. Chairman.

Senator Mack. Congressman Watt?

OPENING STATEMENT OF REPRESENTATIVE MELVIN L. WATT

Representative Watt. Thank you, Mr. Chairman.

Let me first, Dr. Grove, applaud you for the position you just took on this taxation issue because I think it's a very, very difficult issue and one that I think we've got to come to grips with.

I think your forthrightness in dealing with it and coming to grips with it, while you don't profess to be speaking for the industry, is a welcome step.

Just a point of clarification and information.

The figure that you have on the federal IT research funding, the decline from $75 billion in 1990 to $62 billion in 1999, how are those—where are those federal dollars being appropriated to, primarily?

Dr. Grove. Universities and national research labs.

Representative Watt. Okay.

Dr. Grove. Very little of those go to industry. A lot of those dollars are being spent in doing what I call precompetitive research, research that is done— take a university being a perfect example of it.

Basic research being done in the university that is available to companies like Intel and Intel's competitors. And we take that basic knowledge and we build on that. We compete with each other on the basis of what we have ourselves, out of our own spending, built on it.

The concept of looking at precompetitive research that's available to all comers as compared to commercial, private, or competitive research, is a good way to look at it.

And I think the investment in precompetitive research is a very appropriate place for the Federal Government to puts dollars, particularly when the spending of those dollars will contribute to the training and education of technically-trained professionals because it is spent in universities.

Representative Watt. So your recommendation would be continuing that funding process primarily through universities and independent research.

Dr. Grove. National labs.

Representative Watt. National labs. Okay. Thank you, Mr. Chairman.

I, in the interest of time, yield back.

Senator Mack. Thank you very much.

Dr. Grove, we want to thank you for your participation this morning. We wish we could keep you here longer. But as you know, we have quite a line-up this morning.

Again, we thank you so much for your participation and for laying out those thoughts that you believe we should be focused on.

Thank you.

Dr. Grove. Thank you very much, Senator Mack.

Senator Mack. Let me again say to the members that are here, I announced at the beginning of the hearing that we have a fairly tight schedule. We've got a lot of people to hear from.

So I'm keeping record of when members arrive. I will try to be fair in going back and forth. Those who didn't get a chance to ask questions during this panel, I will try to recognize you at the beginning of the next panel, and so forth.

Senator Gorton, you're going to introduce. And Senator Murray. There aren't any chairs. Would you mind bringing the chairs up? Or you can join us, whichever way you'd like to do it.

Senator Gorton?

OPENING STATEMENT OF SENATOR SLADE GORTON

Senator Gorton. Mr. Chairman, we are here in a superfluous duty, to introduce to you Bill Gates, whom, of course, you already know.

(Laughter.)

But you're here today to discuss matters of the future of technology. You have certainly an all-star cast. And you have a constituent whom I share with Senator Murray, the poster child for the technology in which we have found ourselves during the course of the last two decades.

Senator Mack. Put the microphone a little closer.

Senator Gorton. One which continues to change at an increasing rate of speed.

But I'd like to take just a moment to mention two matters about Mr. Gates that may not directly be a part of your inquiry here today.

The first is the kind of work that the Microsoft Corporation engages in with respect to our young people.

The latest example of that is an education program called Washington-To-Washington, pairing a school here in the District of Columbia with a school in suburban Seattle, for the magnificent learning experience that the students in each of those schools can have dealing with a society very different from their own, but still American.

And the second is to speak to you about a subject that we were discussing just before we came on here. And that is the charitable nature of both the Microsoft Corporation as a corporation, which is a leader in the United States in recognizing its social obligations and its ability, given its fame and its position in the world, to have an impact on improving our society for young people and for older generations as well, together with the magnificent record that Mr. Gates has in that respect on his own, as an individual, through the Gates Foundation.

So you do not have a one-dimensional person here before you this morning. You have a man who has probably changed the way in which

all of us live and perhaps the way in which our children and grandchildren live to an even greater extent through technology. But who is also changing it for the better through his contributions to society in the widest possible fashion.

Senator Mack. Thank you, Senator Gorton.

Senator Murray?

OPENING STATEMENT OF SENATOR PATTY MURRAY

Senator Murray. Mr. Chairman, members of the Committee, it is an honor for me to join Senator Gorton here today to introduce a man who, it has been said, needs no introduction, Bill Gates.

He has been a tremendous boon to the economy of the Pacific Northwest, and to our entire country.

I can think of no one in our history that has changed the dynamics of the economy as much as Bill Gates has. All of our constituents understand the need to learn technology because of the job prospects and the excitement for the future, which still remains today and will be there for some time.

His contributions to creating new jobs has been tremendous. Creating new ways for people to learn and, new ways to have health care be more affordable and accessible to people in remote communities are tremendous efforts.

And as Senator Gorton mentioned, his personal contributions have far exceeded all that any of us can imagine.

I personally just want to take this moment publicly to thank him particularly for his contributions to education, to making sure that all of our children get the skills that they need to be able to compete in the future world, and to his contributions to immunization world-wide, so that that issue can be resolved, hopefully in our lifetime as well.

It's a pleasure to introduce him to you today.

Senator Mack. I thank both of you.

We welcome you back to this Committee, Mr. Gates, and look forward to your comments this morning.

So the floor is yours.

PANEL II

STATEMENT OF WILLIAM H. GATES, CHAIRMAN, AND CHIEF SOFTWARE ARCHITECT, MICROSOFT CORPORATION

Mr. Gates. Well, good morning. I'll just make a few introductory remarks and then we'll have the remaining time for dialogue.

I want to thank you for inviting me here. I'm honored to be back and I appreciate the opportunity.

I think this hearing is very timely and very important. I really want to focus my remarks on, of all the high-tech issues in front of Congress, I think the most important are those that relate to education, at the time of unprecedented prosperity and growth, a good deal of it generated by the advances in the high-tech industry.

In the United States alone, information technology has accounted for some 30 percent of our aggregate growth, and about one half of total business investment, which is really extraordinary to have one sector contributing in that way.

The United States is certainly at the forefront. But other countries have recognized what we've done well, so we can't rest on our laurels.

Meeting the ever-changing demands of a high-tech economy and maintaining our global leadership and stimulating further growth will depend largely on our ability to produce and expand our competitive work force.

The lifeblood of our industry is not capital equipment, but human capital. One of the key challenges all these businesses face is attracting and retaining the best among our ranks.

One issue of particular note there is the ability to bring in world-class talent on a world-wide basis, which is why Microsoft and our industry is so key on raising the cap on H-1B.

So the rapid shift from an information- to a knowledge-based economy means that education is the linchpin.

Technology plays a role here as well.

The PC really would have been worth creating if the only application had been in schools and libraries. If you go into those schools and see the way that kids are pursuing their curiosity, it's very gratifying to anybody who's been involved in our business.

The PC software and hardware industry have demonstrated a dual commitment, a commitment to high-paced innovation and the lowering prices.

In fact, the greatest change brought to the computer industry was a recognition that even as we brought these prices down, that the demand would be there, and so we could have the virtual cycle of lower prices but increasing volume.

If we look forward for the next five years, the PCs are going to continue to get better, whether it's having a microphone or a camera, the high speed.

These devices will become wonderful communication devices for reaching out around the world.

If we combine this with the idea of broad-band connections and some of the other new devices that will be out there, like cell phones or TVs connected to the Internet, the opportunity for sharing and learning is really quite unprecedented.

By putting technology directly into students' hands, schools can provide access to learning at any time and any place. And teachers will get the ability to share work with each other and customize the information they want to provide to their students.

In addition to the work that Microsoft has done around education, my wife Melinda and I, through the work of our foundation, recently launched, a three-year, $350-million-dollar grant program aimed at helping teachers and administrators integrate technology into their curriculum.

The goal of the program is to increase academic achievement for all students by identifying and replicating school environments, where students achieve at a high level with no student left behind.

It's great to see that parents are playing a renewed role as they are able to review their children's work and connect more easily with teachers through electronic mail.

These tools also allow us to view learning as a lifelong pursuit, providing new ways to enrich how we live and how we work.

I think the toughest challenge and the most important for the future work force is a focus on K through 12, particularly math and science.

Microsoft has a lot of ways that we're trying to help with this.

We've created a connected learning community approach, which is based on the idea of bringing people together, having an Internet site for the school that connects out to all the different things that are going on.

During the past three years, Microsoft has committed over a half-billion dollars of software and support for these activities.

A good example is the Lemon Grove School District in California, where they've created an environment that connects together the community, the local library, and the parents. The school district has put together this hub for life-long learning.

I think another key element here is access for everyone, whether it's through the school or the library.

There's often this talk about the digital divide, which emphasizes the challenge. Another term is the digital opportunity, which really emphasizes the positive side of what can be done.

There's a lot of institutions that I think it's important to partner up with.

We have work going on with the Boys and Girls Clubs, which are a great place to expose kids to technology and help them learn how to use that responsibly.

Another key location we think is the library. And that's why Microsoft and the Gates Foundation, in partnership, made a commitment that every library in this country would be wired up and have a state-of-the-art personal computer so that anybody who can get to the library can get to this technology and get to the Internet.

And that's being rolled out across the country. We're about halfway through that roll-out and the results in terms of the kids coming in, the communities stepping up and being excited about it, and the librarians themselves really embracing this expanded role.

It's been quite fantastic.

Turning to education, the biggest potential comes from getting technology into the curriculum. This is going to take time.

It's going to really involve the teacher on a very central role— training teachers so they feel comfortable with this, giving them the equipment so that it can be done.

Today, surveys suggest that 20 percent of teachers feel confident about really pulling technology into their classrooms.

So that says we have a long ways to go.

There are some great training programs out there that are aimed at closing the gap and some web sites that Microsoft and others have created.

Andy Grove has Intel very much behind what they call "Teach To The Future." That's got a goal of training 400,000 teachers. It's a model initiative, in our view, that we're very involved in in terms of providing the software to make that possible.

Ensuring the success of students and teachers requires support programs for the schools so that they can move forward with the right infrastructure.

I'm excited to talk to the Committee about specific things that we're trying out. And that's this idea of connecting schools together, using video connections across the Internet and shared Internet sites.

Senator Gorton mentioned, one of the initial pilots here is connecting schools here in Washington, D.C., with schools back in Washington State.

I'll participate in a demonstration of how students are using that later today.

Over the course of the next school year, Sequoia Junior High School in Kent will be paired with the seed public charter school here. They'll be connected up and sharing ideas and trying out new things together.

So as you look to renew the elementary and secondary education act, I think it's important to consider the role of technology and how we get teachers involved enthusiastically in embracing technology.

Technology is not standing still. Things like a tablet computer that you can write on, a computer screen whose resolution is good enough that you'd be able to read off of it, so-called electronic book, those things are coming and they're coming soon. Within the next three years, both of those will be a reality in selling literally millions of units.

We at Microsoft look forward to working with you as we strive towards this shared goal of a great educational system. And the goal of having every child have the same opportunity to use these new tools and to embrace the excitement of technology, is something that's well worth the effort.

Together, I think the private sector and public sector can rise to this challenge and it's certainly pleasing to see that education is being made such a priority.

These are truly amazing times, times of limitless possibilities. And we can say without doubt that the best is yet to come.

So once again, thank you for the opportunity to come here today. [The prepared statement of Mr. Gates can be found in the Submissions to the Record.]

Senator Mack. Thank you, Mr. Gates.

I will now turn to Senator Bennett. Just to kind of tell my colleagues, we'll go to Senator Bennett, Senator Frist, Senator Bingaman— we won't go to Senator Bingaman.

(Laughter.)

Senator Bingaman. I didn't know I was on your list.

Senator Mack. All right. And then to Senator Burns. And then we'll see where we are.

OPENING STATEMENT OF SENATOR ROBERT F. BENNETT

Senator Bennett. Thank you, Mr. Chairman.

Mr. Gates, we appreciate your coming here. You were very helpful to the Committee last time when you were here a year ago and we're glad to have you back.

We appreciate your focus on education exclusively in your testimony this morning.

Let me share with you that it was education and educational problems that brought me into public life. I was very content as the CEO of a rapidly growing company when I was recruited to be the chairman of the strategic planning commission for the Utah State Board of Education.

It was a very important learning experience for me. It was also terribly frustrating.

I have never dealt with any establishment more resistant to change than the educational establishment. It seemed like the only thing they liked better than things the way they are, are things the way they were.

You represent change in this economy more than any other individual—rapid, drastic, dramatic, ongoing, unrelenting change comes out of you and your organization.

And as I deal with educators, I find still they're good people. Don't misunderstand me. I am not in any way criticizing the people that have devoted their lives to education.

But they're caught in a system that is structured to resist change. They're caught in a paradigm that says, things must always be done in the same kind of way.

And people say to me, well, we'll solve our educational problems if we just put more money in it. And as a businessman, I know that the worst thing you can do when you're faced with a bad system is to continue to fund it.

You must learn to change it, change it fundamentally. And then the good people that are caught in the bad system can start to produce for you.

I have that feeling about education.

Don't we have the ability now by virtue of technology to track individual student performance almost daily? Don't we have the ability to track teacher performance almost daily, certainly weekly?

And don't we have the ability to change the way teachers are prepared? I think this is the real core.

I remember one fellow saying to me, the best way to solve educational problems in this country is to abolish the schools of education in every American university and start over again.

Don't we have the ability to change the whole question of evaluation and compensation and promotions, et cetera, of teachers by virtue of what you contract now through your technology?

Mr. Gates. Well, I think there's a lot of interesting ways that technology can help out.

Certainly the ability to make a judgment on a daily basis of whether somebody's doing a good or bad job goes beyond any sort of software technology that I think exists today.

The technology can be a tool. It can track what's going on in the classroom. It can keep track of what the student is doing well at, what they're not doing well at, and therefore, help guide them to things that drive their curiosity forward in the right direction.

I'm not sure that we'll ever get a chance to be quite as radical in starting over as you're talking about. I do think we have to take the opportunities for experimentation and new ideas wherever they arise.

And in the programs that both Microsoft has done and the foundation has done, a lot of what we do is, we say, okay, for people who are willing to give up their time off in the summer and come to these technology learning classes, if you do that, not only will you learn various things, but you'll get a free portable computer of your own and some funding to take back to your classroom.

We've been impressed that about 30 percent of teachers in any district we've gone in and offered these programs are willing to give up literally months of their time at no additional pay and get involved and become agents of change within the school.

And so, I think the process here, the process of change will be both a bottoms-up process of these teachers who really want to try out the new things, some of whom are younger, at least in their approach, and tops-down change, where you allow an entire district or a school to go off and do things in a new way.

Certainly, coming from the private sector, the idea of letting lots of these experiments flourish seems very attractive. And I know in some states, this is moving forward and I hope we can take the objective results and get them spread throughout the nation.

Senator Bennett. Thank you.

Senator Mack. Senator Frist?

OPENING STATEMENT OF SENATOR BILL FRIST

Senator Frist. Thank you, Mr. Chairman. And Mr. Gates, welcome, and thank you once again.

I want to say publicly what I told you privately many times; I want to commend you for your leadership on the social issues that Senator Gorton mentioned. You, your family, and your foundation, should be credited for calling attention to issues like the 24 million people who are HIV-positive in Africa, who have little hope in the future. You have become a real model for charitable giving this new economy and the new generation of young entrepreneurs who are doing well, who take risks and are rewarded, and who can turn around and give back in the way that you have done and have demonstrated.

It's an important model that has an impact around the world.

Let me switch gears just a little bit.

First of all, I believe that as we look to the future in terms of preparation, education is the most important issue. So I appreciate your emphasis on that.

But let me shift to health care in just a few minutes, to quality and efficiencies in health care. Two issues in which I will make quick statements and let you comment.

Over the past year, the Institute of Medicine talked about 70,000 to 90,000 people who have died because of medical errors. While the definition of error is debated.

A lot can be done through a systems approach, on the one hand, so you look at quality there.

The area of individual empowerment, is the second issue on which I would like to speak. About 15 years ago very well educated patients came to me as a physician.

Now my colleagues tell me that they come in after going straight to the Internet, to access information— they are much smarter, much more inquisitive, with more data in hand. Patients now know the good and the bad, the potential for getting a higher quality of care, and also their ability to challenge the system.

That individual empowerment has been achieved through a systemwide approach, and the personalization of data which computers have made possible.

Still, we have a long way to go. Can you just make a few comments about health care information technology, future applications in this field?

Mr. Gates. Great. Well, one of the two themes of the philanthropic work I'm doing are world health and education. The opportunity to take the level of health care that exists in the United States and get that to be available globally, the impact that that can have I think is very dramatic and something that I'm pleased to see the Congress is looking at supporting the global alliance for vaccines and also giving some incentives to the drug-makers to think about these world needs, particularly in the area of vaccines.

The medical scene is being changed by this empowerment, the idea that the patient can go out and learn about new drugs and learn about all the support groups that are out there, I think, overwhelmingly, that's a very positive thing.

Now like any good change, it's got to be scary to the medical establishment, the patient who walks in having seen these various websites and has ideas about their own treatment.

It's a big change from how things were done in the past.

I think the idea of doctors using electronic mail to exchange information with patients, the idea of having some of these websites really have some sort of quality control applied to them, so patients can know that some of the information out there is really quite valid in terms of what they're reading.

I think there are some things that probably need to be done along those lines.

But overall, the reduction of visits, the reduction of anxiety, the opportunity to learn new things, I think the medical establishment has to look at itself and say, should we resist this and basically embrace it aggressively while knowing that there's a few things that have to be avoided there.

In terms of errors in medicine, this digital world will give us the ability to track activities and make comparisons about outcomes in a way that's never been possible before.

The history of the information revolution is one where being able to drive quality into the processes is one of the huge benefits that we have.

And the medical sector certainly can be a big beneficiary of that.

I think, overall, the quality of medicine in this country is very, very high. That doesn't mean that we shouldn't strive to make it even better. But I do know on a world basis, we are absolutely the envy of the world and we should reach out to the world to help them get to our level.

Senator Frist. Thank you.

Senator Mack. Senator Bingaman?

OPENING STATEMENT OF SENATOR JEFF BINGAMAN

Senator Bingaman. Thank you very much.

Mr. Gates, thank you for being here. Let me ask the question which I'm sure you're asked often about Internet privacy and whether there's anything that— I know the general view of folks in the industry is that this is something that Congress doesn't know enough to be wading into and I'm generally in agreement with that.

But more and more of the people that I talk to in my state do raise a concern about financial information that is on the Internet that they think people have access to, health-related information that may be put on the Internet that people would have access to.

What's your view of how that issue should be resolved, if at all?

Mr. Gates. Well, the fact is that a great deal of information about people's activities has been stored in computers for quite some time.

It's just that with the Internet, people are becoming aware that that information is there and that it might be used in a way that they wouldn't like it to be used.

For quite some time, every phone call you make, every credit card charge you make, all these different activities have been stored in some sort of computer database.

In certain areas of activities, it's important that there be explicit regulations about the use of the information. I'd say that tax records, health care records, those are areas where the rules ought to be quite black and white.

And it is fairly complex because you have different rules. The health care record itself will have to be partitioned up into various parts. And some parts an insurer probably should have access to and some they should not.

And as you are serviced, as you go in for a medical visit, different people who are helping you out should have access to some part of your health care record and other parts they should not.

The area that I think industry has been concerned about is that if there is sweeping regulations enacted today when we're at the early stage of these things, a lot of the ways that information is used on behalf of the consumer in a beneficial way could be blocked out.

For example, when you're browsing the Internet, some of the sites are free because ads are displayed. And that's a good thing. It's nice to have free sites that you can go to.

The ability to target those ads to the viewer so that they're ads that might be particularly relevant really is of mutual benefit.

You don't want to waste your time looking at ads that aren't interesting.

And so, some ability to take a profile, but on an anonymous basis, and use that in the presentation of ads, that's the example of something that probably should be allowed and is not a disadvantageous thing.

And so, the whole privacy issue is really on the radar screen in a big way.

Even in terms of expanding the use of the Internet commercially, we've got to get our users to feel that their privacy is going to be respected.

So without any regulatory things, I think that certainly the private sector has got to work together, got to have clear designations about how information is used.

I think over the last few years we've made some good progress. There have been some cases of companies that didn't do well that really highlight the need here.

And so I would argue for a cautious approach in a very, very important area.

Senator Mack. Senator Burns?

OPENING STATEMENT OF SENATOR CONRAD BURNS

Senator Burns. Mr. Gates, thank you for coming this morning. Let me go one step further in the privacy dialogue.

Education, by the way, is key and what we've been doing in our— I saw a marvelous thing this past week where we have young people going into senior centers and teaching our seniors how to use a computer, send and receive. And they use the computer and it's remarkable what young people can teach us.

I know my kids had to teach me to use a computer. I was always afraid if I touch it and hit the wrong key, it would blow up. But instead, I found out that computers are more like mules than anything else.

You can't make them do what they don't want to do.

But let's take this. We have legislation pending in the privacy area that allows the industry to develop standards and to promote those standards in some type of a Good Housekeeping sort of speak, and safe harbors for those companies who have a clear policy on privacy.

If you double-click on their privacy policy, you will probably get 26 pages of legalese, of which very few people want to wade through.

We need some help in this area. We need some recommendations because the next question comes— you can set any kind of a standard, either the industry or through public policy or public law.

Enforcement will be very, very difficult. And so, I am appealing to you and your colleagues in the industry to help us with this because we can injure— because I really feel before these new technologies can reach their full potential, they must be secure, safe, and responsible.

And encryption is part of the safety. And privacy is part of the security of this new tool for it to reach its full potential.

So I'm asking you and the industry to work with us in finding that ground in which we can develop a privacy policy that the American people will have confidence in.

Would you want to further comment on what I said?

Mr. Gates. Sure. I agree with everything you said there. In encryption, fortunately, we did make progress where we're no longer discouraging U.S. companies from having strong encryption and using that in their products world-wide.

So, fortunately, an issue that was in deep trouble and going the wrong way is now in good shape.

The privacy thing does require a lot of focus to have easy-to-explain standards. I agree with you that despite all the efforts by industry, it's still a bit confusing there.

I do think it's important to separate out different domains. If you're talking about buying books or movies and using information about that, it's quite different than things related to health care or the taxes that you owe and those kinds of things.

Senator Burns. Financial services.

Mr. Gates. And financial services is an area where people expect a very high degree of privacy.

And so if we could pick one or two levels that people understood, there are some clear principles that apply everywhere. Any information that's collected about you, you have the right to see and you have the right to say, no, I want you to delete that from your files.

And you have a right to understand whether that's being shared with any companies other than the ones that you're interacting with.

Those are the key things that we want every site to be very clear about what they're doing.

And so, we look forward to working with you on that because striking the right balance here can help the Internet achieve its potential. There's the potential, it's possible that we could do too little, but it's also possible that we could do too much in this area.

Senator Burns. Thank you.

Senator Mack. Thank you, Mr. Gates.

Mr. Dooley?

OPENING STATEMENT OF REPRESENTATIVE CALVIN M. DOOLEY

Representative Dooley. Thank you very much, Mr. Chairman. Thank you, Mr. Gates, for taking the time.

A number of us worked to develop H-1B legislation in the House. It's a bipartisan bill. The primary authors are Congressman Dreier and Congressman Lofgrin, that increases the caps from 115,000 to the

200,000, which is fairly consistent with what's being proposed here in the Senate.

Dr. Grove spoke at length in terms of, though, this is in some ways a band-aid on a band-aid, and that we need to be looking at a longer-term approach to how, in your words, we attract and develop the talent that we need to continue the growth in the technology sector.

The proposal that we have helped to develop increases the fees from $500 to $1000, and invests that money in a host of areas, primarily targeted to how do you increase the number of our students graduating from our academic institutions with expertise in the math and the sciences, as well as providing incentives for teachers that will teach in our public schools in those disciplines.

We have a group of our new Democratic coalition out in Silicon Valley just last week. I was impressed by the number of people in the technology sector— I was talking out there— that expressed a willingness to even see that fee increased to a greater amount if we could demonstrate that that would provide the funding that we could invest in programs that would help to develop the domestic talent that would complement the H-1B visas that we are bringing in.

I would be interested in what your perspective is. Does a fee of $1000 or $2000 or $3000, what does that mean? And what would be your perspective in terms of where we should invest that and does that make sense from a longer-term H-1B policy?

Mr. Gates. Well, I think that this is a very critical issue. In fact, if there's anything that can help the technology industry, move it full speed in the next couple of years, I'd say it's this visa issue.

No matter what you do, the demand for these kind of world-class engineering skills exceeds supply. And the basic trade-off for us as an industry is whether we can continue to do 90 percent of this work here in the United States or whether we have to go outside the United States to do the work.

Bringing in world-class talent into this country, most of which was actually educated in this country, is a totally positive thing.

It's very strange to have somebody come here and be educated, and then because of our visa policies, they have to go do their work and contribute outside the country.

In our case, in no way are the workers that are coming in on these H-1B visas, it's more expensive for us because of having to go overseas in some cases to actually locate the people and helping to move them here and things like this.

So it's actually more expensive than hiring somebody domestically.

In our case, these jobs are such critical jobs, that an extra $2000 would not hold us back in terms of being able to achieve our goals.

Anything you invest in is not going to have an overnight impact. Even within the next five years, it won't have a substantial change on the imbalance we face.

All that's going to happen in the next five years is how much of the great work and the great companies have done here in the United States versus other locations.

In terms of how that money is best spent, it's like any money that's available, there's more ideas than there is money.

There's basically two philosophies. One is to make sure that the elite institutions in this country continue to be the best. There's a contrast.

Why do we say that the education system in America is not as good as we want it to be, and by some measures, it's not competitive. And yet, we have all these great technology companies.

The answer is that our university system, particularly the stronger universities, are the envy of the world. They are the best.

In fact, if you took the top 40 or 50 universities in the world, the top 50, say, I think at least 40 of them would be institutions in this country.

And so, keeping those strong, which sometimes people take that as a given, that's certainly a great priority.

We are starting to see because of the incredible opportunities, more students go into the technology field. That hasn't yet caught up with the demand. But the market place does work.

When you offer people jobs that are fun, exciting, that can change the world and pay pretty darn well, in addition, over a period of years, they move from whatever else they were doing— I don't know, investment banking or different things—and come contribute to building great software.

And so, the fees would not be an issue in our case. What is an issue is that the numbers are just not generous enough to let us go full speed.

Senator Mack. Because of time, we're going to have just one more question.

Senator Abraham?

OPENING STATEMENT OF SENATOR SPENCER ABRAHAM

Senator Abraham. Thank you, Senator Mack. And welcome, good to see you. Thanks for being here today.

I want to follow-up really on Congressman Dooley's point and on a couple of other related matters.

I think your statement that the high-tech worker visa limits and addressing that is a very critical component of our ability to continue to grow in terms of our technology, in this debate we have, there are several counter-arguments that are being made by groups who oppose changing this limit.

I was wondering if you might comment on one or two of them.

Mr. Gates. Okay.

Senator Abraham. One of them is that if somebody comes under an H-1B visa here, they take away a job that an American would otherwise be filling literally immediately because the foreign worker takes that job instead of an American.

Second, there are no consequences to American companies if they can't fill these positions because the cap has been reached.

And I was wondering if you might comment from the perspective of the industry or at least from Microsoft on those conventions.

Mr. Gates. Well, I can be very, very concrete on the second point.

We sit in review meetings while we're talking about the great new

products we're working on and people say that part of the reason their schedule stretches out as long as it does is because some of the new people that they've hired are outside the country waiting to come in and do the work that we think is very important to get done.

So this is not an abstract issue when it comes to Microsoft and other high technology companies.

We now have this thing where whenever the limit gets raised, it gets used up very quickly. And then all of the people we recruit, say from Canada, just have to stand by and waste their time until there's an opportunity to get their visa approved.

So in terms of the other point, we are recruiting in the U.S. at the highest levels possible.

And believe me, the supply is just not there to fill the demand.

Anybody in this country who has even just an undergraduate degree in computer science will get ten or 12 job offers, fantastic job offers from established companies, start-up companies.

And that's wonderful for them, but it does mean a lot of those jobs are going unfilled.

What's the net result of that?

The net result is that companies outside the United States or companies in the United States are forced to do that work in other locations.

The U.S. isn't the only place that this kind of work is at critical mass. It is getting to critical mass in India. It is getting to critical mass in Europe.

But there's never been an industry where one country was so much in leadership. There's never been an industry where there was so much jealousy about the fact that one country has so much leadership.

And by having the industry here, the application of our advances also takes place here far more rapidly. And that spreads throughout all the different kinds of companies that are involved.

I remember once when we recruited some very, very top people from India, how there were articles in India saying how terrible this was. And then there were some people in the U.S. who said how terrible it was.

And I said, well, there's something wrong here. How can India be sorry to lose these people and the U.S. be sorry to get them?

I think the kind of talent that is available is a great thing. And as I said earlier, it's overwhelmingly talent that was trained here in the United States.

Senator Abraham. I thank you very much. I would just say, Mr. Chairman, I agree completely.

I think the absurdity of— in fact, in no small measure, subsidizing the post-graduate education of many of these students, only to then force them to leave for foreign competitors, is in my judgment directly contradictory to our goals of trying to expand our own economy.

Thank you very much.

Senator Mack. Thank you, Senator. Thank you, Mr. Gates, again for being before this panel. We appreciate your statement and your

responses to the questions.

Thank you for being here.

Mr. Gates. Thank you.

Senator Mack. And I would ask the next panel to come forward.

Mr. Holleyman, I want to welcome you and the other members of the panel. We might just wait just a second to get a little order here.

Mr. Holleyman is the president and CEO of the Business Software Alliance.

I'd like for you to introduce the panel that we have here this morning.

PANEL III

STATEMENT OF ROBERT HOLLEYMAN, PRESIDENT AND CEO, THE BUSINESS SOFTWARE ALLIANCE

Mr. Holleyman. Certainly, Mr. Chairman.

Again, I am Robert Holleyman. I am delighted on behalf BSA member companies to be with you this morning.

This is the occasion of the BSA's fifth annual CEO forum. And the goal of the CEOs and the BSA is to share a vision for the future of high-tech in America.

This Committee has just heard from two of the BSA member executives— Andy Grow from Intel, and Bill Gates of Microsoft.

On this panel, there are three additional BSA CEOs: Carol Bartz of Autodesk, John Warnock of Abobe Systems, Bill Larson of Network Associates.

And the next scheduled witness on the next panel is Jay Walker of Walker Digital.

Each of these and other BSA member companies contribute in significant ways to the growth of the nation's economy.

By 2005, the american software industry will have $148 billion in revenues, with an estimated annual growth rate of over 17 percent.

The good news is that we believe that the best times are still ahead. But there are several challenges and I would like to very quickly highlight three.

One, cybertheft.

According to a survey of BSA CEOs that will be released tomorrow, on-line distribution of software will increase from 12 percent of software which is delivered on-line to 66 percent by 2005.

Yet, the illegal distribution of software on the Internet is increasing at rates even faster than legal distribution.

In most of America, shopkeepers look first to their mayors and governors to fight crime. However, in the area of cybertheft, the federal lawmakers and prosecutors have exclusive criminal jurisdiction.

Thus, we look to Congress and the Justice Department to vote additional resources to combat this growing illegal activity in its threat to e-commerce.

Secondly, in foreign markets, we must open those markets for the software industry to continue to grow. And we believe that we must grant PNTR status to China or seek control of that important market.

And finally, Dr. Grove and Mr. Gates have already commented on the need for a world-class workforce and the BSA CEOs share their view.

We think that by collective efforts of industry and government, each of these challenges can be met. We look forward to that dialogue and share with you a vision for the future.

Thank you, Mr. Chairman.

Senator Mack. Thank you very much. I will start with Ms. Bartz. But I also want to welcome to the panel Dr. Mark Leavitt, CEO of MedicaLogic.

Again, we're delighted that you're here.

Ms. Bartz?

STATEMENT OF CAROL BARTZ, CHAIRMAN, PRESIDENT AND CEO, AUTODESK INCORPORATED

Ms. Bartz. Thank you, Mr. Chairman, members of the Committee.

I'm very pleased to be here today and really do thank the Committee for holding these hearings the second year in a row.

Because technology, as you've heard, continues to have a strong effect on the economic future, I think it's very important that we continue to understand each other and to have dialogue such as this.

I appreciate the opportunity to talk about how innovation and software is removing barriers as we move to the new economy.

But on the flip side of this topic, I want to talk about how widespread software theft is creating barriers that slow the new economy.

Globally, of course, as you are well aware, some of the biggest software theft problems are in China. So I do want to talk about how China's PNTR decision can help reduce this theft and create new opportunities for U.S. companies.

To give you a quick background, my company, Autodesk, is the global leader in design software. Millions of architects, engineers, mechanical designers, use our solutions on a daily basis.

I like to say, if God didn't create it, one of my customers probably did.

They're designing the buildings, products, infrastructure, bridges, roads, that we all use every day.

We also create the virtual world, the digital world. So films such as "Titanic" and "Matrix" special effects are used by our software.

And close to your heart, our Frost software is used to instantaneously generate television graphics such as election returns.

We are deeply involved in using the Internet to help our customers remove the barriers from their business. We allow them to be able to share drawings instantaneously around the world and of course around the U.S., significantly reduce project timetables, which means costs in construction and manufacturing, and of course, use e-commerce in supply chains.

So the Internet has a huge effect.

But there's also a downside to all this information technology. And that is that it's creating a new kind of crime and a new kind of criminal.

I'm talking, of course, about cybercrime and about cybertheft and really talking about the cutting edge of lawbreaking.

This includes, by the way, computer-based vandalism, terrorism, and theft. And you'll be hearing more about that from my colleagues.

I want to talk, though, specifically about a kind of cybercrime— software theft. And I emphasize theft.

There's no question that this is a major problem. Nearly 40 percent of the software applications globally are stolen— 40 percent.

Overseas, of course, the theft rate is even higher. In China and places in the Far East, it's 95 percent, which means only five copies of every hundred are legal.

But to be fair, it's a U.S. problem as well, and it's a corporate U.S. problem.

Globally, the retail value of stolen software is $11 billion annually. This results in more than 100,000 fewer jobs in software companies and related industries and the loss of nearly a billion dollars in uncollected taxes just in the U.S. alone.

We in the software industry have a basic and fundamental problem in convincing government that software theft is really a crime.

I believe one of the reasons this happens is because software feels so invisible.

But I contend if a CEO of an automobile company came before you and testified that 40 percent of their production was stolen every month of every year, and furthermore, these stolen vehicles were sold openly to the public, that this would gather a lot of intense interest by government and law enforcement.

This is exactly what is happening to software companies. Stealing software is not an unseen crime. It is an unseen crime wave.

But even though software is invisible, please remember that it is the foundation of the information economy. Without software, the visible parts of the information economy— fiber-optic servers, the PC on your desk— would not be usable.

I'm here today to put a human face on this cybertheft problem.

A CD-ROM like this was purchased in Beijing last month for two dollars— $20,000 worth of software is on that CD.

The Internet is a prime conduit for software theft. On-line auctions routinely sell our software.

World-wide, there are more than 2 million web pages offering stolen software. In fact, we call the Internet the Home Shoplifting Network.

(Laughter.)

Software theft is not just damaging my industry. It's starving our nation's software development process.

This means fewer jobs, lower tax revenues, and less trade. It also means that we're not getting the productivity increase that we would all like to enjoy.

But we can do something about it.

Industry and government can work together as partners to address the problem.

Some specific remedies, if you will.

First, it's important to finish the work to grant China permanent normal trade relations and to bring them into the World Trade Organization. Membership in WTO will obligate China not only to pass laws against software theft, but to enforce these laws.

Bringing China into WTO can also improve market access and reduce copyright theft.

I believe it's a win-win for our economy and our country.

A second remedy is a renewed commitment to enforce the good copyright laws that Congress has recently passed.

For example, the DOJ and FBI can devote agents and prosecutors to the field tackling cybercrime, including software theft.

High-tech training for those individuals will improve their ability to catch not only software thieves, but hackers, porn distributors, and others who use the Internet for criminal purposes.

We are very eager to help with this.

Business Software Alliance member companies like Autodesk already work with DOJ and the FBI to train investigators and develop cases. We want to build stronger, more effective partnerships to improve this enforcement.

In addition, we would ask that Congress exercise its oversight authority to monitor the progress. A few high-profile cases have been brought recently by federal prosecutors and that's a good start.

But an annual report from the Justice Department would help Congress determine if software theft and other cybercrimes are receiving appropriate attention.

In the software industry, a significant amount of our revenue goes into new product development. For example, just in Autodesk, our R&D budget per year is $150 million. The software industry's next wave of new product represents a great future for our industry and for information technology, and I believe it's a bright future for the economy and society.

The dark cloud, however, is software theft.

Software thieves are doing a whole lot more than committing an unseen crime. They are setting up roadblocks to the new economy and they are stealing the future for everyone in our society.

Thank you.

[The prepared statement of Ms. Bartz can be found in the Submissions to the Record.]

Senator Mack. Thank you, Ms. Bartz.

I want to welcome back Mr. Larson. We look forward to your comments as well.

STATEMENT OF WILLIAM L. LARSON, CHAIRMAN AND CEO, NETWORK ASSOCIATES

Mr. Larson. Thank you very much, Mr. Chairman. And I want to personally congratulate you for the election of your grandfather to the Oakland As Team of the Century this last weekend.

(Laughter.)

As sponsors of the Network Associates Coliseum in Oakland, California, it's especially pleasing for me to be here in front of you and your Committee today.

When we came last year, I had the opportunity to speak to you about the deregulation of export controls on strong encryption and I want to thank the Committee for your efforts bringing to bear change and now allowing for the export of U.S. encryption outside the United States.

So thank you very much for your efforts last year.

Today, I'm here to talk to you about one of the most critical barriers facing our new economy, and that's the issue of security on the Internet.

Before I do that, let me just take a brief moment to introduce myself and my company.

I'm Bill Larson, the chairman and CEO of Network Associates. Network Associates is a leading provider of security and network performance software for the Internet.

In brief, we make sure that the Internet store stays open and secure. With nearly 3000 employees and nearly a billion dollars in revenue this year, our product line includes many products that you use here in Congress, including the McAfee Virus Scan anti-virus product, our PGP encryption product, and our Gauntlet firewall products, all used by the U.S. Congress and the Department of Defense.

As I said before, one of the most critical barriers to the new economy is the security risk of doing business or communicating via the Internet. This is a growing threat, according to the FBI and their computer intrusion squad. The number of open cases of computer crime has more than quadrupled over the last three years, from about 200 in 1997, to over 850 in 1999 and growing.

We work closely with law enforcement to try to help them resolve these cases and we talk about three different types of computer crime.

The first and most prevalent really is nuisance-based attacks. These are the attacks that we all experience— the Love Bug and the Melissa attacks. They are the most prevalent and the least harmful.

Typically, we call them the graffiti on the walls of the information superhighway. But they do result in economic loss, as many of you may have personally experienced during the recent Love Bug outbreak.

The second level of attack is really hacking for profit. Increasingly, this is being done through organized vehicles like organized crime, where wire transfers may be redirected and then money extorted for return of those wire transfers.

And then the most serious, though least prevalent form, of computer crime is really state-sponsored, low-resource aggressor attacks, or cyber-terrorism.

And we work closely with the intelligence community on this new form of warfare that is essentially developing. Over the next five years, we'll see more and more of it.

The nature of the threat you see is an evolving one. As more people and organizations go on line using e-mail and putting up e-commerce websites or connecting to their remote offices through the Internet, there

are more targets of attack and the damage that malicious viruses and hacking can do grows exponentially.

In addition, we have a switch going on to broadband and always-on cable and DSL modems. The risk of attack increases exponentially here again.

Recent studies show that the always-on users can expect to be scanned or hacked an average of over five times a day, as automated software goes out looking for these sources of free Internet usage on the Internet.

Network Associates and companies like ours are working to develop evolving solutions to this evolving set of threats. We're continually developing new products such as security scanners that provide a network administrator a hacker's view of the vulnerabilities on their network.

Virus scanning tools that can scan at multiple levels, stopping the virus at the e-mail server as opposed to the desktop, for instance.

And personal firewalls to protect these always-on cable and DSL modems.

But obviously, new products are not enough. As more small and medium-sized businesses get on the Internet, the demand for stronger security grows.

Unfortunately, those companies don't have the expertise and increasingly, there's an evolving market of applications service providers, or ASPs, providing that security solutions to these medium-sized companies.

Keeping abreast of these security challenges and providing Internet solutions is obviously very expensive and Congress can help companies like ours to continue to respond to these emerging security threats by, one, promoting the use of legal software, as my colleague, Ms. Bartz, referred to in her testimony.

Illegal and pirated software contributes to the security problem because the pirates don't receive important software updates and most of that pirated software is usually infected with viruses as it goes through the Internet.

Expanding the H-1Bvisa program, we do need more skilled workers to keep software in the United States. If that means bringing in foreign workers trained in the U.S. to do that, that's something that we need to do.

Our company was recently forced to open a development site in Canada because the cap to the H-1B visas was reached so quickly last year.

We just opened a sight in Windsor, Canada to do security development there. So we need to continue to expand that program.

And lastly, we'd like to ask for continued and increased funding for advanced security research done through DARPA and NIS.

The last and most important way that Congress can help is to work with industry to educate the public regarding how they can take these security precautions on their own and prevent their system from being hacked.

An excellent example of that was just last Thursday, representatives from our company joined with 43 members of industry and government representatives, including the DoD and the NSA, to release to the public a list of the top ten computer vulnerabilities and how to fix them.

So, in closing, educational efforts like these and hearings like these are key to trying to tackle these problems that we solve.

And I thank you very much for the opportunity to speak today.

[The prepared statement of Mr. Larson can be found in the Submissions to the Record.]

Senator Mack. Thank you, Mr. Larson.

Dr. Warnock?

STATEMENT OF DR. JOHN WARNOCK, CEO AND CHAIRMAN OF THE BOARD, ADOBE SYSTEMS, INCORPORATED

Dr. Warnock. Thank you. Good morning, Mr. Chairman. My name is John Warnock and I am chairman of the board and chief executive officer of Adobe Systems.

I am pleased and honored to have the opportunity to participate in the Joint Economic Committee's third national summit on high-tech.

Senator Mack. Bring that microphone down just a little bit.

Dr. Warnock. Okay. Thank you. At the outset, let me commend your leadership in holding these remarkable summits and express my thanks for your gracious invitation to provide testimony.

In my remarks today, I would like to talk about the ways technology is enabling government to provide better services at lower cost, in short, to reap the benefits of the new economy.

I would like then to turn to a major potential barrier of the new economy reaching its full flower— software piracy.

Let me say first a few words about Adobe and touch on embracing the new economy means in the private sector.

When my partner, Chuck Geshke, and I founded Adobe in 1982, we never envisioned employing more than a few dozen people working on a single range or products.

Fortunately for us, our rather modest initial business plan did not quite work out that way as we predicted. Instead, Postscript and Pagemaker went on to a large desktop publishing revolution.

Today, Adobe is the United States' third-largest personal computer software company, with annual revenues exceeding a billion dollars and more than 2600 employees world-wide.

Our mission is simple—to help people communicate better. We do this with powerful and intuitive software for web, print, dynamic media publishing, newspapers. Our technologies have become ubiquitous.

There is not a magazine, newspaper, television commercial, website or product package in use today that Adobe technology has not touched.

A key underpinning of our technology is embracing technology to help the company work better.

Today, our workflow is around e-mail. We send about 250,000 e-mail messages internally within Adobe. About a quarter of those carry electronic documents with them.

We have converted all of our forms to electronic transactions and we save roughly $50,000 a month because of the electronic forms processing.

We really are a very productive company. By doing more work in the virtual world, we save money, we save resources, and we create our products much more efficiently.

Adobe sales last quarter on an annualized basis amounted to $420,000 per employee, a figure unheard of for traditional businesses and possible only because of the edge technology has given us.

Another benefit for companies that have embraced the new economy as a way of doing business, they can afford to pay their people well without fueling inflation.

At Adobe, for example, our average annual base compensation in the United States before incentives and profit-sharing is in excess of $80,000.

Many government agencies are also embracing new economy ways of operating.

A major benefit— technology allows federal agencies to revolutionize how they interact with the public. Congressional offices, I am sure I need not tell this group, now get as much e-mail as stalemail. The Library of Congress has performed a remarkable service to the public by unifying the entire catalogue and making the complete database available for free on the Web.

This searchable, browseable database of more than 15 million records is truly an amazing resource.

One of our technologies lies at the heart of the e-government revolution. More than 120 federal agencies use Acrobat. And we estimate that the Federal Government has already saved in excess of a billion dollars by moving documents from paper to PDF.

Adobe PDF not only saves money, but enables government to communicate faster with fewer errors to more people and many fewer dead trees.

The ability to disseminate information quickly and accurately means that Adobe PDF has literally saved lives. The Center for Disease Control uses PDF to communicate world-wide to all of the health organizations on infectious disease outbreaks on a world-wide basis.

The federal Food and Drug Administration now approves all of its drugs in an electronic approval process. This shortens drug-approval process times and literally saves the various drug companies tens of millions of dollars in approving every single drug.

That moves the drugs faster to the market.

The whole point of this is that Adobe and all software companies are part of an eco-system. We spend in excess of $200 million a year in research and development. We sell products based on that at an annual revenue of about a billion dollars.

But the result of that software being used by both the government and by the economy saves tens of billions of dollars.

And what has happened is that people, because software is so ubiquitous and is so ethereal, people devalue it and tend to try to pirate it and tend to move it around like it is not a product, or like it's not contributing to this food chain.

It's very important that Congress understand that this is a critical part of the food chain and if that food chain is disrupted, the whole economic growth pattern is disrupted.

So to echo what Carol says, responding to software piracy by clamping down on it, by enforcing it, by valuing the intellectual output of our minds, we really are enhancing the growth of the American economy.

And not doing that, we should do that at our peril because it will take a critical link in this economy and ecosystem and destroy it.

Thank you.

[The prepared statement of Dr. Warnock can be found in the Submissions to the Record.]

Senator Mack. Thank you very much. Dr. Leavitt?

STATEMENT OF DR. MARK LEAVITT, CEO, MEDICALOGIC/MEDSCAPE, INC.

Dr. Leavitt. Chairman Mack, Representative Stark, and members of the Committee, thank you for the opportunity to appear today. I am truly honored.

My name is Mark Leavitt and I am chairman of the board of MedicaLogic Medscape. Also seated behind me is our editor-in-chief and executive VP, Dr. George Lunberg, who you probably know better than me.

Before I start, I'm going to bring us back to health care and I'd like to do that by asking you to just think about what it would be like if the plane that you flew here on operated with the same information technology that's used in 95 percent of doctors' offices for your clinical care.

There would be no cockpit instruments. When the pilot needed to know speed and altitude, the attendant would have to fetch a thick paper chart from the rear galley.

There would be no warnings about flaps and collisions. We would simply count on the pilot being well trained to do everything perfectly every time.

Oh, communications? You scribble on a flight prescription pad illegibly. No intercoms.

And of course, FAA warnings about dangerous weather? They would be printed on paper and published in a monthly FAA weather journal mailed to pilots' homes.

I'm glad that the response was laughter. But if you fly a lot—

Senator Mack. I think you made your point.

Dr. Leavitt. Thank you.

(Laughter.)

This can be a little bit chilling if you fly a lot. But in fact, your medical system runs on paper.

I'm talking about not your bills, but your clinical care.

With my experience as both an engineer and a doctor, 15 years ago, I set about to solve this problem. And I can tell you, it's a lot more than any one person can do. But along the way, I've been joined by over a thousand very passionate people in our now newly combined MedicaLogic Medscape Company and we're trying to take this digital technology and deliver health information that matters to save money, save time, and save lives.

We're now being used by more than 12,000 doctors and more than 9 million patients in America have their records in our systems.

We also operate Medscape and CBS Healthwatch, two of the most respected medical Internet sites. Together, they have more than 2.2 million registered users and 350,000 physicians.

These on-line health records house the charts, not the bills, that your doctors use to take care of you.

Because they have alerts and reminders and bring accurate information to the doctor in seconds, we expect children will be more likely to get the vaccinations they need.

Healthy people will get the screenings that they need. We won't be depending on the memory of the patient or the doctor. And chronically ill get more consistent management year-in and year-out.

Currently, most doctors use a personal computer or a laptop to access this. But in the near future, palm computers, wireless phones can even bring the chart to the doctor on the golf course.

In the past year, we also added an interesting capability for patients. This means that you can go on the web if you've authorized it and see your own chart created by the doctor. And if you click on your diagnosis or your medication, now you can read authoritative information from CBS Healthwatch or Medscape about your condition or about the medicine that you're taking.

This is very empowering.

We also let people communicate with the doctor to ask for refills, to ask questions and in fact to correct errors in their chart. And about 16 percent of those accesses are for that very reason— they found out either they forgot to tell the doctor something or a mistake was made.

And that brings me to the topic of mistakes.

I think— was it Bill Gates or Dr. Frist— yes, you referred to medical errors in the IOM report.

We're really serious about helping to solve this. Let me give you just one real-world example.

A month or two ago, the FDA issued an alert and the drug Resulin, which is used for diabetes, was voluntarily withdrawn from the market.

The doctors that use our products within one hour received an e-mail alert. The news was picked up by Medscape, passed to the doctors on e-mail, and they were told exactly how to do a query and find every patient in their practice on that medicine.

So those doctors had their nurses calling their patients within an hour saying, don't stop it, or do stop it, and here's the change.

Now for the 270 million minus 9 million, other patients in the country, well, I sure hope they read the papers. And I sure hope they didn't stop the medicine without switching to another diabetes drug.

We think that this needs to become the standard of care. This can really save lives.

You talked about the number being equivalent to the crash of a jumbo jet every day, somewhere between 50,000 and 100,000 lives a year. We want to help solve that problem with technology.

And speaking of other problems, we want to help solve the digital divide and we've decided to donate our software to any physician that uses it to take care of the underserved. And in fact, the Bureau of Primary Health Care, under HRSA, Health Resources and Services Administration, now has it at 160 community health centers.

That means legible records that go where the patients are. We'd like to roll that out to all the federally-supported community health centers and prevent the digital divide from leaving anyone behind.

Quite a bit has been said about privacy and ethics. I would like to just point out that we're extremely active in this area. There are a number of voluntary industry efforts. But we actually support well-reasoned federal legislation and regulation to protect medical privacy.

We believe it should extend to all medical information, not just electronic medical information. You don't know where your paper chart has been. They get faxed. They get photocopied. And they travel everywhere and the paper can't tell you who's seen it.

Electronic records can actually enhance privacy over paper.

Let me just sum up.

Consider this. Most people consider their health and their wealth to be the most important things to them. The order tends to depend on your age and other factors.

Citizens gained greater control of their wealth long ago— debit cards, credit cards, ATMs, on-line banking, on-line trading. It's time for them to gain greater control of their health.

We look forward to working with you in any way we can to help us apply this technology.

Chairman Mack, Representative Stark and members, thank you and I will be happy to answer questions.

[The prepared statement of Dr. Leavitt can be found in the Submissions to the Record.]

Senator Mack. Thank all of you for your presentations. I think that they've been terrific. For those of us who don't have the backgrounds in the line of work that you're involved in, it's very helpful. And I think that this hearing should be of assistance to the Congress as we address some of the issues that you have raised.

It's been very, very helpful.

Senator Allard?

OPENING STATEMENT OF SENATOR WAYNE ALLARD

Senator Allard. Mr. Chairman, thank you. I just would like to say to Dr. Leavitt that I was probably more fascinated than anybody on this panel about your wireless technology since I'm a veterinarian.

We work outside the office many times.

But, anyhow, as fascinated as I was with that, I do feel like I need to take the limited time that's been provided to me here to focus on the copyright issue.

I've been very interested in the copyright issue, which is your cybertheft area. It's something that we've been struggling with with authors, with the movie industry, and now with people who write in software programs.

Unlike the car analogy that was used, if there was a car stolen, there's a jurisdictional thing there. You know where it was stolen.

I wish you would talk a little about the jurisdictional issue because I think that's very complicated in the fact that our software piracy involves world-wide theft. So it goes across country jurisdictions as well as states.

And I wonder if you might give this Committee and perhaps the Congress some ideas on how they might deal with cybertheft through some legislative suggestions.

Ms. Bartz. I'd like to respond, and perhaps John would as well.

Senator Allard. Yes.

Ms. Bartz. A couple of comments. Before we think about international issues, domestically there are issues between the states and the Federal Government.

Several states don't take this very seriously. And so, that's an issue.

The Federal Government, however, has the only tools through the FBI and DOJ to even begin to understand how to tackle cybertheft.

The states can't possibly— or for a long time, can't possibly be there.

So it really is up to Congress to help enforce the laws that you've already enacted, which are great.

A couple of years ago, we were asking for those laws. Now we're happy with those. But there's only been three prosecutions under the Net Act, three prosecutions in about 18 months.

That isn't near going to solve what's happening on over two million sites out there.

Internationally, the WTO, bringing all of the countries under at least a common philosophy of not only recognizing the need for copyright, but enforcing it, is a fabulous first step. And that's why we are so supportive of China, for instance, coming into WTO and philosophically getting involved.

Dr. Warnock. I think the other thing is that if we don't see the prosecutions that need to set the examples, there need to be prosecutions to set examples that the government is serious about this as real theft.

In the absence of that, the software industry will defend itself in a way no one will like. It will really damage productivity.

We don't want to encrypt the software so it gets sort of, in some sense, stapled to a machine and you can't move it, so that it operationally causes a hassle every time you update the operating system.

There are things that we can do technically to protect it, but we don't want to do it because we want a partnership with the Federal Government to work together to set the examples that this is a serious law that needs to be enforced.

Senator Allard. Somebody would go and buy a software program legitimately for $50, $60, maybe down at the store. Then that individual can put it on the Internet and then it can be distributed.

How do we track that? How do we enforce that?

Dr. Warnock. Well, there are databases. We have done a lot of the finding of the cases, the individual software companies themselves.

We track them down. We have very active anti-piracy groups within the thing. But we find them, and then nothing happens because we can't get the prosecutions.

Senator Allard. So a prosecution problem. Okay. Now let me dwell a little bit on China.

Are these software programs redistributed in Chinese or are they redistributed in English?

Ms. Bartz. Both.

Dr. Warnock. Both.

Senator Allard. Both.

Ms. Bartz. All languages, by the way. The one I have happens to be Chinese.

Senator Allard. Okay. Now can I ask you this. Can they claim some copyright privileges because they interpreted the program over into Chinese?

I know I'm getting a little technical here, but it is an issue that could come up. I'm just curious how you respond to that.

Ms. Bartz. They didn't interpret the program, the Chinese. They stole our Chinese version.

Senator Allard. Oh, they did?

Ms. Bartz. Yes.

Senator Allard. Okay. So there was not an interpretive process, then.

Ms. Bartz. No. We take the expense and the job of translating the software into the various languages and then they steal the translated version.

So it's very simple.

Senator Allard. So your particular program, you had done the interpretation. You had Chinese on your staff, or people who are fluent in Chinese—

Ms. Bartz. Yes.

Senator Allard. — develop the program and it went to China because you had customers there, and then you lost the market because of piracy.

Ms. Bartz. Yes.

Dr. Warnock. That's right.

Senator Allard. And that's a 95-percent loss in China.

Ms. Bartz. Absolutely.

Senator Allard. I mean, if I was in business, I think I would seriously look at whether it would pay me or not to even develop the program for that country.

Dr. Warnock. And we do.

Senator Allard. Ultimately, the loser, I guess, would be China. Right?

Dr. Warnock. Yes.

Ms. Bartz. We do. But then they would simply do the translation. I can go into First Auto and find 100,000 engineers using my software and nobody's paid me a dime. So they would translate it because it makes them so productive.

Senator Allard. I'm very concerned about this copyright problem. I agree with you. I'm just trying to figure out how we enforce this.

Yes?

Dr. Warnock. As an example, our software is standard world-wide, in both India and in China. But very few licensed copies have been sold.

But the Chinese printing presses use all their software prolificly throughout the government, and they don't pay for it.

Ms. Bartz. Please, could I remind the Committee, though, before we go too far on China, that about 24 percent of all software in the U.S. is stolen.

It's easy for us to look elsewhere.

Senator Allard. Well, that's another good issue. I've been told that the group where software theft is most prevalent on is the college student.

Is that your— we get to audio. We get to that. A lot of it is on that group. It's not necessarily malicious. Sometimes it's just trying to follow your education.

Dr. Warnock. We're concerned more about the systematic organized crime.

Ms. Bartz. I'm also concerned as well about business. The college students, frankly, perhaps I'm just getting trained students for later.

Senator Allard. Sure.

Ms. Bartz. So I'll let the college students be for a moment.

(Laughter.)

And I don't mind if grandma copies some software for their grandchild or the other way around.

But it's too easy in a company to say, we are having an expansion. So we'll take the ten copies we bought and copy ten more for the new engineers coming in.

This happens every day. In fact, most of the ways we find out about it is, frankly, employees in these companies will call us and tell us that their company is using illegal software because they don't feel good about it.

So it is American business.

Senator Allard. Thank you, Mr. Chairman.

Senator Mack. Thank you.

Senator Robb?

OPENING STATEMENT OF SENATOR CHARLES S. ROBB

Senator Robb. Thank you, Mr. Chairman.

Your apprentice program, Ms. Bartz, with respect to how you train some folks may raise a few eyebrows. But let me go back to a question for Dr. Leavitt, if I may.

If you could help us perhaps better understand how it is that health insurers and employers and other members of the public actually have or gain access to the various patient medical records.

What do they physically do?

Dr. Leavitt. Well, because they're paper, there's almost no way to selectively release the records and this is a big part of the problem.

And so, almost everyone, when they sign up for health insurance, is forced to sign a blanket release saying that any part of their record that's needed can be looked at by the health insurer or anybody else that needs that.

And the health insurer may have a relationship with the employer, saying, in order to lower your costs, we're going to share information with you.

Very little control by the patient. There is no option. The patient cannot say, you may release this and not that.

So we actually don't know, and patients don't know.

With digital information, you can say, I opt in for this and not for that. And you know there's some federal protection for limited areas for alcohol and chemical dependency or HIV. But there's lots of other areas that deserve protection and don't have it.

Senator Robb. Based on the digital application at this point of the medical records and some of the protections that you're talking about, are you confident that you can guarantee the types of protections that you advertise under these circumstances?

Dr. Leavitt. Well, I'll put it this way. We're betting our company on it because we have to succeed at this or people won't trust it.

We believe that it takes equipment. It takes the right software. It takes the right policy and procedures. And actually, you have to have the right motivations as well, all five layers.

But we believe you can do that. You can set and publish your policy in an open way. You can have rigid procedures to make sure the policy is enforced.

For example, you can't get into our data center without a biometric ID. In fact, in the inner sanctum, where the certificate servers are, it takes two people at once, kind of like setting off a nuclear missile.

You don't want one person to go crazy and release your records.

So I think it can be done, yes.

Senator Robb. Looking at it from the other side, from those 16 percent that you indicated found errors or found something that they disagreed with in their medical records, how do you ensure that they don't make unauthorized changes that may not be approved by either the

medical inputter or by someone else.

Dr. Leavitt. Yes. The patient actually does not— since the medical record is signed by the care givers, the patient cannot directly edit the record. But the patient points out the error.

And this is not an adversarial issue generally. They are helping because there was a miscommunication.

So the patient tells the doctor's office, I see a mistake, and then the doctor and other people authorize to make the changes to the chart.

Senator Robb. But if it did have something to do with, say, insurability or one of the sensitive questions and there was no specific check and a patient were simply to apprise you of the fact that there was an error, would you check with some authorized medical facility before you removed something or changed something in the medical record?

Dr. Leavitt. Well, if there was an area that there was no clear regulation or law, we know that the record is the physical property of the doctor.

There is kind of a doctrine that the information is the property of the patient. But it's quite inconsistent state to state and we don't really have federal guidelines on that. And we think that it would actually be helpful.

Senator Robb. Do you have consumer groups or patients that are represented on MedicaLogic or Medscape?

Dr. Leavitt. Yes. Well, we work with Internet Health Care Coalition and other groups.

For example, I know that the National Coalition of Cancer Survivors and other consumer groups are active in that. So we believe that, actually, the patient is a fundamental and equal partner in this process.

Senator Robb. Let me just ask you one question that's related, if I may, and my time is expiring.

The patent question about the mapping and DNA and whatever, and the patenting of human body or cell structures.

Would you just give a comment on that? It's been so frequently addressed in the lay press, that I'm not sure that many of the members are particularly clear on when that's appropriate and when it isn't.

Dr. Leavitt. Well, let me first say that it's not an area of particular expertise for me.

But as both a physician and an engineer and an inventor, I think that patents should be granted to inventors and I think the inventors of the gene and parts of the human body— well, not here on this earth, I don't think we could be granting a patent on things like that.

Senator Robb. The great patent in the sky.

(Laughter.)

Thank you, Mr. Chairman. My time is expired.

Senator Mack. Right. Well, again, I thank all of you for your presentations and responses this morning.

Again, because of time, we're trying to keep on somewhat of a schedule. I'm going to cut the questions off at this point and we'll have our final panel.

But, again, thank you very much. Your thoughts were very, very helpful.

Our final panel will be Mr. Jay Walker.

(Pause.)

What a pleasant surprise. I didn't expect to look out and see you sitting out there. You might want to switch that nameplate.

OPENING STATEMENT OF SENATOR JOSEPH L. LIEBERMAN

Senator Lieberman. Well, I don't know. If we could switch net worths—

(Laughter.)

Senator Mack. We'd have an argument about where it would go.

(Laughter.)

Joe, welcome. We're glad you're here.

Senator Lieberman. Thanks, Connie.

I appreciate the opportunity to introduce Jay Walker to the Joint Committee.

I thank the members for their courtesy in allowing me to do that.

Jay founded Walker Digital more than five years ago and had the extraordinary good sense to base it in Stamford, Connecticut, my hometown, and a great place to be.

Momma's still there if you ever need a little chicken soup or anything.

(Laughter.)

Walker Digital is a perfect example I think of success in the new economy. It's a company that recognizes the value of knowledge and intellectual property and that has leveraged the power of the Internet, not only to create new businesses and products, but to transform the way we do business and conduct our daily lives.

Walker Digital has been called a New Age Edison. And if you'll allow me a little parochial pride, I think there actually is some sense to that reference because their work can be compared to what good old Tom Edison did at the Menlo Park laboratory.

Like that lab, Walker Digital's creativity is transforming American and global life and industry.

The company currently holds about 50 patents in the U.S., with an additional 350 pending. It is therefore a leader in using intellectual property to create companies and build value.

The most well known of these created by Walker Digital— and I say this not only because its familiar ads feature, unusually and surprisingly, a crooning William Shatner, A.K.A. Captain Kirk, Priceline.com, which was launched two years ago and has become one of the country's most successful Internet businesses operating under several of Walker Digital's patents, including its buyer-driven commerce business model, or reverse auction. Priceline allows consumers to go on line, name their own price for airline tickets, hotel rooms, mortgages, new and rental cars, groceries, and most recently, long-distance telephone service.

Just two years after its launch, Priceline, the name, the company, is now recognized by two-thirds of all American adults in the survey that

I saw, and it's among the most recognized e-commerce brands worldwide.

I know a few national political candidates who would like to have equal recognition, as a matter of fact.

As the dot com sector begins to go through the expected shake-out, Priceline remains a success story, trading— I checked again this morning— comfortably above its offering price, which is not true of a lot of the other companies.

So Jay Walker is the person whose intellectual foresight and innovation has made this happen, this particular success story happen.

And as we transition into a new economy, this rapidly-evolving market place governed by new rules and driven largely by new forces that you've been exploring here today and before, Jay Walker and Walker Digital, I'm proud to say, are at the forefront in defining and harnessing these forces.

I'm proud to have him before your Committee.

Senator Mack. Mr. Walker, welcome to the Committee. We look forward to your comments this morning.

STATEMENT OF JAY WALKER, FOUNDER AND CHAIRMAN, WALKER DIGITAL AND PRICELINE.COM

Mr. Walker. Thank you very much, Chairman Mack, and other Members.

I'm going to try to provide a brief framework to understand the new economy by looking at history. And then I'm going to talk very briefly about what improvements can be made at the congressional level that are actionable and immediate.

Senator Lieberman certainly gave you a more than glowing introduction.

I am the founder of five companies, which this year have about 12 million customers and will do over a billion and a half dollars in sales. And all of those companies have been founded in the last ten years and have over a thousand employees.

I am very much a part of the old world of creating jobs and creating opportunities for consumers and for millions of them.

And I am also unusual in that I am an inventor, so I am a user of the patent system. I hold 50 U.S. patents and I expect to hold quite a few more, God willing, in my career.

I have a lot of first-hand experience with the intellectual property system and with going out to raise capital based on intellectual property, which is a very unusual experience if you've never done it.

But to understand the new economy, which we spent a lot of time doing at the laboratory, I think the most important thing is to understand the past.

A lot of people in the new economy ignore history, and that's a giant mistake.

The history of our country can be viewed economically through six great networks. And if you will, looking at each of these networks allows

you without having any experience to speak of on the Internet, to truly understand what makes this network so different.

What do I mean?

Well, to begin with, let's look at the postal system. That was a network. It was a network of constant communication, the first network where people could communicate with others. And it changed not only all of the society that we knew, but it changed the political system.

The whole idea of campaigning changed when the political network met the postal network.

The second great network was the rail network. The railroads were literally the essential ingredient of their age— railway barons, capital markets, the whole idea of an infrastructure play, the exploitation of the western part of the United States, the growth of industrial America, can all be understood inside the railway network.

And if you will, Congress and society played a very large role in shaping and interplaying with each other in the creation of a rail network.

The third great network was the electrical network, the power grid around us in this room today.

But that network was literally a connection of hundreds of power stations, of millions of homes, offices and work places which suddenly became interconnected with one another and gave rise to entirely new forms of commercial behavior, new forms of factories, new forms of political organization.

Without power, all of society doesn't look a thing like it looks today.

The highway network was the next great network in American history. And the highway network changed everything it touched. Cars and trucks, if you will, replaced in many ways the rail networks of old and suddenly, the highway went everywhere, to every home and to every office— the rise of the city, the rise of the suburbs.

And when you combine the highway network with the electrical network, suddenly you saw changes that you never expected.

The electrical network made possible elevators. Elevators made possible office buildings.

Who thought when they were regulating the electrical network that they were also affecting what it meant to have a city? Who thought that air conditioning would change the nature of what it meant to be in the south? Or electrical power changed the nature of irrigation in the west?

The power of networks is often totally misunderstood because it can't be predicted. And as policy-makers, that's one of the great challenges.

You're trying to manage policy around a network, and yet, you can't predict where the network is going.

The phone network is another perfect example.

Good telecom policy was always about providing equal access and total access to homes and people everywhere. But telecom policy also shaped the network of the Internet because the Internet rides the rails of the telecommunications network. And now, today, there is ten times more

digital traffic, information traffic on the phone network, than there is voice traffic on the phone network.

And yet, as policy-makers, you always thought about the phone as a voice system. But the phone is not just a voice system any longer. It's actually the backbone of the information network, which is the one that's transforming our economy and society today.

In my brief remarks here, it's impossible to tell you about all the elements of the network that I think you ought to consider. But here's just a few that distinguish the information network from all other prior networks, and yet, it still behaves like a network.

Number one, there's zero variable cost of communication.

Whether you talk to five people, 500,000 people, or 5 million people, it's the same cost on the information network.

Number two, the cost of computer processing. If you think of it, the cost of thinking is going to zero on the information network.

You can process more and more and more. So things that were not practical on a computer— looking up everybody's record of everything they ever said since they were a child— suddenly becomes practical when the processing power of the information network means that nothing is ever forgotten or lost.

Bandwidth, the ability to push things through the network, becomes bigger and bigger.

Today, we're pushing voice and data. But it's clear tomorrow we'll push pictures through the network. And then as we push pictures, we'll push all kinds of transmissions and visuals through the network.

That changes the nature of your problems.

And in a few years, any time, anywhere will be the network. You will be wearing the network fairly soon.

If I could give you a shirt which would monitor your heart and your other medical conditions, would you wear that shirt?

Of course you would, because it meant that any time you had a medical problem, the network could instantly know you were having a medical problem and of course, nobody who could afford it would not wear such a medical monitor.

Everybody will wear such monitors.

In fact, all information will move to the network— file cabinets, customer histories, processing power, people's intentions. All information, just like all cars move to the roads, all volts move to the power system, all phone calls move to the phone network.

All information and knowledge will move to the information network. That's a frightening thought. Because in the past, we never had an information network, except the ones between our ears.

The cerebral cortex is our information network. It's our processing network. It's our ability to think. It's what we are.

And for all of us who have children and watch a two-year-old wire up his or her brain from ages one to three, where suddenly language emerges, thinking emerges, speech emerges, all those kinds of things emerge— that's exactly what's going on in society.

The cerebral cortex of society is being wired up while we sit in the middle of it. And every day, hundreds of thousands of new people get on the network. Tens of millions of new connections— akin to neural connections but on a societal level— are being connected.

So as all business, as all society, as all education, as all commerce, moves to the information network, what are the challenges for policy-makers?

I think the first challenge is to recognize that you cannot predict the change.

Just as if we took a slide of somebody's brain cell and looked at it, we couldn't predict consciousness. We couldn't predict their ability to think by examining a neuron under a slide. We couldn't predict that families would form. We couldn't predict the nature of our world.

That is what's happening in the network today.

To some extent, there is an awe that we all feel who work on building this network because we know we don't know where it's going.

And you as policy-makers are not used to having a world that can't be predicted with some degree of reliability.

Imagine military decisions without predicting military technology and where it's going. It would be almost impossible.

An education system. An infrastructure world.

These things in the past have always been built on a relatively reliable degree of prediction.

So that for the first time, we're stuck with a set of problems that we can't predict.

The second thing that we have is that we have a sense of a need to evolve rapidly. But our lawmaking system and our founding fathers did not want things to evolve rapidly.

Our system of checks and balances were designed for deliberation, were designed for thoughtfulness.

So we need to create regulatory environments that can evolve quickly, as opposed to the past regulatory environments which evolved slowly.

In other words, we may make mistakes. But we need to build in the self-correcting mechanisms into whatever decisions we make today at the policy level, so that when it turns out we are wrong, we can fix it fast.

Because if we can't fix it fast, we're going to live with it wrong for a long, long time.

To conclude, I would say that one of the things Congress can do most is strengthen the intellectual property regulations specifically in the patent area.

Our patent system— you know, there was a time when the patent office was the biggest building in Washington. It was the last great age of innovation and invention a hundred years ago—the age of Edison and Alexander Graham Bell, the age of mechanical evolution that put the United States in the forefront of the world to this very day as the greatest, most inventive nation in the world.

And then after that age of great invention, the patent office became less important, it appeared, and we entered the age of the corporation, the

age of Henry Ford and U.S. Steel that took the intellectual property from the age of invention and put enormous capital behind it.

And in the age of capital formation and mass industrialization, we changed our country to become the leading industrial power in the world.

Now we are entering the next great age of innovation. Here, it will not come from large companies, that the great innovators are not the great capital-intensive laboratories, but are the millions of people that are inventing new methods and systems on the Internet, that are inventing new ways to manage information, that are the companies you just saw at the panel who ten years ago didn't even exist, who now not only employ thousands, but affect millions.

The challenge here is to provide the tools to the patent office that's faced with an avalanche of new innovation, ranging from genetics all the way to business methods, the tools they need to do their jobs and to do them well.

The patent office needs to keep its fees. The patent office is having money taken from it that users like myself pay them. And literally, ten percent of the patent office's budget is being taken from it directly out of its own fees.

I am not talking tax revenue. I'm talking fee revenue.

Not only does the patent office need its tax revenue back, it actually needs more revenue to hire more experts and to pay the kind of people that private enterprise are hiring away from the patent office.

Much like the FAA today is the result of decisions made ten years ago, we have a lot of challenges in the Federal Aviation Administration as we all fly, we need to strengthen the patent system and strengthen it now, because we are the leaders in the world in innovation at all intellectual property levels.

And financial capital will follow intellectual capital in this century, not the other way around.

So I don't envy you. These are not difficult problems to understand, but they are difficult problems to solve.

And people who would tell you that you need to be in Silicon Valley, you need to be on the Internet to understand this are wrong.

It's about understanding the history of our country, the history of networks, and the balance between public and private interests to create an environment that will be better for all Americans.

Thank you very much.

[The prepared statement of Mr. Walker can be found in the Submissions for the Record.]

Senator Mack. Thank you very much for a very thoughtful and exciting presentation.

We appreciate that.

Senator Bennett?

Senator Bennett. Thank you, Mr. Chairman.

Mr. Walker, I'm sure you heard the previous panel. If we're going to have a solution to privacy and piracy— let's talk about piracy— we're going to have a solution to the piracy problem, it's going to have to be a technological solution.

We can pass all the laws we want. But in the circumstance you have described where someone can communicate literally with the entire world, and do so secretly, technologically, the law will have little or no impact.

For example, Senator Allard, Senator McConnell and I were in Los Angeles this last week talking to some people in the entertainment world.

It is technically possible for a movie to have one viewer and that viewer put it on the Internet and every other person who wants to see that movie receive it as e-mail, download it, and watch it for free.

This understandably has the folks at Disney a little upset.

Can you comment on a technical way to put a watermark or copyright notice of some kind into the movie, or into the receivers, so that it could be traced that someone had done that in such a way that a law enforcement agency could say, you have done this and we can prove that you have done this and you owe Disney $120 million for distributing "Titanic"— I'm mixing up. Disney didn't make "Titanic."

Mr. Walker. I understand.

Senator Bennett. All right. You owe the studio $120 million for distributing "Titanic" to x-million viewers over the weekend and not collecting the theater fee for having done that.

You're an inventor and you understand the problem.

Mr. Walker. I understand it well.

Senator Bennett. Can you talk about the technical challenge that faces us there?

Mr. Walker. The technological challenge is impossible. And anybody who would have you believe otherwise is not correct. You cannot possibly insert a technology that filters or controls the movement of information and/or is capable of understanding what information it is moving.

It is not possible.

You can insert limited time period barriers at enormous cost as you force hardware into society, if you will, locks on every door.

But ultimately, that can't win because in an information age, you can distribute the keys as fast as you can distribute the locks.

In other words, this is an arms race where there isn't going to be a magic bullet which ends the arms race.

Senator Bennett. I'm not talking about keys. I'm talking about a watermark, maybe like a cookie.

Mr. Walker. But watermarks can be stripped out, Senator. The problem here is we can enforce and require watermarks. And as fast as you and I require watermarks, somebody else will have a program to strip the watermark out undetectably.

I think the answer here is that need to attack the problem with a market force solution, as opposed to trying to attack the problem from a technology standpoint.

Not to say that we can't require watermarks. We can. But ultimately, the crooks will figure out how to distribute ways for kids to take the watermarks out.

If we use market force solutions, we can go back to the marketplace and say, how can we make it unprofitable, either by creating legal liability for those who would distribute pirated property, and thereby, stop the problem that way by going after the nodes of redistribution as opposed to the end-users of redistribution, a little bit like pornography.

It's hard to stop its consumption. But we can stop its distribution a lot easier because real companies have to distribute it.

Or how do we ultimately make it in a new world so that every version of the movie is different and everybody wants to pay for their own version of the movie— how do we get a market force, which is really what's going to happen?

Ultimately, our ability to stop movements of information or track them are going to be almost impossible. Any more than I can stop you from thinking thoughts you want to think.

We can put certain safeguards in. But from my technological viewpoint, they're simply a series of stopgaps as the other side puts in more and more ways to strip them out.

We've got to attack the problem at a more fundamental level, which is we've got to teach people that it's wrong to steal. Anybody can steal, but most of our citizens choose not to.

Why?

Because we educate people in our schools that it's wrong to steal. And as a result, we have a society that primarily doesn't steal.

We need to teach people to respect those issues starting at the educational level and moving all the way through the system. Just like most people don't shoplift, though they could and not get caught.

So if we look for technology answers here, I'm afraid we're going to be disappointed. And I'm speaking as a technologist.

If we look for real fundamental market and societal answers. I think we have a better chance of succeeding.

Senator Bennett. I don't want to extend this, but wouldn't some kind of watermark or technological solution help?

Mr. Walker. Yes, some kind would help as long as we gave it thoughtful—

Senator Bennett. I have to know that I am stripping out the watermark and therefore doing something illegal, and therefore, exposing myself to prosecution.

Mr. Walker. I agree. That would help.

Senator Bennett. But if it's not there, then I don't know that.

Mr. Walker. No argument from me.

Senator Bennett. Okay.

Senator Mack. Congressman Dooley?

Representative Dooley. Thank you for coming, Mr. Walker. A fascinating presentation.

You talk about this new network that the digital age is driving. In many ways, some of us are assessing this, that it's making our ability to institute domestic policies that are insulated from international pressures or really the digital pressures, is becoming almost impossible.

And we're currently engaged in discussions on our digital signature legislation, which in many ways is important to facilitate the advancement of digital commerce.

I'd be interested in your perspective. When we have been sensitive to the issue of state's rights and sensitive to the application of federal pre-emption, how is this consistent?

If we are seeing this new network that goes beyond even national borders, but international borders, is this not going to put increased incentives to move to, if not national harmonization, and how do we balance that with the whole state rights and federal pre-emption?

Mr. Walker. We have two advantages here. One is we have history to guide us.

The uniform commercial code, which was adopted by essentially every state, is still a federal way of looking at the world. And I think we need a UCC, if you will, for the emerging of e-commerce. And I believe that the states are anxious for there to be a code that everybody can quickly embrace and say, let's get on with the standards here.

So I think that, unlike many more contentious states rights issues where there is a high degree of difference of opinion, I think all states want to benefit from the e-commerce revolution and as such, would embrace a thoughtful federal effort.

Similarly, that's also true somewhat internationally, although there's an American imperialism sort of backlash a little bit. But I think it's more talk than action.

When I travel in Europe and Japan and we've been expanding Priceline globally, I hear very much, look, we need leadership here. If you will give us leadership, we will follow on many of these standards.

Now privacy is an area that's much trickier because the European view is very different than the U.S. view.

But with that exception, I believe that there is a strong desire for the U.S. to establish against a commercial regulatory reasonableness that others can embrace.

Now, inasmuch as we try to push things down to the states, we're going to have challenges, of course.

But inasmuch as the fact that we get private industry here which represents in all states to come on board, I think fairly quickly, we can get by that issue if we move with thoughtfulness.

The privacy problem is much more challenging, much, much more challenging, as you know better than I. And that's because there are many states that have common criminal-civil commonatorial interests here that are far more than just commercial interests.

And that's a much different issue.

Senator Mack. Senator Frist?

Senator Frist. Thank you, Mr. Chairman. And thank you, Mr. Walker, for your excellent presentation; because it allows us, by looking back, to look to the future.

In terms of government policy and your comments on the fact that it is very much like neural connections, you mentioned the slow and deliberative process of policy-making, which for the past 200 years in

this country has characterized the Senate and the way we conduct business, versus the breakneck speed of information technology that's accomplished through exponential growth in communication and the dissemination of information.

I want to shift to the complexity of regulations that we have today, again allowing you to project a bit as to how it might change the way we legislate in the future, and the how we pass a particular bill.

You commented that future policy needs sufficient feedback mechanisms to be self-corrective, which is tough, but critical that's tough to write and put in the legislation that we pass.

We talked earlier today about the telecommunications bill, which I believe was a very good bill. But as good as it was, four years later it is outdated.

Mr. Walker. Right.

Senator Frist. And we're using it to interpret things that we didn't anticipate four years ago, which brings us back to your feedback mechanisms.

Let me shift and talk about complexity.

We just heard Dr. Leavitt talk about the great advances that can be made in health care using dissemination of information, sharing of information, and production of information as we go forward.

In Medicare, we have passed laws 35 years and built up a composite of about 132,000 pages of federal health care regulations which is four to five times the size of the IRS Code. If you include the regulations, the laws, and the manuals that interpret those laws, we end up having codes in 10,000 different communities that are variously interpreted.

Physicians today are petrified that the government is going to come in, and put them in jail because they haven't read all 132,000 pages.

You come into this area of tremendous waste with these books and stacks of regulations— the potential for fraud, and the potential for abuse is huge.

How do you see the networking of data affecting the complexity of regulations that we rely upon to carry out something as simple as a physician treating a patient?

As complex as the regulations are, it's a very simple interaction.

Mr. Walker. I think the answer to that question, and that is really a tough question, has to do with how we eliminate the bad as to how we create more good.

Effectively, sunset provisions of regulations and sunset provisions of laws are probably our best hope of getting rid of things that are outmoded.

I think what we need to ultimately do is build into our legal and regulatory structure mechanisms by which things automatically sunset and die— no matter what— after a certain period of time, and then provisions under which it would die sooner and require replacement.

Let's take the Telecom Act.

Had we in the Telecom Act said, this act will be repealed automatically upon any of these events— the carrying of traffic of

information of more than 60 percent greater than voice, the reduction of points of network size to less than 10,000 per network node, or whatever the appropriate mechanisms were— I think it's sort of like the girl you dated back in junior high school, there's sort of an automatic sunset provision there that says, that wouldn't be the same girls I would be dating today.

So I think we need to recognize that even if we can't predict the future, we can certainly predict what probably won't be useful any more.

And inasmuch as we have to adopt that kind of thinking, we at least won't be saddling the cumulative arterial sclerosis of the regulations to our children, and instead, we'll give our children some help that, guess what?

The repeal of this automatically may create political vibration, but at least we won't be inheriting a system we can't possibly cope with any more.

That's my first and best thought.

My second best thought would be allowing the network, which is the people in the world, to essentially vote to repeal themselves elements where you can use the network to create a grassroots appeal to effectively kill something.

Now we'd need to be thoughtful. The tyranny of the minority obviously is what we do not want.

But at the same time, we do want redress mechanisms built into our systems. And if you're a business, the customer is always the redress mechanism.

Something that I did yesterday that doesn't work today, I just stop doing. I don't need an act of Congress to stop it.

So we need to figure out how we're going to build faster mechanisms into the system while still allowing for the deliberateness and for the protection of the rule of law and the rights of the minority.

Senator Frist. I think that really answers my question in part because it doesn't have to be that complicated. With science, you can have a feedback loop, which is the only way that you can have a self-corrective mechanism, whether it's in the heart or in the neural connections.

In government and policy, there are no feedback loops.

This 135,000 pages of regulations in Medicare is the accumulation of bill after bill, year after year, of 35 years.

So if we're at a standpoint to truly have the ultimate feedback, we're going to have to say, let's start over.

I'm an advocate for that because we don't have internal feedback loops. But I'm not sure you want to try to reinvent every ten years, because it will be every five years or four years.

And I think you're point about having an automatic sunset which forces us back to the table is probably the most responsible thing.

Mr. Walker. And some trigger conditions. We could say something is going to sunset in ten years, but it sunsets in three if the world changes this way.

I think the intent of Congress can be very much codified if we're thoughtful about what the intent is.

Senator Mack. I think we're getting down to closing. I might pose one thought to you, Mr. Walker. And it has to do with the patent process.

I just really toss this out here in the context of your statement.

This information age or this innovation age, this age of change, Toffler talked about it years ago and tried to point out to us how, if you change the basic underpinnings of a society, the economic underpinnings of a society, you're going to change it's social and political structure.

So, again, with that thought in mind, does that say we ought to be looking at the patenting process differently than we did during the Industrial Age?

Is there some other way we ought to be going about this patenting process other than what we're doing today?

And again, I'm not talking about the fees.

Mr. Walker. No, I understand.

Senator Mack. I'm talking about the kind of revolutionary way of looking at protecting an innovation.

Mr. Walker. Yes and no. The process as a framework where an individual examiner examines a patent application and goes through a rigorous review of it, which is then reviewed by a higher examiner, is a good process.

It's a human process, which means it will have some error. But it's self-correcting with the checks and balances of a good court system.

The difference here is the speed at which we're asking the patent office to move in this age, they were never built for.

Imagine if when you went to buy a house, it took two years to get your title search back. How many houses would you buy?

Well, that's how long it takes today to get the first action back from the patent office. Why?

Because they don't have the modernization. They don't have the employee head count to literally move faster under an avalanche of needs to examine patents and inventions.

And so, when you take a horse and buggy and you try to make it go 120 miles an hour, it can't go. There's nothing wrong with horses and buggies. It's just that we need to put motors on them and call them cars.

So the challenge for the patent office isn't that it's not using the right process. It's that the patent office must be given the resources and tools to very thoroughly modernize that process and, by the way, have thoughtful people say, you know what? This process could be improved.

For example, we could have challenges to an inventor during the examination process. That's done in Europe. That's a reasonable thing to do within a treaty obligation we have in the GATT.

So my answer here is a simple one.

We need to embrace the good things of the process. It doesn't need to be overhauled. It needs to be modernized. There's a big difference.

We need to give these people tools or we're going to be really sorry we didn't.

And ultimately, we need to bring everybody into that process, both inventors, companies, the patent office, the policy-makers, to make sure that just as we're not using telegraph rules to modernize the phone system, we're not using the Industrial Age assumptions in an information age property system.

Senator Mack. Thank you. Senator Robb, did you have a question you wanted to raise?

Senator Robb. Very briefly. Just let me follow up on the question of the self-correcting mechanisms. You were addressing that in part when you were talking about sunsetting, recall, however else you want to put that particular part of the provision.

That's what we deal with all the time, is when to act and how to provide for some sort of a mechanism or amendment, if you will.

I'm not sure that I have been able to detect in the conversation, as fascinating, as provocative as it has been, any particular guidance on how to do what you're proposing because of the exponential increases in activities that are clearly beyond the pace of an organization like this, or any other regulatory or statutory body.

What can you tell us that makes this different from any other system where you're behind the curve, if you will? And what do you do about the certainty that you're trying to put when you're establishing an architecture, some particular framework for others to adhere to?

Or if you make a change in the tax code, to use a different analogy, and somebody makes business decisions based on a certain result that's going to come about if they make a particular decision.

How do you address the question of certainty, particularly if you allow for the repeal under some circumstances that are somewhat doubtful?

How do you get everybody else on the same page when you're making such a decision? I'm trying to find some common denominator here that can help me sort that out.

Mr. Walker. Needless to say, I won't be able to give a roadmap for that, other than to start. I'll just try to begin.

I would argue that the beginning point for that mechanism, because there's a balance against businesses' need to know that if I'm going to make investment, I have a certainty of regulatory environments, certainty of the rules of the game.

On the other hand, as a business person, nobody gives me certainty in the market place. I can wake up tomorrow and all of my customers are gone.

I'm out of business.

So I never had that much certainty to begin with, despite what I've complained to you that I want.

So I would argue that one of the ways to do this is to build the assumptions into the rules, which is to say, here is an act and a set of policy and law that we are promulgating. Here are the assumptions in the law that this act is based on. It's based on this and this and this and this and this and this.

Inasmuch as we can describe those assumptions, we can make good policy anyway because we can't make good policy if we can't agree on what the truth of the reality of today is. And we can't agree that we're making good policy unless we can say, and here is why we are making this policy for tomorrow. Here is why we are changing our energy policy, because we believe a dependence on foreign oil is a bad thing for our country. Therefore—

And we could say, if our oil dependence was more than 42 percent or 40 percent, certain elements of this act are going to kick in, or certain elements of this act are going to sunset, because we could define a threshold that we might agree to that would require a change in the act, if you will, and the law.

And so I would argue that the challenge here is almost to argue about what the assumptions are that we all see, which are typically hidden today. We see the act, but the assumptions are sort of read the Congressional Record, so to speak, and then have the courts try to interpret the sense of Congress, which is tricky on the best day.

And I would say that we need to start putting those assumptions into our legal code so that we can see exactly what we've all tried to deal with as a basis.

Is that helpful?

Senator Robb. It is helpful. I think you've pinpointed the difficulty that we have.

Mr. Walker. Yes, it's hard.

Senator Robb. It's the problem that you tinker with one little piece of the larger mechanism in an environment in which we have normally provided weeks or months for comments on a proposed rule, whatever the case may be, and something that, a change that could take place, market-driven perhaps, that would cause the structure to change and everybody who's been foreseeing on one track, to suddenly have the ground shift beneath them and either not have notice or not be able to make the kind of change.

Mr. Walker. And that's how the marketplace works today. Nobody gives me notice.

Senator Robb. Sure. But with the exception of agriculture and a few others, we try to let the market be as dominant as we can.

Mr. Walker. It's a tough question.

Senator Robb. It's a very tricky problem. And I guess I'm just saying, thank you for an articulate presentation of the dilemmas that we face with most of the kinds of statutory and regulatory issues that we confront.

But the special urgency with respect to technology and the way it leapfrogs itself every day.

Thank you, and I thank you, Mr. Chairman.

Senator Mack. All right. Thank you, Mr. Walker. We appreciate again the presentation and the responses to our questions. And I thank the members of the panel for participating.

Mr. Walker. Thank you very much.

(Whereupon, at 12:18 p.m., the hearing was recessed, to reconvene at 10:00 a.m., on Wednesday, June 7, 2000.)

SUBMISSIONS FOR THE RECORD

CM Opening Statement
JEC High Technology Summit
"Removing Barriers to the New Economy"
June 6, 2000

Good morning and welcome to the Joint Economic Committee's third high-tech summit, "Removing Barriers to the New Economy." I'd like to thank all of our distinguished guests for participating in what promises to be a meaningful dialogue on how public policy affects the growth of the high-technology industry and, as a result, the U.S. economy.

Anyone who doubts the importance of the high-tech industry to our economy need look no further than the following facts:

- The high-technology sector has been responsible for about one-third of real U.S. economic growth in recent years.

- The number of high-tech manufacturing jobs has soared 32% during the past six years, twice the overall U.S. growth rate in jobs.

- Over half of U.S. households are now plugged into the Internet.

- Workers in high-tech industries earn 82% more than the average for all private workers.

- High-tech trade is surging with the value of U.S. high-tech exports more than doubling since 1990.

Over the next two days we will be focusing on education, trade and deregulation issues — how must our education system change to prepare the workforce of the 21st century? What will opening China's markets mean for the high-tech sector? How will new technology change the way we teach our children? And how will the actions Congress takes regarding these issues affect the health of the high technology industry?

"Removing Barriers to the New Economy" will give us the opportunity to continue our dialogue at the JEC and in Congress on what Washington can do – and what it should avoid doing – to make sure that high-technology continues to play such an important role in the health of our economy.

With so much of the legislation being considered in Congress having a direct effect on the high tech industry, we need to make sure we maintain policies that give the strongest possible support to innovation, and the entrepreneurial spirit that turns innovation into jobs and GDP.

I look forward to listening to our participants today. It is with your guidance that we hope to ensure a continued healthy environment for the high technology industry and a continued healthy economy.

Thank you.

FORTNEY PETE STARK (CA)
RANKING MEMBER

REP. CAROLYN B. MALONEY (NY)
REP. DAVID MINGE (MN)
REP. MELVIN L. WATT (NC)
SEN. CHARLES S. ROBB (VA)
SEN. PAUL S. SARBANES (MD)
SEN. EDWARD M. KENNEDY (MA)
SEN. JEFF BINGAMAN (NM)

Congress of the United States

JOINT ECONOMIC COMMITTEE — MINORITY

106TH CONGRESS

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HOWARD ROSEN
STAFF DIRECTOR

OPENING STATEMENT

CONGRESSMAN PETE STARK, RANKING MEMBER
HIGH TECHNOLOGY NATIONAL SUMMIT

June 6, 2000

I want to welcome the impressive list of witnesses to the Committee. The speed at which new technologies have become part of our daily lives is incredible. We are constantly amazed by the development of new products and capabilities in the high tech industry. I hope this hearing will provide us with an opportunity to move beyond this infatuation and enable us to talk about what role the high tech industry can play in meeting the many important challenges facing our society.

The US economy is experiencing an impressive performance -- it is the envy of the world. Economic growth is strong, and in contrast to the predictions of many experts, the US economy is into its third year of record low unemployment and inflation.

But this is not the full picture. Although most American workers are experiencing some improvement in wages, they are far from recovering from the declines in living standards they experienced during the 1980s. The income gap continues to widen -- not just between the rich and the poor, but between the rich and the rest of Americans. Although every income group has enjoyed some improvement, the real increase in the income gap has been between the top 20 percent of Americans and the rest of the population.

The advent of the technologies being discussed today and tomorrow have contributed to both of these phenomena. According to the Commerce Department, about a third of the record economic growth we have been experiencing is due to the growth of the high tech sector. Sales of computers and software have pushed up total investment in the United States to its highest level in recent history. This investment has helped double productivity growth, which in turn has enabled the economy to continue experiencing low unemployment without stimulating inflation, allowing workers' wages to grow.

However, the high tech industry continues to comprise less than 10 percent of our national output and only 3 percent of our workforce. As a result, economic advances in the high tech industry have initially only benefitted a few -- particularly those who are already well-off.

We must be mindful that despite their far-reaching benefits, these new technologies have the potential to divide our society into a new breed of have and have-nots and to exacerbate our already troublesome income gap. The challenge for policymakers is to insure that we take full advantage of the benefits of technology and minimize the costs wherever possible.

With all the success in the high tech industry, I often get the impression that its corporate leaders hold the egotistical opinion that the government is an unfortunate holdover from a different era that is ill-suited to the high tech world they are creating. However, the entire high tech industry, as we know it today, is based on technologies which were conceived in federally-funded national labs and university research programs. The US government provided the original venture capital needed to develop the computer and the Internet. Debate over the actual parentage may go on forever, but one thing is clear -- US taxpayers financed the original research.

Over the next couple of days, I fully expect representatives from the high tech industry to use this summit as an opportunity to lobby for increased copyright and patent protections, prevention against piracy, and the need to open foreign markets to increase sales abroad. There will be calls for the removal of regulatory barriers, lowering taxes and raising the number of temporary foreigners allowed to work in the United States. But as we consider these requests, I would hope that the industry would also look beyond their own self-serving interests and address some of the broader concerns facing the nation as a whole.

I strongly believe that US companies should stand for something more than just profits. I believe that corporate leaders should help this country develop social values and a vision for this nation beyond their own self-interest.

Don't worry, I am not planning to ask the high tech industry to repay the government for its initial investment in developing the computer and the Internet - although it would be a sure way to finance comprehensive health insurance with a serious prescription drug component for every American. Instead, I ask for several things.

First, the industry - both as an industry and as individual firms - needs to publicly acknowledge the government's role in creating and developing the technology which is at the foundation of their success. We are constantly hearing that the government is in the way. The development of the high tech industry is a case where the government did something right, and it would be nice if the industry would be willing to acknowledge that fact. Hopefully this acknowledgment will turn into a broader effort to restore confidence in our government.

Beyond this though, I believe that the high tech companies must give the American taxpayers some return on their original investment. One example would be for the high tech community to become leaders in providing health and pension benefits to all its workers and their families, raising the minimum wage, aiding the government to create a first class education system and helping to create strong medical and Internet privacy laws.

In particular, I would like to see representatives of this industry take a strong public stand on closing the income gap in America. I suggest that as a tangible product of these hearings, that you and the rest of your colleagues in the industry make a commitment today to insure that all people associated with the industry - full-time, part-time and temporary workers, as well as workers of firms doing business with the high tech industry - receive some form of employer-provided health insurance.

The high tech industry has created an enormous amount of wealth over the last decade and has been a leader in our new economy. It should also be a leader in providing first-rate health care and retirement programs for all their employees. If your industry can't "afford" to provide all its workers with basic needs, such as health care and pensions, how can we expect other industries to do so? The industry needs to take a leadership role in working with the government to provide health insurance for all Americans, regardless of where or if they work.

The high tech industry may not hire many workers at the minimum wage, but you and your employees come in contact with people who earn the minimum wage every day - at the coffee houses, the food stores, and the restaurants they and you frequent. At its current level, the minimum wage is not enough to enable a family of four to live above the poverty rate. How can we as a society allow this injustice to continue? I ask you to join us in raising the minimum wage.

Although new technology has increased the ease of communication between companies and individuals, the public is deeply concerned about their privacy and the treatment of any information they provide willingly or unwillingly. I am particularly concerned about the importance of privacy in the area of health care. I would like to hear from our witnesses how we can address these privacy concerns -- taking advantage of the available technology without infringing on the rights of individuals.

It has become fashionable to "bash" our education system. I remember 15 years ago, when we were concerned that Japan was going to eat our lunch, that our education system was at the core of all our problems - the same education system which produced the likes of Andy Grove, Bill Gates and Carly Fiorina, in addition to all the others testifying before the Committee, as well as the thousands of young, bright, talented, and creative kids launching and running high tech start-ups every day.

Although our education system has contributed to helping many talented people become successful entrepreneurs, it has been less successful in helping raise people out of poverty. Poverty is the number one indicator of student academic underachievement. Unfortunately, many in the Majority would reduce federal funding for education in poorer communities by allowing states the flexibility to use these funds for other purposes. I call on the high tech community to support increased funding for all schools and to continue the practice of targeting funds for poorer communities.

There is something wrong when some students have access to the newest computers available while students in the next community do not even have basic text books. Given your deep concern about education, I call on the high tech community to go beyond their own self-interest of simply providing schools with computers and work with Congress to insure that all students have the basic educational materials of text books, pencils, papers good teachers and adequate school facilities. All of these basic materials are needed to learn.

Instead of bashing our education system, we need to make sure it serves all of our students, not just the well-off and the fortunate few.

The achievements of the high tech industry are not only impressive, but also historic. If used properly, these new technologies can continue to improve the quality of our lives and contribute to the ongoing health of the economy. We can be very proud that this technological revolution is the result of the hard work and endless energy of thousands of talented and creative Americans. The industry has achieved much over the last decade, and I certainly wish for its continued success. Just think what we can achieve if this creative energy is also put to work in addressing the economic and social challenges still facing the nation.

Andrew S. Grove
Chairman, Intel Corporation

"Twin Engines of the Economy"

Joint Economic Committee
United States Congress 6/6/2000

Twin Engines of The Economy

- **Trade > 'Globalization'**
  - **Three decades of trade agreements bearing fruit**
- **Technology > 'Digitization'**
  - **Independent of stock market gyrations, IT remains the driving force of the economy as IT-based productivity gains take hold**

Trade: What Has Worked

- **US-Japan Semiconductor Agreement (1986)**
  - After 20 yrs of being shut out by Japan's MITI, the US went from 8% > 30% semiconductor market share
- **Information Technology Agreement (1997)**
  - 52 countries (95%+ of WW IT trade, i.e. $600B)
  - Eliminated 100% of IT tariffs by 2000
  - Saved $1.5B US/Europe semiconductor tariffs (7/97-1/00, SIA)
- **US-China WTO Agreement (1999)**
  - After 10 years of negotiations China agreed to open its markets and adopt the same WTO trade rules 134 other nations use
  - ... just as China has become the #3 IT market in the world

Trade: What Must Be Done

- China PNTR:
  - WTO agreement was the 1st step
  - US House approval was the 2nd
  - We now ask the US Senate to do the same

Trade: What Must Be Done

- e-Commerce Trade Rules:
  - Internet will transform goods like software from "atoms" to "bits"
  - WTO's GATT classifies 'off-the-shelf' SW (atoms) as a "good"
    - Result: SW moves around the world virtually tariff & barrier free
  - EU proposes that <u>all</u> e-Commerce (bits) be classified as "services"
    - Result: SW would come under more trade restrictive GATS rules
  - This could lead to "e-Protectionism"... country-by-country
  - Our trade principle must be 'technology neutrality' --
    - In this case: 'goods are goods' no matter how delivered

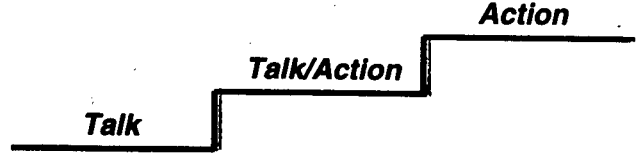
Trade: What Must Be Done

- "Mass Market" Export Controls:
  - Currently: US Government set MTOPS based export controls
  - But government 'cycle time' is slower than technology
  - New: base controls on market size, not performance

- "World Class Talent" Import Controls:
  - Currently: 55% of US Engineering PhDs are foreign born
  - Educating them and then making them leave makes no sense
  - Even when cap raised from 65K to 115K, visas ran out 3/2000
  - New: A comprehensive review of skills-based immigration in an age when the high technology worker is the key resource

Technology: Work in Progress

- **Telecom Act (1996)**
  - **The Internet is about connected computing**
  - **Prior to TA there were increasingly "free" MIPS (computing)...**
  - **...but no reduction in cost of bauds (connection)**
  - **De-regulation has brought mergers, acquisitions and increased competition**
  - **Generally positive, but consumers still waiting for bandwidth**



Tech: What Must Be Done

- **Federal IT Research funding:**
  - **Total federal Information Technology R&D is declining:**
    - **From $75B in 1990 to $62B in 1999***
    - **While High Tech industry grew 10-30% per year****
  - **Industrial, federal R&D for "computers and electronics" is not matched:**
    - **30% of industrial R&D* (#1), but only 6% of federal R&D***
  - **Recommendation:**
    - **Rationalize federal R&D with GDP contribution of sector**
    - **IT was 11%* of GDP in 1997 (probably 12%+ last year)**

* Source: NSF, 1998 ** Source: Bureau of Economic Analysis, Milken Institute

Tech: What Must Be Done

- Two issues of "Atom - Bit Parity" ('Technology Neutrality'):

- Internet taxation:
  - No sound basis for tax advantaging the Internet
  - Tax neutrality has to be achieved or we contribute to digital divide

- Internet privacy:
  - Treat private data like user's private property
  - Consequently, protect it like other forms of property
  - Develop a single, national policy for privacy:
    - Don't legislate tech solutions (e.g. focus on code)
    - Leave room for self-regulation

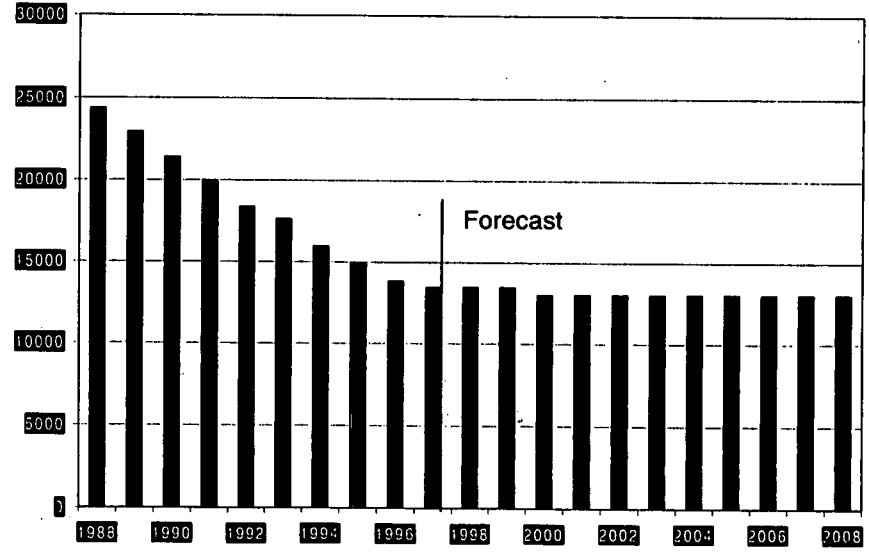
Tech: What Must Be Done

- 21st Century Patent Office:
  - '98 to '99: PTO applications up 11%, funding down 16%
  - Major problem: diversion of PTO fees to general treasury:
    - $564M to date, another $113M in FY'01
    - PTO needs money to improve training, search technologies
  - Stop the fee diversion

Tech: What Must Be Done

- **World Class Math & Science Education:**
  - **All degrees inc. from 1.4M to 1.6M from '88 to '98**
  - **EE, CS, CE degrees declined in same period**
  - **e.g. BS in EE down 25k to 14K '88 to '98**

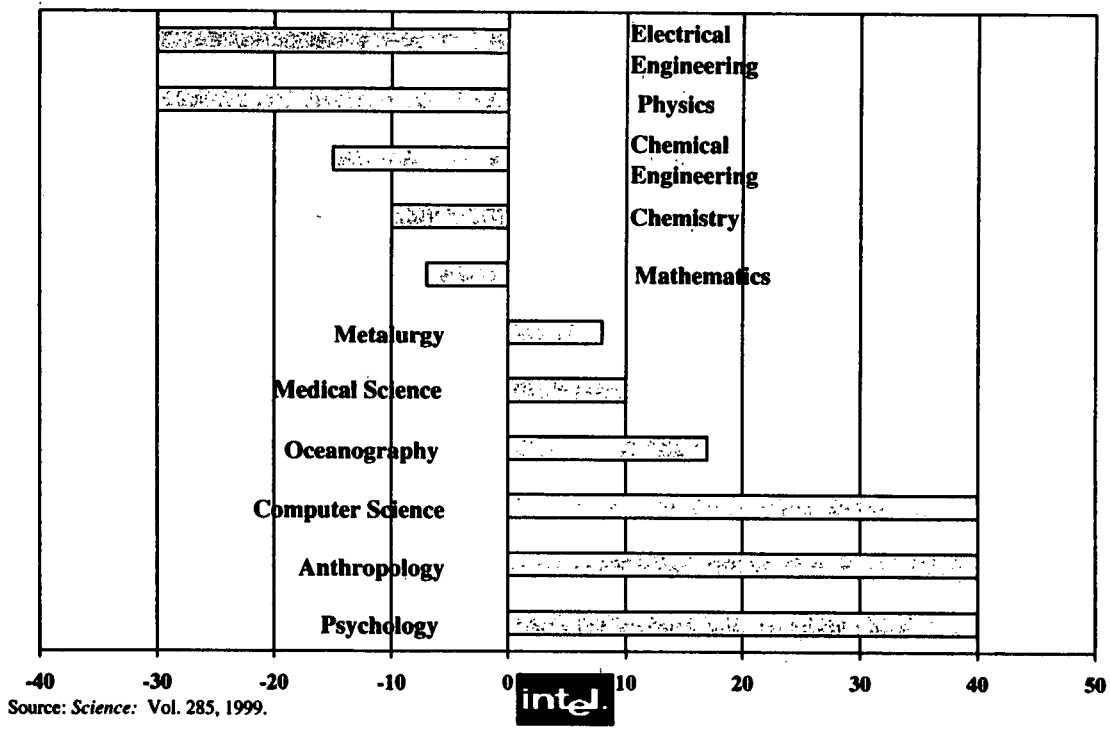
B.S. Electrical & Electronic Engineering Graduates



Source: Engineering Workforce Commission[17] through 1997; SRC Model 1998 - 2008

Percentage Change in Federal Basic Research Funding FY 1993-97

**** in constant dollars***



Source: *Science:* Vol. 285, 1999.

Tech: What Must Be Done

- **World Class Math & Science Education (cont'd):**
  - **What Intel is doing...**
  - **Teacher Development:**
    - **Teach to the Future (400K teachers)**
  - **Community Based Education:**
    - **Computer Clubhouses (100 centers over 5 years)**
  - **Competitions:**
    - **Intel Science Talent Search**
    - **Intel International Science and Engineering Fair**

Suggested General Principles

- "First, do no harm"
  - We have avoided "Department of the Internet"
  - Understand problems before moving to solutions
- Be consistent
  - Enable private sector planning
- Achieve atom - bit parity (technology neutrality)
  - For trade, taxation and privacy
- Digital Economy is all about human resources
  - Education
  - Immigration
  - Research & Development funding

Testimony of William H. Gates, III
Chairman and Chief Software Architect
Microsoft Corporation

The High Technology National Summit: Removing Barriers to the New Economy

Joint Economic Committee

June 6, 2000

Chairman Mack, Vice-Chairman Saxton, and members of this committee:

First, I would like to thank you for inviting me here this morning. I am honored to be back again, and I greatly appreciate the opportunity to take part in these proceedings. More importantly, let me commend you for convening this hearing. Among the many high tech issues before this Congress none carries greater importance for our future economic vitality than education.

This is a time of unprecedented prosperity and growth, a good deal of it generated by the high tech industry. In the United States alone, information technology has accounted for some 30% of our aggregate growth and about one half of total business investment – truly extraordinary figures. The United States has been fortunate to lead the way, but we cannot rest on present laurels or past accomplishments. Meeting the ever-changing demands of a high tech economy, maintaining our global leadership and stimulating further growth will depend largely on our ability to produce and expand a competitive workforce. In our rapid shift from an information to a knowledge-based economy, education is the linchpin for our future success – and the time to act is now.

I have always believed that the single most important role of information technology is to improve lives, particularly with respect to education. In fact, the advent of the PC would have been invaluable for no other reason than its capacity to revolutionize education. Increasingly, the link between education and technology is one of mutual re-enforcement. As technology transforms today's classroom, so an educated workforce will be able to sustain America's technological pre-eminence.

The high tech industry has demonstrated its dual commitment to innovation and to lowering prices, so that these essential tools are available to everyone.

At the same time, increasingly affordable PCs, other new devices, powerful software and an explosion of Web-based services are set to empower the next generation.

By putting technology directly into students' hands, schools can provide access to learning at anytime, any place, while new tools enable educators to customize learning and improve their schools.

In addition to our work at Microsoft, Melinda and I, through the work of our foundation, recently launched a $350 million program aimed at helping teachers and administrators integrate technology into their curriculum. The goal of this program is to increase academic achievement for all students by identifying, and replicating, school environments where all students achieve at a high level – with no student left behind.

Parents are also playing a renewed role, as they are able to review their children's work and connect more easily with their teachers. As never before, learning is becoming a lifelong pursuit, providing new ways to enrich the way we live and work.

If we are to realize our full potential, then our primary focus must be on K through 12, particularly with respect to math and science. There are several ways Microsoft is working to do just that.

We have created the Connected Learning Community, which is guided by our vision of empowering parents, teachers and communities to work together to help their children learn, by giving them the tools they need. It is a comprehensive initiative, based on the idea of anytime/ anywhere learning. During the past three years alone, Microsoft has committed $570 million in software and support, as well as direct funding, for education, training, and access to technology programs.

For example, there is our work with the Lemon Grove School District in California, where a technology-based educational environment connects public and private schools, parents, community members, the city government and the local library, where web - delivered applications are not limited to school but available to the entire community twenty-four hours a day. Students there are now challenging standards, as literacy rates improve and the school district serves as a hub for lifelong learning for the entire community.

Providing widespread access to technology is the first crucial step, whether at home or at school, at the public library or the local senior center.

At Microsoft, we believe that what is often referred to as a "digital divide" can be harnessed into "digital opportunities" for all Americans. With special focus on under-served communities, we are actively supporting many efforts to bridge this divide and create these new opportunities, including our work with the Boys & Girls Clubs of America.

With the help of NBA great Shaquille O'Neal, these kids are learning how to access the web safely and responsibly, as part of our larger commitment to provide technological solutions – solutions that empower parents and teachers, and that guard against harmful content on the Internet, promote consumer safety and protect personal privacy on-line.

Yet if our children are to benefit from such access, then we must see that our teachers can effectively integrate technology into the curriculum. The role of the teacher cannot be over-emphasized. At one time or another, we have all been energized by their faith in our abilities, and led to succeed thanks to their guidance. Yet just twenty percent of them feel confident using technology in the classroom, which is why we developed the Microsoft Classroom Teacher Network, an online resource for teachers, as well as teacher.training@microsoft, which this year alone will help train more than 450,000 teachers to use technology in the classroom.

Andy Grove has spoken of Intel's *Teach to the Future* program, a worldwide initiative to provide technology training to more than 400,000 classroom teachers – a model initiative that deserves our admiration and support. We at Microsoft have pledged a $344 million donation in software to the program.

Ensuring the success of our students and teachers also requires support programs that enable the schools themselves to plan, build and maintain modern learning infrastructures. The Connected Learning Community initiative has developed a wide variety of such programs, tailored to the specific needs of schools and communities across the country.

Mr. Chairman, I am excited to inform this committee of a new effort that I believe underscores the pressing importance of these hearings. Later today I will help launch Microsoft's Washington 2 Washington program, where we will be equipping two classrooms on opposite coasts with in-class technology and a web-based digital classroom for collaborative learning and exploration.

Over the course of the 2000/2001 school year, Sequoia Junior High School in Kent, Washington will be paired with the SEED Public Charter School here in Washington, D.C. A veritable laboratory of learning, the two classrooms will use technology tools to share information and conduct peer-to-peer instruction. At the same time, curriculum modules will be posted so that teachers in other parts of the country can review and borrow ideas, allowing even greater inter-activity. Easy access to such resources will spark innovation in classrooms nationwide.

And finally, as the 106th Congress moves to reauthorize the Elementary and Secondary Education Act – a task of tremendous importance – I would ask you to consider the fundamental role information technology should play in the future of American education, a role that will surely be enhanced by a new generation of software that will enable every tool and every web site to work even better together, and by recent advances like the Tablet PC, distance learning, and e-books.

The public and the private sectors are both participants in this process: we have a common vital interest in seeing that all our students are ably equipped and properly prepared, both to enter the workforce and as citizens. Their success, like that of our nation – as a society and as an engine for economic and technological growth – requires our unwavering commitment and our enlightened cooperation.

Building upon our own programs, we at Microsoft look forward to working with you, as we strive to create an educational system where every child has the same opportunities and access, where no one is left behind and no teacher is unprepared. Together we are rising to these challenges. These are truly amazing times, of limitless possibilities – and the best is yet to come.

Once again, thank you for the opportunity to come here today.

Testimony Of

CAROL BARTZ
CHAIRMAN OF THE BOARD AND CEO
AUTODESK, INC.

Before The
JOINT ECONOMIC COMMITTEE
UNITED STATES CONGRESS
June 6, 2000

Testimony Of

CAROL BARTZ
CHAIRMAN OF THE BOARD AND CEO
AUTODESK, INC.

Before The
JOINT ECONOMIC COMMITTEE
June 6, 2000

Thank you, Mr. Chairman, Representative Stark and Members of the Committee.

I'm pleased to be here today -- and thank the committee for holding these important hearings for the second year in a row.

Because technology continues to have a strong effect on our economic future, it's vitally important that we continue this dialogue.

I appreciate this opportunity to talk about how innovation in software is removing barriers as we move to the New Economy.

On the flip side of this topic, I also want to talk about how widespread software theft is creating barriers that slow the New Economy.

Globally, some of our biggest software theft problems are in China.

So I also want to talk about how the China PNTR decision can help reduce this theft -- and create new opportunities for U.S. companies.

To give you a little background, my company, Autodesk, is the global leader in design software.

Millions of architects, engineers and designers use our solutions on a daily basis.

They're designing the buildings, products and infrastructure – like roads, bridges and utilities – that we use every day.

They're also creating the virtual world, such as special effects for movies like The Matrix and Titanic.

And our frost* software is also used to instantly generate television graphics – including election returns.

Autodesk is now deeply involved in using the Internet to help our customers remove barriers in their businesses.

They're using our new, Internet-based design software to:

- Share drawings instantly.
- Significantly reduce project timetables.
- And use E-Commerce to cut costs.

But there is a downside to information technology.

It's creating a new kind of crime -- and a new kind of criminal.

I'm talking, of course, about cyber-crime -- the cutting edge of lawbreaking.

This includes computer-based vandalism, terrorism and theft.

Today, I want to focus on a specific kind of cyber-theft -- stealing software.

There's no question that software theft is a major problem.

Overall, nearly 40% of the software applications used globally is stolen.

Overseas, the theft rate is even higher. In China, it's 95%.

Only five software programs out of every hundred are legal.

To be fair, this is a U.S. problem too.

And corporate America is one of the biggest offenders.

Globally, the retail value of stolen software is $11 billion annually.

This results in:

- More than 100,000 fewer jobs in software companies and related industries.
- And the loss of nearly a billion dollars in uncollected taxes -- just in this country.

We in the software industry have a basic and fundamental problem in convincing governments that software theft is a real crime.

I believe that one of the reasons this happens is because software is invisible.

Let's say that the CEO of an automobile company testified that nearly 40% of their production was stolen every month -- of every year.

And, furthermore, the stolen vehicles were being sold openly to the public.

This would probably get the attention of government and law enforcement.

But this is exactly what's happening to software companies.

Stealing software is not just an unseen crime.

It's an unseen crime wave.

But even though software is invisible, please remember that it's the foundation of the Information Economy.

Without software, all of the visible parts of the information infrastructure -- including fiber-optic cable, servers, and the PC on your desk - would be useless.

The Internet is another prime conduit for software theft.

Online auction sites routinely sell our stolen software.

And users routinely trade programs over the Internet.

Worldwide, there are more than two million Web pages offering stolen software.

Software theft is not just damaging my industry - it's starving our nation's software development process.

That means fewer jobs, lower tax revenues and less trade.

It also means that we're not getting the productivity improvements that software innovations deliver.

We can do something about it.

Industry and government can work together as partners to address the problem.

Here are some specific remedies.

First, it's important to finish the work to grant China permanent normal trade relations -- and to bring them into the World Trade Organization.

Membership in WTO will obligate China to -- not only pass laws against software theft - but also to effectively enforce them.

Bringing China into WTO can improve market access - and reduce copyright theft. That's a win-win for our country and our economy.

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A second remedy is a renewed commitment to enforcing the good copyright laws that Congress has recently passed.

For example, the Department of Justice and the FBI can devote agents and prosecutors in the field to tackling cyber-crime -- including software theft.

High-tech training for these individuals can improve their ability to catch -- not only software thieves -- but also hackers, porn distributors and others using the Internet for criminal purposes.

I can tell you that we're eager to help.

Business Software Alliance member companies – like Autodesk – already work with the DOJ and FBI to train investigators and develop cases. And we want to build stronger, more effective partnerships to improve enforcement.

In addition, Congress can exercise its oversight authority to monitor progress.

A few high-profile cases have recently been brought by federal prosecutors – and that's a good start.

But an annual report from the Justice Department would help Congress determine if software theft and other cyber crimes are receiving appropriate attention.

In the software industry, a significant amount of our total revenue goes into new product development.

For example, at Autodesk our R&D budget to develop new software is more than $150 million a year.

The software industry's next wave of new products represents a bright future for information technology. And a bright future for our economy and our society.

The dark cloud on this horizon is the widespread, un-prosecuted theft of software.

Software thieves are doing a whole lot more than committing an unseen crime.

They are setting up roadblocks to the New Economy.

And they are stealing the future from everyone in our society.

Written Statement of
William L. Larson
Chairman and Chief Executive Officer
Network Associates, Inc.

Before the Joint Economic Committee

High Tech Summit Hearing

"Barriers to the New Economy"

June 6, 2000

Statement of Mr. William L. Larson
Chairman and Chief Executive Officer
Network Associates, Inc.

Mr. Chairman and Members of the Committee, thank you for the opportunity to appear before you today. The subject of this hearing is "Barriers to the New Economy." I am here to talk about one of the most crucial barriers to the new economy that we face today, and that is the lack of security on the Internet. The problem is growing, the threat is evolving, and there are specific things that industry and government can do to address it.

First let me introduce myself and my company. I am Bill Larson, Chairman and Chief Executive Officer of Network Associates, based in Santa Clara, California. Network Associates is a leading provider of network security and management software and services. Our products protect networks from intruders and viruses, and allow network administrators to maximize network "uptime." In essence, we make sure the store is open, and secure. Our products include McAfee VirusScan, Gauntlet Firewalls, CyberCop Intrusion Protection, Sniffer Network Analysis tools, and PGP encryption. We employ about 3,000 people worldwide and expect to do close to $1 billion in revenues this year.

The Nature of the Internet

The rush to take advantage of e-commerce has driven everyone, from large organizations to mom and pop stores, to the Internet. It has become our business and information infrastructure and operating system. It has literally opened access to a world of information, consumers, vendors, new markets, and potential.

For most people, the benefits of having this vast array of information and opportunity at our fingertips greatly outweigh the risks involved. But our ability to reap the greatest benefits from this amazing technology will depend upon our ability to mitigate the risks and respond quickly to the security threats that come with it.

The Nature of the Threat

Let's talk about the security threats for a minute. In a report released earlier this year by the FBI and the Computer Security Institute, ninety percent of respondents indicated that they had detected computer network security breaches over the last year. Almost seventy-five percent said that the security breaches included theft of property or information, financial fraud, data or network sabotage, and denial of service. The losses from the 273 respondents totaled approximately $265 million, almost a million dollars in losses for each respondent. According to a representative from the FBI's computer intrusion squad, the number of open cases of computer crime have more than quadrupled over the last three years. From 206 is 1997 to 834 in 1999, and growing.

The nature of the threat is changing and evolving. I like to characterize the types of security breaches into three categories that make up a pyramid. At the bottom of the pyramid we have the most prevalent threat, but the least harmful. These are nuisance attacks, things like defamation of websites or certain non-malicious viruses. I like to characterize this as the graffiti on the overpasses of the information superhighway. Like graffiti artists, the culprits are usually teenagers looking for notoriety or recognition.

Unfortunately, as we saw in the recent Love Bug outbreak and distributed denial of service attacks, sometimes the graffiti artists do real damage and cause real financial loss.

The second category of threat or attack is what I call "hacking for profit." This consists of individuals or organizations stealing valuable information, such as credit card numbers, from businesses, or possibly extorting their victims for financial gain.

The third category of threat is potentially infinitely more harmful to us all: cyberterrorism, or information warfare. This is hacking activity directed against governments or economic organizations to create a certain economic or political outcome. It is also activity designed to threaten our economic or political instability through attacks on the Nation's critical infrastructure.

Ultimately, if not addressed, the impact of all three of these types of threats could be to undermine the adoption and widespread use of a technology that has revolutionized our economy and our world.

Evolving Solutions for an Evolving Problem

Network Associates and companies like ours are working on ways to solve these problems. First, we are constantly developing new and innovative tools for individuals and organizations to use to counter these continually evolving threats. We have a database of over 53,000 known viruses that we have collected over the years. We receive several hundred new virus samples from around the world every month. That's an average of about 25 new viruses every day. We have researchers around the world responding to new security threats and new viruses on a 24-hour basis, which is why we were able to catch and cure the Love Bug before it struck in the US. We have developed tools that network administrators can use to provide a "hacker's eye view" of their network and potential vulnerabilities.

But it is not enough for Network Associates to say "buy our tools to protect yourselves." As more companies, individuals and organizations are putting their business "on the web" the challenges grow exponentially. There are more targets for attack, and smaller targets are less sophisticated at protecting themselves. A small or medium-sized business or organization may be fortunate to have one person who understands technology at all, let alone a staff that can keep up with the threats and implement the necessary security precautions.

So we are also developing tools to make implementation of security easier for everyone

Network Associates has begun providing our anti-virus and security products as services, via the web. In a traditional anti-virus software model, the customer receives the updates, the vaccines, from our company and distributes them throughout their organizations. Small companies or less sophisticated users may not be able to do this quickly enough to protect against the most recent threats.

Our Application Service Provider, myCIO.com, can provide companies with a service that automatically protects desktops, mail servers, etc. from new viruses and security threats as they are found. Our subsidiary, McAfee.com can provide the same protection for individual customers, so you no longer have to download and install new vaccines but can automatically protect your desktop via the web. We can also provide services to your Internet Service Provider or Telco to allow them to scan your email before it reaches your desktop, so that viruses can be caught and cleaned "in the sky."

How Congress Can Help

Developing new and innovative tools and services to combat the threats we know of, and the threats that are emerging, is expensive. In order to stay abreast of new threats, we

must refresh or rebuild our product lines every 12 months. For this reason, Network Associates spends nearly 20% of our revenues on research and development. That means we will spend close to $200 million this year on R&D in an attempt to stay a step ahead of the individuals and organizations who are creating and deploying these threats against our information infrastructure.

Congress can help by enacting policies that promote the development of technologies to protect the Internet without regulating the industry and impeding innovation. Such policies include:

- Promoting the use of legal software. If software is illegally licensed or stolen, it will not provide adequate protection from viruses and security hacks. Our software must be updated continually to ensure that it can protect against the most recent threats. Our paid customers get free updates, pirates do not. This is why the impact of viruses or other security attacks is often worse in regions such as Eastern Europe and Asia, where piracy rates are high.

- Expanding the H1B visa program so that our company can attract and retain the highest quality workers for our very highly skilled engineering and development jobs.

- Permanently extending the Research and Experimentation Tax Credit. The long extension provided by this Congress was helpful. Permanent extension would provide for more reliability and longer-term planning.

- Funding research in the areas of advanced security through NIST, DARPA or other government research organizations.

- Promoting trade opportunities for US companies, such as the opportunities that exist for us in the Chinese market. Permanent Normal Trade Relations with China will mean that tariffs on our products in China will come down, giving us access to that huge market – sales from which will help to fund further research and development efforts in the US.

Finally, industry and government need to work together to educate the public regarding the important security precautions that they should be taking, not only to guard their own systems but also to prevent their systems from being used to launch attacks on others, as was seen in the DdoS and Love Bug attacks. A great example of this type of cooperation was seen last week. On June 1, our company joined with 43 industry and government representatives, including representatives from the Commerce Department's Critical Infrastructure Assurance Office, the NSA, and DoD to publicly announce the top 10 computer security threats and how to fix them.

Hearings such as this one provide a great forum to educate the public and to discuss ways in which we can continue to work together to solve these tough problems. Thank you for the opportunity to appear before you today, and I look forward to your questions.

Testimony of

DR. JOHN E. WARNOCK
CHIEF EXECUTIVE OFFICER AND CHAIRMAN OF THE BOARD
ADOBE SYSTEMS INCORPORATED

before the

JOINT ECONOMIC COMMITTEE
UNITED STATES CONGRESS

Removing Barriers to the New Economy:
Making Government More Efficient and Fighting Software Piracy

Washington, D.C.
June 6, 2000

Good morning, Mr. Chairman. My name is John Warnock, and I am Chairman of the Board and Chief Executive Officer of Adobe Systems Incorporated. I am pleased and honored to have the opportunity to participate in the Joint Economic Committee's third National Summit on High Technology. At the outset, let me commend your leadership in holding this remarkable Summit, and express my thanks for your gracious invitation to provide testimony.

In my remarks today, I would like to talk about ways technology is enabling both companies and government to provide better services at lower cost—in short, to reap the benefits of the "new economy." I would then like to turn briefly to a major potential barrier to the new economy reaching its full flower: software piracy.

The New Economy: Benefits for Private Business...

First, let me discuss what embracing the New Economy means in the private sector context. Technology firms like Adobe have transformed the U.S. economic landscape over the past decade and a half. The numbers for the software industry alone, as indicated in a recent economic study by the Business Software Alliance, are head turning:

- The software sector is growing at 15.4% annually, three times the rate of the rest of the economy;

- The software industry is on track to make a net positive contribution to our country's trade balance of $20 billion this year; and
- By the end of the year, the software industry's share of U.S. GDP will exceed that of any manufacturing sector.

Those of us who started the desktop computer and software revolution almost 20 years ago had no idea what an impact our ideas would have on the economy and society as a whole. In Adobe's case, when my partner Chuck Geschke and I founded the company in 1982, we imagined that, one day and if we were quite successful, we might employ around 40 people working on a single family of products based on our PostScript page-description language. Fortunately for us, our rather modest business plan did not work out the way we had predicted. Instead, Adobe PostScript and PageMaker went on to launch the desktop publishing revolution. Today Adobe offers a broad range of award-winning software solutions for Web and print publishing. Its graphic design, imaging, dynamic media, and authoring tools enable customers to create, publish, and deliver visually rich content across many types of types of media. Adobe is the United States' third-largest personal computer software company, with annual revenues exceeding $1 billion and more than 2,600 employees worldwide.

A key underpinning to Adobe's success has been embracing technology internally to help us work better as a company and free up funds to reinvest in product development. E-mail, to name one example, is central to life at Adobe, where we send and receive more than 250,000 e-mails a day. Last year, we moved over 100 of our most common internal business

forms from paper to electronic Adobe PDF documents. Using the power of Adobe PDF, employees now access forms—like expense reports and travel authorizations—on the Adobe internal Web site. The forms are then completed, approved, and processed completely electronically, resulting in significant increases in efficiency and lower costs to the company. For example, we save more than $50,000 monthly in expense report processing costs alone by using Adobe PDF forms instead of paper. We have also seen a drop of 90% in the volume of flawed forms submitted by employees. Why? ePaper is simply "smarter" than physical paper, since the built-in "intelligence" possible in an Adobe PDF form catches errors. Finally, moving away from paper to PDF-based electronic forms enables us to save on storage costs and to search archival material far more easily.

I have just given two examples of how we use technology to drive internal efficiencies, but it is no exaggeration to say that Adobe—and many of its peers in the technology sector—run electronically. By doing more and more of our work in the virtual world, we save money, we save resources, and we create our products much more efficiently. Adobe's sales exceed $420,000 per employee, a figure unheard of for traditional businesses and possible *only* because of the edge technology has given us. According to a study released by Cisco Systems last year, Internet workers are 65% more productive than their non-Internet counterparts. The bottom line for companies that have embraced e-business: they can afford to pay their people well without fueling inflation. At Adobe, for example, our average annual base compensation in the United States, before incentives and profit sharing, is in excess of $80,000.

...and Benefits for Government Efficiency

I am happy to report that many government agencies are embracing "new economy" methods almost as fervently as they have been adopted in the private sector. Using new technologies and the Internet, Federal agencies have the opportunity to revolutionize how they interact with the public. Adobe PDF, for example, is enabling government entities around the globe to do more with less—to communicate better, at lower cost and with many fewer dead trees involved.

In this country, more than 120 Federal agencies use Adobe Acrobat, which can enable striking cost savings. A tax form that costs the IRS three dollars to mail to a taxpayer costs only a fraction of a *penny* delivered via the World Wide Web in Adobe Acrobat PDF format. Similar convenience and cost savings have been achieved via Adobe PDF with Congressional bills, court filings, passport applications, GAO reports, Postal Service manuals, CDC communications, and most any kind of government communication with the American people. The FAA, using a PDF-based electronic workflow to produce and distribute safety manuals, has cut the time it takes to disseminate critical safety information from months to days.

Getting an effective new medicine to market can improve or save lives, so it is vital that the FDA's new drug evaluations proceed as expeditiously as possible. Before 1997, the FDA used a paper-based approval process that required pharmaceutical companies to

submit—literally—truckloads of documents, as many as 1,000 volumes averaging 300 pages each, in triplicate, for every drug. Three years ago, the FDA launched an electronic New Drug Application system using Adobe Acrobat PDF to streamline the application process. The FDA's move away from physical paper has had tangible benefits for consumers and companies. Pfizer, to cite one example, saved millions of dollars and shortened their overall time to market by using Adobe PDF, rather than a traditional paper-based workflow, during the FDA approval process for Viagra.

Assuming current trends continue, and the government continues to make more and more of its services available electronically, I foresee a future in which public information is liberated, government operates more transparently, and direct contact between citizens and their leaders is easier and more commonplace than ever before. Adobe is certainly proud to be playing a role in helping enable this move towards e-government.

Piracy as a Barrier to the New Economy

You have heard about some of the opportunities the new economy presents for both the public and private sectors; let me now turn to the threat. The software industry faces no more important—or economically damaging—danger than software piracy. Many computer users, who would never consider shoplifting a box of software from the store, do not think twice about copying a program from a friend, or downloading software from the Internet without the permission of the author. Yet all three practices amount to the same thing: stealing.

My distinguished colleague, Carol Bartz, has spoken eloquently to the economic costs of piracy, the high worldwide piracy rate, and the particular threat posed by Internet piracy. I wholeheartedly endorse her comments, and will not repeat her arguments in the interests of time. Suffice it to say that, as a computer scientist by profession and founder of a company that still sells software I had a hand in writing, theft of Adobe products is an issue I take quite personally! I do want to make one additional observation, however.

I am disturbed by a recent trend in news reporting that portrays what I believe is a false trade-off between the future growth of the Internet and copyright and patent protection. For example, the Wall Street Journal earlier this month reported the concerns of Professor Lawrence Lessig of Harvard that overly strong intellectual property protections might have a chilling effect on Internet development. Numerous press accounts on Internet music piracy have quoted college students as saying that trading copyrighted music online is a victimless crime much like speeding—you know it is illegal, but you do it anyway and figure it is no big deal. And, besides, the press stories often go, music sharing software is just "cool." If copyrights have to trampled in the interests of progress, so be it.

To cite one particularly extreme example of this anti-copyright/anti-patent sentiment that seems to be brewing, The *New York Times* reported on May 10 that Internet software products such as Freenet and Gnutella have the potential to enable software piracy on the Internet on a mammoth scale

and without any clear technological choke point for law enforcement or copyright holders to pursue to defend their rights. One of the Freenet programmers interviewed in this article was quoted as saying that people in the near future would soon look back at present-day notions of intellectual property rights "in the same way we look at witch burning today."

In response, I would argue that the Internet and the software industry have flourished not *in spite* of strong intellectual property protections but *because* of these laws. Without strong copyright, patent, and other intellectual property protections, companies like Adobe would never have had the economic incentive to create and support the kind of world-leading software we produce today. It is no accident that many developing countries which lack strong intellectual property protection regimes also lag behind in high-tech development. China, for example, could have a formidable domestic software industry if their government were to undertake legal reforms and increase enforcement to lower the 91% piracy rate. India, by comparison, has a comparably educated population and yet enjoys a thriving domestic software sector. The lower piracy rate in India—61%—and stronger intellectual property protections there deserve at least some of the credit for India's relative success.

Other critics of copyright in the context of the Internet espouse an ideological position that intellectual property should somehow be treated differently from other forms of property and should be free. While everyone is certainly entitled to an opinion, I would submit that this view runs directly counter to the intent of the Framers, who considered copyright and patent so

important that they placed both intellectual property rights in Article I of the Constitution. As a former academic, I certainly respect the choices made by those who develop open-source software or who pursue business models that differs from Adobe's. I believe, however, that customers should have the choice of licensing whatever type of software—commercial, freeware, shareware, open source—that best suits their needs.

As this Committee has heard, both today and at previous High Technology Summits, the intellectual property industries have brought great economic benefits to this country. I am not aware of any evidence that strong intellectual property protection has hindered technological innovation in the era of the Internet. Nor should hypothetical concerns about a "chilling effect" somehow arising from "overly strong" intellectual property laws trump the rights of software authors to legitimate property interests in their creations. This country's copyright and trademark laws have served us well, and government should resist any temptation to weaken or dilute intellectual property protections now. Thank you.

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Testimony of

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Chairman

and

George Lundberg, M.D.,

Executive Vice President and Editor in Chief

MedicaLogic/Medscape, Inc.

Before the

High Tech Summit
"Removing Barriers to the New Economy"

of the

Joint Economic Committee

United States Congress

June 6, 2000

Introduction

Chairman Mack, Representative Stark, members of the Committee, thank you for the opportunity to appear before the Joint Economic Committee at this important High Tech Summit on "Removing Barriers to the New Economy." I am Mark Leavitt[1], Chairman of the board of MedicaLogic/Medscape, Inc. I am joined today by my colleague, George Lundberg, M.D.[2], Executive Vice President and Editor and Chief. Our company represents a combination of approaches that bring critical, timely knowledge to physicians, other healthcare professionals, and consumers.

As both a physician an engineer, I began 15 years ago with a vision of moving paper medical records to the personal computer. Since that time, the company I started in my bedroom has developed and deployed online health records technology that is the most powerful and sophisticated available. As a result of MedicaLogic's recent merger with Medscape, Inc., we have joined with the leading source of peer-reviewed medical information on the Internet with this powerful technology. We are committed to making the whole greater than the sum of the parts. By integrating patient-specific online medical records, life long diagnostic information, practice protocols and other clinical decision support systems with extraordinarily deep and broad medical information and making that available to physicians and other clinicians at the point of patient care – wherever that might be – MedicaLogic/Medscape will advance the quality of clinical care while bring new economic efficiencies to the practice of medicine. None of this would be possible without the capabilities brought by high technologies and the Internet.

In my oral testimony today, I will focus on MedicaLogic/Medscape's mission: to provide health information that matters – improving quality, saving time, costs, and even lives – to extend the point of care beyond the physician's exam room, bringing the patient and physician together at any location, at any time, and influencing the major decisions in health care today. This written testimony will address efforts by healthcare internet leaders to develop a framework and process for industry self-regulation that warrants consumer confidence. Also, I will discuss how MedicaLogic/Medscape's commitment to protect the privacy of personal health information and how technology makes those protections possible.

MedicaLogic/Medscape's Mission

Today, MedicaLogic/Medscape makes online health records systems available to both patients and physicians. At the end of March, we had over 12,000 clinicians maintaining charts for more than 9 million patients. We also operate two of the most respected health and medical information sites on the Internet – medscape.com for professionals and CBSHealthWatch for consumers. Together, they had more than 2.2 million registered members at the end of March – including over 350,000 physicians.

[1] Dr. Leavitt holds a doctorate from Stanford University in electrical engineering and a doctor of medicine from the University of Miami. Board-certified in internal medicine and geriatrics, Dr. Leavitt practiced full-time for 10 years, and then served as medical director of information systems at Providence Health System for two years.

[2] For the last twenty years, Dr. Lundberg has been at the forefront of medical publishing, serving for 17 years as the Editor of the Journal of the American Medical Association and from 1999 forward as our Editor-in-Chief.

The Power of Online Health Records

Our online health records system – we call it Logician – includes medical records and charts relative to individual patients built and maintained by the patient's physician. But it is also much more. The package of tools integrated in Logician permit the clinician to maintain, archive, retrieve and search records with little effort. Logician accurately codes patient encounters for claims submission. Logician allows the clinician to electronically retrieve lab results, prescribe medicine online, query decision support systems and be reminded when the patient is due for another visit. Logician can be customized to meet the individual clinician's style. It is intelligent and learns as it is used so that it actually becomes easier to use over time. And it is literally available wherever the clinician has a computer and Internet connection. In the near future, clinicians will be able to access their electronic medical records through a variety of wireless devices including tablets, personal digital assistants and web-enabled cell phones. A demonstration of Logician can be seen at our website: http://www.medicalogic.com/products/logician_internet/demo.html.

Patients whose physicians use Logician can access an online summary of their medical records, including lab test results through a special patient site: www.98point6.com. They can review their records with the doctor, correcting errors or just adding things they may have forgotten to mention during earlier visits. And they have a chance to take those records along with them, with all of the security and privacy they need.

Avoiding Medical Errors

By putting high quality, timely information online, we improve healthcare for consumers. For example, in March we were able to respond rapidly to the voluntary removal from the market of the diabetes drug, Rezulin. Physicians using our online health records were able to instantly determine which of their patients were taking the drug. Within an hour after the news release, warning calls were being made to the patients. At the same time, our Web sites were issuing warnings to visitors, both on the Web sites and via electronic mail.

We also know that online health records and up-to-date medical information can help to reduce medical errors. As the Institute of Medicine informed us, the number of people who die each year from medical errors is equivalent to the crash of a jumbo jet every single day. We want to use our technology to help solve this national problem.

Bridging the Digital Divide

At MedicaLogic/Medscape, we believe that state of the art healthcare information technologies should be available to meet the healthcare needs of all Americans, and we've decided to do our part to help achieve this goal. Very recently, working with the Health Resources and Services Administration and its Bureau of Primary Healthcare, we donated about one million dollars worth of our online records products to 160 community health centers. This is a pilot program in which we are giving clinicians the ability to record, access and share legible, up-to-date medical records online for the benefit of their patients, regardless of their ability to pay. Following the pilot, we expect to provide online records capability to the approximately 3,000 federally supported community health centers throughout the nation.

We are doing this because we believe so strongly in the application of healthcare technology. When you see how technology can streamline a physician's office, identify a new treatment or keep a patient away from a potentially dangerous drug, you can understand why we call this "health information that matters."

Participation in industry efforts to build consumer confidence

MedicaLogic/Medscape is participating in several efforts to create codes of ethics and conduct for healthcare web sites. Last September, the company published on Medscape.com what is believed to be the online healthcare industry's first advertising policy covering a wide range of ethical issues. Subsequently, the company has taken an active role in two important healthcare internet industry initiatives:

- The Hi-Ethics Code is a set of 14 operating principles developed by a coalition of 20 of the most widely used Internet health sites and content providers. Hi-Ethics companies agree to provide online health services that reflect high quality and ethical standards. The Hi-Ethics Code is dedicated to meeting the goals of providing health information that is trustworthy and up-to-date, clearly identifying online advertising and disclosing sponsorships or other financial relationships that significantly affect our content or services, keeping personal information private and secure, and employing special precautions for any personal health information; and empowering consumers to distinguish online health services that follow the principles in the code from those that do not.
- The eHealth Code of Ethics was created by the eHealth Ethics Initiative that has been organized by the nonprofit Internet Healthcare Coalition. The eHealth Ethics Initiative is an ongoing international agenda organized by the Coalition. It was launched at the Coalition's annual meeting in New York last October 13 after MedicaLogic/Medscape's Dr. Lundberg told the group: "The essence of professionalism is self-governance. Just as the International Committee of Medical Journal Editors, founded in 1978, has set the standards for how medical journal authors and editors should behave, the leaders of the eHealth information enterprise should now set common standards for ethical behavior. I call upon the Internet Healthcare Coalition to now set international standards that can become commonly accepted." The Coalition then launched the eHealth Ethics Initiative to create the eHealth Code of Ethics. The IHC is devoted to educating stakeholders about the role of the Internet in healthcare. Principles of the Code – covering candor, honesty, quality, informed consent, privacy, professionalism, responsible partnering and accountability – reflect broad-based participation by leaders in industry, academe and government, as well as patient and consumer advocates and input from the general public.

The company also supports the HON Code of Conduct (HONcode) for medical and health Web sites. That code was developed by the Health on the Net Foundation, a Geneva, Switzerland-based organization guiding the growing community of healthcare consumers and providers on the World Wide Web to sound, reliable medical information and expertise.

The new ethics codes identify several general principles that deserve protection. By following them, health care web sites can develop consumer confidence and trust. Among the most important principles are the following:

- *Information about people's health is special.* Unlike some other kinds of information, health information is very sensitive. Recent surveys have shown that consumers believe this type of information should receive special privacy protections. Both the Hi-Ethics and eHealth codes contain special, stricter rules for medical or health information that comes from consumers. The Hi-Ethics Code also requires that its members follow the FTC-recommended fair information practices on the web sites even for non-health related personal information.
- *For consumers to trust health care web sites, they must understand how the sites generate information.* In many cases, the companies that operate health care web sites have complex relationships with other companies that may affect the way information is presented on their site. For example, some web sites allow sponsors to write about their products, then post that

information online. In other cases, advertising may not look like advertising, or the results of a search may list some companies higher up than other because of behind-the-scenes payments. Or the company that runs the web site itself may have a conflict of interest, because it sells products that are discussed on its site. Both codes address these issue by requiring defined editorial procedures and disclosures of financial relationships and other potential conflicts of interest.

- *The Internet cannot replace the relationship between a consumer and a health care professional.* Someday in the future, we may have the technology that allows physicians and other professionals to treat patients from hundreds of miles away, without ever physically meeting them. That day, however, is not today. The Internet can enable and facilitate relationships between health care professionals and patients, but it cannot replace them. Again, both codes clarify the appropriate use of the Internet in a way that avoids interfering with the relationship between patient and physician.

MedicaLogic/Medscape is participating in both the Coalition and Hi-Ethics efforts because we believe each hold out the opportunity of improving the quality of online healthcare information and services. We will continue to work with multiple ethics initiatives with the idea of achieving a cooperative implementation of their common goals. We are also continuing our own efforts. In fact, MedicaLogic/Medscape has been driving the process towards standard setting and ethical practices on its own health care web sites for some time now.

For example, our two information-based web sites, Medscape.com and CBSHealthWatch, have been widely praised as among the best in the industry for trusted and comprehensive health and medical information. Last September, the company published on medscape.com what is believe to be the eHealth industry's first advertising policy covering a wide range of ethical issues. Dr. Lundberg was instrumental in publishing what is acknowledged as the first major content evaluation code in the Journal of the American Medical Association (JAMA). Dr. Lundberg also helped to create and publish in JAMA the International Committee of Medical Journal Editors code, another of the early efforts to promote ethics on the medical Internet.

In addition, MedicaLogic/Medscape is a member of The eHealthcare Association (TeHA), which represents a wide variety of companies in the area of technology and healthcare. Dr. Leavitt is a member of the board of directors of TeHA. TeHA is the trade association of health care organizations using the Internet to improve clinical quality and economic efficiencies. While a young, rapidly growing association, TeHA is comprised of approximately 60 leaders in the internet health care community including large well know companies like IBM and small emerging companies with vision and energy. MedicaLogic is pleased to have been involved in the formation of this new effort to give voice to the vision and perspectives of the eHealthcare industry.

Technology can improve privacy

Privacy is an extremely important issue for MedicaLogic/Medscape. People who use our software and web sites choose to share especially sensitive information with us. We are committed to protecting that information from any unauthorized disclosure or use. We believe that technology can improve privacy, especially in the area of health information. That is not to say that technology is without risk, or that the Internet does not pose major challenges in the privacy area. While we are working on the self-regulatory initiatives described above to improve privacy protections and restore consumer confidence, as a general matter we would support well-reasoned new federal legislation or regulation to improve and standardize privacy protections for health information.

As an example of how Internet technology can improve privacy protections, consider our most recent online health record product, Logician Internet (LI). Using LI, physicians can store information about their patients on the Internet. The physician gains enormous benefits over paper records through this approach. We back up their charts, maintain their database, and provide access security. The level of security we provide is much greater than the physician would likely be able to implement for their own paper records or data stored on their personal computer. Our data center in San Francisco features state-of-the-art biometric security to restrict physical access, and access to the data over the Internet is through a secure, encrypted connection. When the new regulations on confidentiality and security of health information under the Health Insurance Portability and Accountability Act of 1996 (HIPAA) are finalized, our software will help physicians and others meet the new regulatory requirements (for example, by providing audit trails and restrictions on access).

We believe that, when it comes to privacy, moving from existing paper-based systems for health records to the new electronic systems can be a change for the better. One common fallacy is that the older paper-based systems are more secure than electronic systems. By its nature, paper is anonymous. A piece of paper cannot tell us where it has been stored, who has looked at it since its creation, or whether anyone has made a copy of it or faxed it to a different location. Properly designed computer systems like ours can record all this information. A piece of paper inadvertently left on a desk stays there until someone notices it and takes action (which could include inappropriate action, like stealing the paper or copying it). A computer screen inadvertently left on that shows an electronic medical record can blank itself by activating a password-protected screen saver, can record or prevent any attempts to copy or alter the record, or can log the user off after a set period of time.

While electronic and online systems can improve privacy protections over paper systems, they also raise new and unique risks of their own. As a company, we are fortunate to have significant experience in dealing with these new challenges. We have provided software and services that process personal healthcare information for over a decade (for example, through our client/server electronic medical records product, Logician Enterprise). As a long time business partner to the health industry, we have always recognized the importance of maintaining the confidentiality of individually identifiable health information. We have integrated comprehensive policies and procedures for maintaining patient confidentiality into our products and services in use at over 350 clinics nationwide. Our customers, both large integrated delivery networks as well as individual practitioners who use our online health records software, have long had confidence that identifiable health information is confidential, protected, and secure. In a competitive marketplace, it simply would be foolhardy for us not to run our business with appropriate safeguards.

In addition to storing health records generated by professionals, we also gather health information from users of our web sites. We understand the sensitivity of this information, and our duty to act responsibly with respect to it. As discussed previously in this written testimony, we have endorsed the eHealth Code of Ethics, which states that "People who use the Internet for health-related reasons have the right to be informed that personal data may be gathered, and to choose whether they will allow their personal data to be collected and whether they will allow it to be used or shared. And they have a right to be able to choose, consent, and control when and how they actively engage in a commercial relationship." We intend to keep any personal information consumers share with us private and secure, and to employ special precautions for any personal health information. If we collect health-related personal information, we will only use it for the purposes for which a reasonable consumer would expect us to use it unless the consumer agrees otherwise (for example, to process an order from an online pharmacy requires us to pass information to our online pharmacy partner). We also intend to hold third parties that work with

us to these same standards with respect to privacy of health information, creating a chain of trust that extends protection to our users across all our commercial relationships.

In some cases, we do intend to use personally identifiable health information as part of our business. However, before we do, we recognize that we must first obtain the fully informed consent of the consumer. Where the source of the information is an online medical record created by a health care professional, we must also seek the consent of the professional. As we commented in a recent white paper we prepared on electronic medical records privacy, a critical component of the doctor-patient relationship is trust. Patients trust their physicians to act on their behalf to promote the patients' health and well being. Ethical medical practice dictates that patients' privacy rights and preferences with respect to the confidentiality of their health information be protected by all users of personally identifiable health information. In the world of online health records, all the same privacy principles apply. To continue in our business, we must extend the circle of trust to include our partners and ourselves. Therefore, to the extent we (or anyone else) intend to make uses of information in online health records not related to care or reimbursement, both patient and caregiver must understand the use and agree to it in advance.

Finally, MedicaLogic/Medscape supports appropriate legislation or regulation to support privacy of health information. The current patchwork of state and federal laws creates a difficult environment for compliance, while leaving many aspects of a consumer's personal health information exposed. As a result, the keepers of personal health information struggle to comply with obscure and varied rules that – even if correctly applied – do not offer necessary privacy protections. In part, this problem exists because of the sector-specific approach to privacy in the United States. For example, we have a federal law that governs the privacy of video rental records, but none that protects medical records. We believe that new legislation, if carefully crafted, could advance the interests of consumers, physicians, and others in the healthcare industry. By harmonizing state requirements and developing a federal standard, new legislation could create a level playing field for companies working with health information, while giving patients new rights and safeguarding their personal information. However, we believe that any such new legislation or regulation must apply to all keepers of health information, not just those who do business on the Internet. We look forward to cooperating with any interested parties to work towards this goal.

Conclusion

Again, Mr. Chairman, Mr. Stark, Member of the Committee, on behalf of MedicaLogic/Medscape's 1,000 employees, the 12,000 clinicians that use our products and the millions of patients whose care is improved because of our work, I thank you for this opportunity.

Information technology offers the nation an opportunity to advance the quality of care while realizing significant economic efficiencies in ways that were previously beyond our reach. We look forward to working with your committee and with others in the legislative and administrative branches of the federal government in the development of public policies which meet the healthcare needs of the American people.

I would be happy to answer any questions.

Testimony of Jay Walker

Chairman, Walker Digital Corporation and

Founder and Vice-Chairman, Priceline.com

before the

Joint Economic Committee

Washington, D.C.

June 6, 2000

Background

Thank you Chairman Mack, Chairman Saxton and distinguished members. The Joint Economic Committee has done much to illuminate the issues and choices presented by the Digital Age. I appreciate having this opportunity to contribute to your deliberations.

My name is Jay Walker. I am the founder and Chairman of the Board of Walker Digital, and the founder and Vice-Chairman of priceline.com.

Walker Digital was established more than five years ago with the goal of becoming the world's leading developer of innovative technology and Internet-based business solutions. We are based in Stamford, Connecticut and have offices in New York City and San Diego, California. We employ more than 180 entrepreneurial business leaders, marketers, Internet technologists and others.

At our intellectual property laboratory we have created more than 300 new business solutions. Five of these new businesses have been launched and represent a combined valuation of approximately 13 billion dollars. Ten more are currently being readied for commercialization, with others to follow.

Priceline.com, the first business we commercialized, is the most well known of our undertakings. In two years, it has become one of America's most successful Internet businesses. Its compound growth rate through 1999 was approximately 5 percent per week, and it is now the largest single customer of almost every major American air carrier. We have successfully extended our name your own price business model to airfares, hotels, telecommunications, new cars, mortgages, and other categories. Many analysts expect priceline to be profitable well ahead of schedule.

Also well known is the Priceline WebHouse Club, a business created by Walker Digital, which operates as a licensed affiliate of priceline.com. Since its launch last November, the WebHouse Club has experienced a 15% compound growth rate, per week. Approximately 6,000 grocery stores and supermarkets, representing almost every leading grocery chain in America, have partnered with the WebHouse Club. In the past six months our members have saved up to half-off on more than 35 million grocery items. We anticipate more rapid growth this summer, when consumers begin using our pricing system to name their own price for gasoline, saving up to twenty cents per gallon.

Understanding the Past

The Walker Digital portfolio extends well beyond businesses based on the priceline business model. Although these businesses are diverse, each is based on a distinct view of the future. Our view of the future is what I felt you would find most relevant today, as your ability to wisely craft public policy requires as much insight and understanding of the changes ahead, as does our ability to successfully create new businesses.

I believe no one can truly understand the Digital Age we have entered without first understanding the past. And in particular, without understanding how society's evolution has been shaped by the emergence of a series of *networks*, each of which has transformed everything surrounding them; each of which has led to extraordinary, largely unpredictable outcomes.

It is important to understand that networks are unique because they share certain specific characteristics in common.

For example, the value of a network increases with the arrival of each new participant. Think of fax networks. One fax machine is of little value, but a network of thousands of fax machines creates opportunities for entirely new

forms of commerce and communication. Networks are, in effect, the opposite of tools. The usefulness of a tool, say a screwdriver, is in no way enhanced even if millions of other Americans buy screwdrivers.

Networks are also distinguished by the fact that the arrival of each new unit on a network lowers the cost of those that follow it. Cell phones, fax machines, personal computers – all decline in price as more and more units are acquired and join the network, and the arrival of each confers ever greater value to others on the network. So, under the law of increasing returns, network growth rates compound rapidly.

In addition, as networks grow, and their per-unit cost declines, those who own or control them accrue exceptional financial operating leverage. Think of the early television networks: lower priced TVs led to more homes with TVs, which yielded far greater financial operating leverage to networks and the suppliers of content.

Every network also simultaneously requires and shapes prevailing operating standards. And the power of standards is extraordinary. Today's QWERTY keyboard was created decades ago for a problem long since gone: the jamming of typewriter keys. The 48-inch rail bed descends from European railways, which in turn were built on Roman roadbeds, whose 48 inches of paving stemmed from Rome's establishment of 48 inches as the average width of the two beasts of burden yoked side by side.

Most important, truly useful networks become ubiquitous, grow far more rapidly than anyone anticipates, and their evolution yields unanticipated, wholly transformational change. Those changes tend to be far more powerful than anything even imagined when the networks were first created. This will be the case with the Digital Age far more than with the networks that have preceded it.

So, with these network definitions in mind, it is useful to examine networks that have preceded the network currently emerging, the Information Network.

The postal network literally transformed society, as it was the first scalable person-to-person communication system. By extending ordering and invoicing capacities, it expanded commercial reach, accelerating the growth of multiple new aggregations of capital, stimulating multiple new other forms of commerce and rapid social change. By allowing far more rapid and extensive distribution of information, it transformed our nation's political process, both in terms of accountability and the means through which political power was concentrated. The postal network's growth rate was as phenomenal as the Internet's is today. Like the Internet, as its speed quickened, it scaled even faster, its per-use costs plummeted, and it became universally available and relied upon.

The Rail Network was the first massive, coast-to-coast infrastructure play. Its creation yielded multiple fortunes of consequence. Railway barons were to the era what dot com billionaires are today. Railway mania captivated investors. Systems proliferated; some B-to-B, handling freight; some B to C, handling passengers. Railways were the first steps toward the Information Network, as their need for remote switching capacity led to the invention of the telegraph system, a co-located network distributed along railroad rights of way. The gauge standard consolidated, linking individual railways and making the overall network far more valuable. The railway network became the nation's central nervous system, concentrating the flow of goods, information and prosperity.

The Electrical Network, like the telegraph network, was originally conceived solely as an industrial application. Generating stations were originally built only adjacent to factories. But like all other networks, the electrical network was unstoppable. With the adoption of Alternating Current as its operating standard, the cost of new additions to the network plummeted, expanding the network's reach and value, accelerating its growth. Its universal adoption yielded

enlightenment in multiple forms, transforming agrarian economies, compressing growth cycles, accelerating production and in fact, changing everything.

The Transportation Network, the highway network, yielded 1000 times the impact of the rail network, because roadways are far more network-like, meaning faster and cheaper to create, rapidly distributed to just about anywhere, and accessible to almost everyone at low cost. Henry Ford created the first popular browser on this network, the Model T. Highways became the first many-to-many network. Like all great networks, in time everything moved to this network. Just as the electrical network meant that industrial energy was transformed from oxen and mill wheels and candle-power, and moved onto the electrical network; the faster, cheaper, more extensive and readily accessible highway network meant freight and goods and people moved en masse from the railways to this network.

The Telecommunications Network also first emerged as an industrial tool, the telegraph network, but rapidly evolved into the telephone network. Unified operating standards allowed universal connectivity, expanding the network's value and growth. In the blink of an eye, points on this network proliferated, with thousands of connections leading to millions of connections, which in turn led to billions of connections. The telecommunications network is still evolving, moving from wires and towers to waves and satellites and beyond. Its origins are of great significance: just as the first European railways used the old Roman roads as their rail beds, the Digital Age is riding the rails of the Telecommunications Network.

The Information Network

The Information Network is being created more rapidly, and its presence and impact are becoming more pervasive, than was the case with any of the networks that have preceded it. Soon, almost everything we consider important to commerce, communication, learning, will migrate to this network.

The network that is being created around us is about infinite possibilities, infinite processing, and infinite connections. Every store, every cash register, every book, every type of information or information exchange, every transaction will rapidly move to this network. Millions of individuals, and billions of individual actions are already wiring this network as we speak.

Why will this network be more pervasive and its impact more profound than any of the networks of the past? Because this network is driven by the same unstoppable forces that propelled every previous network. But this network's product, purpose and focus – information and communication – are thousands of times more powerful in their capacity to transform economies, societies, businesses, schools, communities, than any postal system, railway, power grid, highway system or telephone network.

Look at what is already happening:

Already this network imposes zero variable cost of communication. Five people can email five hundred people, who can email five thousand people, who can then email a million people or more. Transformational software, ideas, and soon, content of almost any form, will circle the globe in days, all at no cost.

Processing costs are well on the way to zero. Bandwidth will also become infinite, imposing no cost to those who use it. And hardware costs will continue to decline.

Points on the network will become infinite. What we even think of as a point on the network will be transformed. In a matter of a few years, the information network will be accessible from anywhere or anytime. Voice recognition technologies, wireless connectivity, and other rapidly emerging technologies mean that this network will be everywhere, all at once.

Like the PC in your hotel doorknob, we will rely constantly on the network, sometimes without even thinking about it. Who wouldn't wear a shirt that monitors your heart and transmits information when needed?

Because it is built on and composed of information, this network has a perfect memory, so all information will be stored on this network. All information creation, processing, storage, replication, distribution will move to this net for the same reasons that other networks grew: doing so will be faster, cheaper, more available, more autonomous, more empowering, more valuable, more transformational than any other prior network or tool available.

The immediacy and asychronicity of network communication will constantly increase. New roads take years. But new software will circle the world instantly.

And this network will become instantly evolutionary. Software and systems will learn from their users immediately and constantly, with improvements and insights redistributed almost instantly to an infinite number of users.

So the network that is emerging is unlike anything that we have seen before, and yet has characteristics of every network that has come before it.

It has power, in that it redistributes power to people because it is so fully an information network; and all of us know that information is power. Just as the Electric Network distributed voltage and wattage, the Information Network will distribute information and knowledge as power.

The Highway Network collapsed distance. It meant distances that might have taken our forebears ten hours, or even ten days, could be traveled in two

hours. So, just as the Highway Network collapsed distance, the Information Network will collapse distance even further.

How far is the person on the other end of the computer network? They are *all*, in fact, right here. Distance is almost meaningless when we talk about the Information Network. If the Highway Network had a profound impact on what it meant to be far away, think about what the Information Network is going to do when suddenly there will be no "away" anymore.

The Telephone Network was about communications and revolutionized us. The Information Network is about communications as well. But it is about communications that do not require the participants to be simultaneously engaged. It is about asynchronous messaging. Again, do not under-estimate of the impact of the fact that any software, any bit of programming, any entertainment form, almost anything, can be sent to those same ten thousand people who will then send it on to five hundred thousand people, who will then send it on to millions of others, all around the world – all in the same week or even the same day, and all at no incremental cost.

In the face of such a network, what store or place of business will not keep instantly available detailed consumer and product histories? What educational system won't seek to transform itself to assure robust access to all relevant information, not just the information contained in a few individual texts? What business won't increasingly tap the information layer that defines every customer, surrounds every transaction, shapes every commercial opportunity? Who would not seek to draw upon the vast history, energy and insight available when the information that resides on this network becomes thousands of times more extensive than it is today, and when its retrieval, recombination and deployment become dramatically faster, cheaper and easier?

Policy Opportunity

For policymakers, the changes ahead are of special importance, in large part because of the changes we can predict, but as well, because of, like all networks, the Information Network will also yield changes that cannot be predicted.

Early on no one realized the electrical network would result in the first elevators, which led to the first skyscrapers, changing our cities forever. No electricity: no air conditioning. No air conditioning: a far different South than we have today.

Few realized the railway network would transform America, dooming the towns they bypassed, but dramatically accelerating westward expansion, and enhancing communications forever by leading to the creation of the central telegraph system that underlies today's communications revolution.

No one realized the highway network would so fully affect the railway network, or result in automobile and energy industries whose economic and social impacts would dwarf those of every industry that preceded it.

The Information Network that is currently being created all around us will transform everything. But, as with the networks that preceded it, none of us can fully predict what and when and how our lives will be changed.

Hence, as policy makers, you face extraordinary challenges. The individual issues you are dealing with are complex and diverse: privacy, taxation, access, infrastructure, and much more. But even more challenging is the fact that the impact of your actions and your decisions will influence changes no one can yet foresee, but which will certainly emerge from the Information Network in the years ahead.

The challenges that are inherent in periods of rapid but uncertain change argue for leadership that takes a prudent approach to regulatory action. The wisdom of this approach is reflected in the robust commercial growth experienced by the Internet during the past several years. During this period, government has primarily exercised vigilance in areas of special importance, such as those that involve consumer protection, security, and the well-being of our children. The array of commercial and social benefits that has resulted from this approach make it difficult to believe that the assertion of a heavy regulatory hand is either warranted, or likely to foster growth and innovation.

However, there are actions Congress can take that will strengthen the twin drivers of every network, that will help propel the two forces that have been at the center of all of the social and economic advances that have emerged from the networks that have preceded today's Information Network: innovation and competition.

I am an agent of innovation; one of thousands whose efforts and new companies are contributing to an expansion and strengthening of our economy. As you can detect, I am also appreciative of, and attentive to, the past. Accordingly, I believe it is important to understand a key difference in how innovation and competition will be fostered in the Digital Age.

Innovation is emerging much differently today than in the past. As the Information Network expands, it will have an increasingly substantial impact on how we innovate.

The innovation of the past fifty years largely emerged from giant, centralized organizations and research centers both in and out of government. It's clear why this was the case: centralization and massive physical resources were required then simply to harness and understand the complexity, data and information behind many new inventions

But today and in the future, the Information Network will make the centralization of information and research far less relevant. For all information will be available on the network, readily commanded by individuals and companies of every type. Armed with fast, cheap, ubiquitous computing, processing and communications power, innovation will increasingly emerge not from a small number of large corporate entities, government agencies and centralized research centers, but from individuals and much smaller organizations. In fact, centralization and control will increasingly threaten to impede research and dramatically slow the process of constantly sorting, sifting, analyzing, understanding, inventing and implementing.

The Information Network will also continue to change the way innovation is funded. In the past, innovation and invention were often propelled by extraordinary concentrations of public funding, necessitated by the essential public undertakings of the day: in transportation, aerospace, defense, energy and other fields.

But the Digital Age is an era in which the inventions that arise from massive aggregations of public funding are being complemented by a rapidly diversifying range of new funding sources. Today, thousands of individual venture capitalists, self-funded entrepreneurs and small finance mechanisms are funding tens of thousands of unique, individual new inventions and innovations, in almost every business category. These businesses, in turn, will spur thousands of other new innovations, inventions and commercial opportunities. The result will be innovation and invention that emerges as never before, faster and with greater variety than ever before.

The leading businesses of the past fifty years were giants. Many were great companies, and many are with us still, contributing much to our prosperity and success. However, few of those businesses are at the center of the

innovation that is exploding all around us, reshaping business and our future. Rather, those businesses are largely built on scale. These businesses tap their national and international reach, their brand identities, their distribution systems and their other fixed assets to deploy and capitalize on innovation, from wherever it might emerge.

Today, some corporate labs are robust and are significant hotbeds of digital innovation. But in large part, this era's digital innovation and new business creation is emerging from countless smaller companies, entrepreneurs and inventors.

In your efforts to wisely craft public policy, these entrepreneurs and inventors must be among those whose interests and opportunities you strengthen. To do so, just as important as policies that foster innovation are policies that foster competition.

Without question one of the greatest opportunities for Congress to foster competition is through the protection of a strong intellectual property system. There are those who contend that intellectual property protection is anti-competitive. To the contrary, the promise of reasonable patent protection encourages creativity and innovation, invariably leading to even more innovation and the development of entirely new businesses, products and services. Patents on Tylenol don't stop the development of Advil, or Aleve, or Motrin or the creation of a host of other products that benefit consumers and our economy.

Centralized economies and states, based on the false belief that diluted property rights somehow enhance society's well being, have been proven wrong time and again, and are rapidly disappearing. Strong court systems are essential to societies based on law. A strong military is the backbone of almost every peaceful nation. And a strong intellectual property system is essential to

any society that recognizes the interdependent nature of innovation, competition and prosperity.

The past fifty years have been the Age of the Corporation. These organizations accomplished much, and have bettered the lives of countless individuals. But it is essential to recognize that time after time, these organizations grew by capitalizing upon, distributing and enhancing the inventions and innovations of a previous Age, the Age of the Inventor.

The Age of the Inventor gave us Fleming, Marconi, Bell, Edison, Salk and other giants whose intellect and ingenuity transformed the world. At the dawn of that era, in the middle of the last century, the largest building in Washington, D.C. was the U.S. Patent and Trademark Office. Why? Because we were on the verge of an era of explosive invention, innovation and economic growth. The prominence and scale of the patent office of a hundred years ago is an unmistakable symbol of the importance that we attached to the value of invention. The economic and social advances that America has introduced since that era are an equally unmistakable symbol of the importance of our having a system of laws that encourages and values invention.

Today, we are at the dawn of the next great Age of Invention, the next great Age of Inventors. Companies like priceline, Yahoo, Amazon, E-Bay and others seem to have come out of nowhere, yet are already yielding enormous change and enormous economic benefit. Like the businesses that resulted from the efforts of the giants who led the last Age of Invention, these businesses -- and others not yet even thought of -- will continue to yield extraordinary benefits and produce extraordinary change. But this will occur only if we recognize that just as a strong intellectual property system was essential to the inventors of the past, a strong intellectual property system is essential today.

For great ideas and innovation to flourish despite risk, and despite the opposition of entrenched stakeholders, America's intellectual property system must be protected and strengthened. Congress can do much in this regard.

Strengthening the U.S. Patent and Trademark Office

The U.S. Patent and Trademark Office currently seeks to use the fees that it collects from patent applicants so that it can modernize and enhance the patent examination system. Given the incredible diversity of Digital Age invention, and dramatic expansion in the pace, scope and complexity of the fields in which important new invention is taking place, it is essential that America's patent system be kept equal to the daunting task it faces.

We otherwise face exceptional risks. To date, the U.S. Patent and Trademark Office has done a remarkable job in avoiding these risks. But lacking modernization and enhanced patent examiner resources, the patent office faces two choices, each of which threatens America's competitiveness.

Delay is one recourse. This strategy would turn what is customarily at least a two year examination and approval process, into four or five or six years. Competitive advantages and market opportunities would in many instances evaporate or evolve to offshore or other interests during such a period.

The other recourse is a less painstaking, less thorough patent examination process. This recourse would be disastrous for American innovation. Certainty and quality are the competitive engines that a healthy intellectual property system fuels. Without the highest quality patent process, little real protection can be provided those who risk their time, companies and fortunes to innovate and

invent. Further, any erosion in the quality of the patent examination process will inevitably result in corresponding increases in litigation and court action, diverting inventors and commercial enterprises from the business of creating value.

To allow the U.S. Patent and Trademark Office to use the fees it collects from patent applicants in order to modernize and enhance its operations requires that Congress no longer divert patent fees to other purposes. Legislation pending in the Congress offers an opportunity to permanently end this diversion, and would allow the patent office to immediately undertake the long overdue innovations in its own operations that are essential to ensure continued high quality patent examination.

Conclusion

As you consider patent policy and other issues critical to innovation in the Digital Age, I urge you to bear in mind the many insights that can be gleaned from history. I urge you to understand that networks have fundamentally shaped all society and all development. I also urge you to consider the fact that our era is one that is being more profoundly shaped by its emerging network, than in any era before. And finally, I urge you to understand that a vigorous and healthy intellectual property system is as important to innovation and competition today as it was in the Age of Invention of the last century.

The Information Network will touch our nation and the world more fully than any network before because it is, at its center, a network consisting of intelligence. With your recognition that we occupy a transformational moment in time, I'm confident this network will positively link all of the thought and all of the actions that in the past have changed the world, transformed our societies, and expanded our understanding of ourselves and the world.

Thank you.