Written Testimony of
William H. Gates
Chairman, Microsoft Corporation
And
Co-Chair, Bill & Melinda Gates Foundation

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Chairman Gordon, Ranking Member Hall, Members of the Committee, my name is Bill Gates and I am Chairman of Microsoft Corporation. I am also a co-chair, with my wife Melinda and my father Bill, Sr., of the Bill & Melinda Gates Foundation. It is an honor for me to speak here today on the occasion of the Committee's 50th anniversary.

Today I am here to highlight the gathering threat to U.S. preeminence in science and technology innovation, and to propose a four-part plan that I believe will help us maintain our position as the world's innovation leader.

During the last 50 years, the world has witnessed truly revolutionary advances in science and technology. We as a nation can take pride in knowing that American scientists, researchers, and entrepreneurs have been at the forefront of many of these advances. Our unmatched ability to turn new ideas in science and technology into thriving businesses has been the engine of growth and job creation that has made our economy among the most dynamic and competitive in the world.

This Committee can also take pride in knowing that it is responsible for many of the key federal policies that provided the foundation for U.S. technology leadership. Through its efforts, the Committee has shaped our national approach and guided our investments in areas such as space travel, aviation, computing and networking, biotechnology, energy, education, and many other fields.

I share this Committee's deep faith in the power and importance of technology. Having spent the last 30 years with one of the world's leading software companies, I am amazed every day at the potential for technology to create new opportunities and improve people's lives. This view is shared by the Bill & Melinda Gates Foundation, which focuses on finding innovative solutions that can help improve health care and education, and reduce poverty.

As rapidly as science and technology have advanced over the past 50 years, I believe these advances will pale in comparison to the innovations of the next 50 years, or even the next 10 years.

In many ways, the incredible advances of the past few decades have really just laid the foundation for much more profound change in the years ahead. There are about a billion PCs in use around the world today. The number of people who use cell phones is close to 3 billion. About 300 million people are connected to broadband Internet. Software permeates every sector of the economy and almost every aspect of our day-to-day lives.

The implications of these developments are profound. Computing and software are increasingly available everywhere: in the office and the home; in our cars; in stores, restaurants, and public spaces. In the future, we will be able to tap into computing capabilities on an increasingly broad range of devices. We will have instant access to all of our personal information – and all of the content, information, and computing power we want or need – at any time and from any location.

These changes will have a dramatic impact on business. Not only will productivity and efficiency continue to improve, but we are moving closer and closer to the time when information systems will have the flexibility, intelligence, and self-awareness to adapt automatically as business conditions change. These systems will deliver precisely the information, services, and applications that employees and customers need, when and where they need them.

These changes will also have a profound impact on the way people *live* – the way we share experiences and communicate with the people we care about; the way we preserve memories of past events; the way we access entertainment; the way we learn; and how we interact with our communities and our governments.

These advances also have the potential to help us address some of the most pressing global challenges that we face today.

In education, information technology can help us eliminate some of the barriers that prevent us from providing a high-quality education to everyone; barriers such as lack of access to great educational content and relevant curricula, a shortage of effective teachers, and a paucity of data that would help us improve student performance.

My involvement in education initiatives at both Microsoft and at the Bill & Melinda Gates Foundation has shown me the great things that information technology can do to improve education. One of the Foundation's earliest initiatives, which it undertook in partnership with Microsoft, was its U.S. Libraries Program. The goal of this program was simple: to ensure that every person in the United States who could reach a public library would have access to the Internet. Today, 99 percent of U.S. public libraries offer free computer and Internet services, and some 14 million people regularly use these services. In my view, the U.S. Libraries Program is a great example of how the public and private sectors can work together to use the power of information technology to address important social needs.

In healthcare, information technology can reduce the cost of healthcare and help ensure that patients receive the most effective care possible. New technologies, such as Microsoft's HealthVault, are giving people simple, secure ways to manage their family's

health information and providing the ability to control who can access that information. These technologies put patients at the center of the healthcare system by giving them the tools to create a complete picture of their health and allowing them, for the first time, to make fully informed treatment decisions.

The Bill & Melinda Gates Foundation, for its part, has committed more than $6 billion to organizations worldwide to promote innovation in access to healthcare, including research to develop new tools to fight diseases that cause the greatest amount of illness and death in developing countries. For example, the Foundation has provided over $250 million to support collaborative research between a not-for-profit and the pharmaceutical industry aimed at developing a preventative malaria vaccine. Late last year, the Foundation issued a challenge grant to Rotary International: if Rotary raises $100 million in the fight to eradicate polio, the Foundation will match it, dollar for dollar. The Foundation also recently provided funding to support the International Medical Corps' mobile clinics and other public health efforts in Kenya, and has committed more than $650 million to the Global Fund to Fight AIDS, TB, and Malaria. With initiatives like the Product Red campaign, the Global Fund is paving the way for business to join with government on these issues. These efforts, together with those of countless other companies and institutions, hold tremendous promise for alleviating existing inequities in global healthcare.

Computing and software will also play an increasingly central role in scientific research. We are rapidly moving into an era of data-centric computational science in which researchers across a wide range of disciplines routinely use software and computers as essential tools for investigation and collaboration. The ability to use computers to model complex systems is transforming the way we learn about everything from genomics and biosciences to physics and astronomy. In the future, scientific computing will play a profoundly important role in advances that will help us treat diseases, address climate change, and confront many other critical issues.

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As I hope these remarks reflect, I am optimistic about the potential for technology to help us find new ways to improve people's lives and tackle important challenges. I am less optimistic, however, that the United States will continue to remain a global leader in technology innovation. While America's innovation heritage is unparalleled, the evidence is mounting that we are failing to make the investments in our young people, our workers, our scientific research infrastructure, and our economy that will enable us to retain our global innovation leadership.

In particular, I believe that there are two urgent reasons why we should all be deeply concerned that our advantages in science and technology innovation are in danger of slipping away.

First, we face a critical shortfall of skilled scientists and engineers who can develop new breakthrough technologies. Second, the public and private sectors are no longer investing

in basic research and development (R&D) at the levels needed to drive long-term innovation.

If the United States truly wants to secure its global leadership in technology innovation, we must, as a nation, commit to a strategy for innovation excellence – a set of initiatives and policies that will provide the foundation for American competitive strength in the years ahead. Such a strategy cannot succeed without a serious commitment from – and partnership between – both the public and private sectors. It will also need to be flexible and dynamic enough to respond to rapid changes in the global economy.

I believe this strategy must place top priority on achieving four fundamental goals:

1. **Strengthening educational opportunities**, so that America's students and workers have the skills they need to succeed in the technology- and information-driven economy of today and tomorrow;

2. **Revamping immigration rules for highly skilled workers**, so that U.S. companies can attract and retain the world's best scientific talent;

3. **Increasing federal funding for basic scientific research**, to train the next generation of innovators and provide the raw material for further innovation and development by industry; and

4. **Providing incentives for private-sector R&D**, so that American businesses remain at the forefront in developing new technologies and turning them into new products and services.

I. Strengthening Educational Opportunities

Like many others, I have deep misgivings about the state of education in the United States. Too many of our students fail to graduate from high school with the basic skills they will need to succeed in the 21st Century economy, much less prepared for the rigors of college and career. Although our top universities continue to rank among the best in the world, too few American students are pursuing degrees in science and technology. Compounding this problem is our failure to provide sufficient training for those already in the workforce.

This Committee, of course, has been a leading advocate for expanding educational opportunities for American students and workers in the vital areas of science, technology, engineering, and math (STEM). The America COMPETES Act, which was drafted by this Committee and passed by Congress last year, includes provisions to train thousands of new STEM teachers and to provide current teachers with STEM-related resources through the National Science Foundation's (NSF) Noyce Teacher Scholarship Program and Math and Science Partnerships Program. America COMPETES authorized expansion of the Noyce Program, an important step toward recruiting 10,000 new STEM teachers annually, a goal that I have advocated previously. It also authorized competitive grants to increase the number of teachers serving high-needs schools and to expand access to advanced placement and International Baccalaureate programs in these schools.

These initiatives − and many others this Committee has spearheaded − represent critical strides in the much-needed effort to reform our faltering educational system, and I commend you for your vision and efforts. At both Microsoft and the Bill & Melinda Gates Foundation, we are investing in innovative approaches to broaden and deepen educational opportunities, which I will discuss more in a moment.

But in order to ensure the continued success of our young people now and in the future, the public and private sectors must do more.

A. Secondary Education

The United States today has one of the lowest high school graduation rates in the industrialized world. Three out of every 10 ninth-graders − and nearly half of all African American and Hispanic ninth-graders − do not graduate on time.[1] Of those who do graduate and continue on to college, over a quarter must take remedial courses on material they should have learned in high school.[2] In all, fewer than 40 percent of our high school students graduate ready to attend college.[3]

Our record on high school math and science education is particularly troubling. International tests indicate that U.S. fourth graders rank among the top students in the world in science and above average in math. By eighth grade, they have moved closer to the middle of the pack. By 12th grade, U.S. students score near the bottom of all industrialized nations.[4] As a result, too many U.S. students enter college without even the basic skills needed to pursue a degree in science and engineering.

To better understand and address these problems, the Bill & Melinda Gates Foundation has invested over $1.9 billion to help establish 1,124 new high schools and improve 761 existing high schools. All of these schools operate under a common mission: that all students should have the opportunity to graduate from high school ready for college, career, and life. These schools approach this mission in different ways − some are large, many are small, some are organized around academic themes, others offer a standard college-preparatory curriculum − but all have common elements:

- **High Expectations:** They set high expectations for all students and engage students with challenging, relevant coursework.
- **High Levels of Support:** They provide personal attention and support in a safe, respectful environment so that students can achieve at the highest levels.

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[1] *See Diplomas Count: The Graduation Project*, Education Week (2007).

[2] *See* National Center for Education Statistics, U.S. Department of Education, *Remedial Education at Degree-Granting Postsecondary Institutions in Fall 2000* (2003).

[3] Greene, Jay and Forster, Greg, *Public High School Graduation and College Readiness Rates in the United States*, Education Working Paper No 3, Center for Civic Innovation, Manhattan Institute (2003).

[4] National Center for Education Statistics, U.S. Department of Education, *Highlights from TIMSS* (1999). Note that eighth graders did better in the 2003 version of TIMSS, but that version did not test high school students.

Through these efforts, we have learned a great deal about what works to improve student outcomes, and what doesn't. We also have concluded that creating a successful system requires better information and greater clarity about the following three sets of questions:

- **Do we know how we are doing?** Do we have transparent, common student performance data as the foundation for measuring impact and making decisions?

No enterprise can be effective if it does not have clear goals and a way to measure its progress toward achieving its goals. At both Microsoft and the Bill & Melinda Gates Foundation, this approach is our lifeblood; it is how we identify our weaknesses and how we improve. Education is no different. We must strengthen our ability to measure what students are learning, the progress they are making over time, and their readiness for college and work. I recognize that developing better information in these areas may be difficult, but it is central to identifying the most effective means of improving educational outcomes in our public schools.

In recent years, school systems have taken important first steps toward greater transparency and accountability in how they assess student achievement. Congress and the Administration have supported increased funding for state data systems and the development of a new State Education Data Center. Now we need to develop data systems that can measure student progress over time and expand the scale of these systems so they are truly national in scope. We also need better student- and teacher-level data so that we can better assess which methods – and which teachers – are most effective at improving student learning.

Getting this right is the most critical first step to improving U.S. high schools and K-12 education more broadly. We need to use these data as the basis for action, adjusting practices based on what we actually *know* about the performance of students – rather than on what we may perceive or assume.

- **Do we know where we're going?** Are we clear about our destination – ensuring that every student graduates from high school ready to succeed in college, career, and life?

All 50 states have now adopted standards that define what young people should know and be able to do, and all states now measure their students' proficiency in core subjects. It is not clear, however, whether these standards are aligned with the demands of college and work or whether existing assessments accurately measure student proficiency. The Bill & Melinda Gates Foundation has supported the American Diploma Project Network, in which more than 30 states agreed to align their standards to the benchmarks developed by Achieve, Inc., a nonpartisan, nonprofit organization that helps states raise academic standards, improve assessments, and strengthen accountability. Working with the Education Trust, the Thomas B. Fordham Foundation, and leaders from higher education and business, Achieve and its partners developed benchmarks to reflect what college professors and employers believe new students and employees need to know in order to be successful.

In addition to adopting high school standards that better reflect what is takes to be successful in college and work, we need to develop better methods for measuring whether students are meeting these standards; a better understanding of the systemic changes that are required to ensure that all students gain the knowledge and skills that are essential for success; and better methods to assess how our own standards compare to those of educational systems elsewhere in the world. Ultimately, we need to identify a smaller set of clear, high, and common state standards that reflect what young people truly need to know to be successful in the 21st Century, along with a common set of measurements to help us understand how well our schools are performing in key areas. At the same time, we must allow for the creativity and uniqueness that teachers and school communities bring to their work.

- **Do we have what we need to get there?** Are we providing the support, working conditions and incentives necessary for teachers to be truly effective?

We all know that no one is more committed to helping our young people succeed than our teachers. Many of us can identify a teacher who had a profound impact on our lives. Research tells us that no other single factor in the educational system has greater impact on student performance. By helping teachers succeed, we can have a dramatic positive effect on student achievement.

We need to ensure that our policies, processes, and systems will develop enough talented, dedicated teachers to ensure that every student has an effective teacher every year. This will be a massive undertaking. Before we take major steps, we need to be very clear about how these policies will affect student performance. Here is what we know:

- **Some teachers consistently generate much larger gains in student achievement than others**, even when they are assigned students with similar baseline performance levels. That fact alone is not particularly surprising, but the *magnitude* of the difference is. In elementary and middle school, for example, being assigned a teacher in the top quartile of effectiveness rather than a teacher in the bottom quartile will result in the math test scores of the *average* student in the class moving up 6-10 percentage points in a single year compared to similar students.[5]

- **Our most needy students are disproportionately taught by less experienced and less effective teachers**. Data from Los Angeles suggest that, compared to students in the wealthiest schools, students in the poorest schools were significantly more likely to have a teacher in the bottom quartile of all teachers as measured by teacher impact

[5] *See* Robert Gordon, Thomas Kane & Douglas Staiger, *Identifying Effective Teachers Using Performance On The Job*, Brookings Institution (2006). Similar estimates of teacher effects have been reported in other papers. *See, e.g.*, Eric Hanushek, Steve Rivkin & John Kain, *Teachers, Schools and Academic Achievement*, 73 Econometrica 2 (2005), at 417-458; Daniel Aaronson, Lisa Barrow & William Sander, *Teachers and Student Achievement in the Chicago Public High Schools*, 24 J. Labor Econ. 1 (2007), at 95-135.

on student performance.[6] In addition, the highest-need students are much more likely to be assigned a novice teacher who will gain experience and then move on to a more affluent school. In essence, our highest-need students too often help provide on-the-job training for novice teachers while students with fewer needs reap the benefits – thus exacerbating the achievement gap between high- and low-needs students.

We have to find better ways to reward and retain the most effective teachers and assign more of them to classes where they are needed the most. It should be a given that every child has an effective teacher every year of their school career.

While governments will take the lead in reforming America's public education system, the private sector can and must support these efforts. At Microsoft, we have a number of education-focused initiatives. Through our Partners in Learning program, Microsoft works closely with governments and non-governmental organizations throughout the world to offer a wide variety of educational resources to teachers and schools, including teacher-training programs, software tools, and best practices. In the United States, Partners in Learning has reached more than 80 thousand teachers and over 3 million students, and actively supports states as they strive to prepare their students for careers in the 21st Century. In Michigan, for instance, we created Career Forward, an online course that in its first year has already attracted over 17,000 participating students.

In 2006, Microsoft, in partnership with the Philadelphia school district, opened a *School of the Future*. This neighborhood public high school – built on a standard budget and meeting all state and district requirements – offers a technology-based education model that can be replicated in other communities. In my view, the School of the Future offers an exciting example of what public-private partnerships can achieve, even when working within existing financial and regulatory constraints. This school has provided strategies that are being adopted throughout the district. And in a district where approximately 20 percent of students are absent from high school every day, the School of the Future has achieved over a 90 percent attendance rate.

The Bill & Melinda Gates Foundation also pursues a partnership model to advance educational reform. Let me highlight three examples in particular:

- **Texas:** Beginning in 2005, the Bill & Melinda Gates Foundation partnered with the Communities Foundation of Texas, the Governor of Texas, the Texas Education Agency, and the Michael & Susan Dell Foundation to support the creation of 35 STEM schools and six regional resource centers across the state. Already, these efforts have helped attract technology businesses to the Austin area.

- **Ohio:** The Ohio STEM Learning Network has launched efforts to create a state-wide network of five STEM hubs and schools. Designed from a systems engineering approach, this network will scale to a state-wide system of innovative STEM schools with a $12 million grant from the Bill & Melinda Gates Foundation and with support

[6] *See* Gordon et al., *supra* n. 5.

from a public-private partnership that includes the Battelle Memorial Institute, the Ohio Business Roundtable, the Ohio Department of Education, the Ohio Business Alliance for Higher Education and the Economy, the Cleveland Clinic Foundation, and many other local partners. This project has already attracted over $210 million in public funding and represents unprecedented multi-sector partnerships.

- **North Carolina:** Governor Easley, the Department of Public Instruction and the New Schools Project launched the Learn and Earn program, designed to improve high schools, better prepare students for college and career, create a seamless curriculum between high school and college, and provide work-based learning experiences for students. The schools, located on two- and four-year college campuses, seek to have all students graduate with two years of college credit or an associate's degree. The goal is to have 75 of these schools in operation statewide by 2008. Forty-two schools have already opened and 30 are scheduled to open in the fall.

Each of these partnerships incorporates new methods to improve STEM education in public high schools. And each is designed to be clear about its goals, rigorous and transparent about measuring effectiveness, and deliberate in how it develops and retains skilled teachers. We hope that these partnerships will point the way to policies and approaches that not only better align our public high schools with the demands of the 21st Century economy, but also provide better opportunities for all of our children.

B. Higher Education

In contrast to our public high schools, America's colleges and universities rank among the best in the world. Unfortunately, we are not graduating enough students with degrees in the STEM disciplines to meet the growing demand from U.S. companies for workers in these areas. Without people who have the skills necessary to drive the next wave of technology innovation, it will be impossible for the United States to retain its global innovation leadership.

Consider these facts. The U.S. Department of Labor has projected that by 2014, there will be more than two million job openings in the United States in STEM fields.[7] Yet the number of American students graduating with degrees in these fields is actually *declining*. Indeed, the number of undergraduate engineering degrees awarded in the United States fell by about 15 percent between 1985 and 2005.[8] This decline is particularly alarming when we look at educational trends in other countries, many of

[7] National Science Foundation, National Science Board, *Science & Engineering Indicators 2008,* at Apx. Table 3-7 (2008), available at http://www.nsf.gov/statistics/nsb0803/nsb0803.pdf. According to another recent study, major U.S. technology companies today average more than 470 U.S.-based job openings *each* for skilled workers, while defense companies have more than 1,265 job openings each for skilled workers. *See* National Foundation for American Policy, *Talent Search: Job Openings and the Need for Skilled Labor in the U.S. Economy*, at 1 (2008), *available at* http://www.nfap.net/pdf/080311talentsrc.pdf..

[8] *Science and Engineering Indicators 2008*, *supra* note 7, at 2-19 & Apx. Table 2-28.

which award a higher percentage of college degrees in engineering than does the United States.[9]

This is not a new problem. For years, however, the decline in the percentage of graduate STEM degrees awarded to American students was offset by an increase in the percentage of foreign students obtaining these degrees from American universities.[10] But various factors – including our immigration policies (which I will address in a moment) – are making it increasingly difficult for U.S. companies to hire foreign-born graduates of our universities. Indeed, according to a 2007 study, 40 percent of all recent foreign-born doctoral degree recipients in the United States intended to leave.[11]

Tackling the shortage of U.S.-born scientists and engineers will require determination by government and support by industry. The goal should be to "[d]ouble the number of science, technology, and mathematics graduates by 2015."[12]

The Bill & Melinda Gates Foundation, for its part, has invested $1.7 billion in college scholarship programs − including the Gates Millennium Scholars, The Washington State Achievers Program, and the D.C. Achievers Program − which together will help more than 17,000 young people attend college. Most of the scholarship recipients are from low-income families.

One of the most important steps that Congress can take to address this issue is to fully fund the America COMPETES Act. Among other things, that Act authorized increases in the NSF's Graduate Fellowship Program and the Integrative Graduate Education and Research Traineeship program that would provide funding for about 1,000 more STEM graduate students than were funded in Fiscal Year 2007. With these increases, the NSF will support more than 35,000 STEM graduate students during Fiscal Year 2008 and approximately 41,000 during 2009.

If we want U.S. leadership in science and technology over the next 50 years to match that of the last 50 years, America's young people must come to see that science and technology degrees open the door to a wide range of interesting and lucrative career opportunities. If we fail to inspire our young people in this way, we simply will be unable to compete with technology innovators abroad.

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[9] *Id.* at Apx. Table 2-28.

[10] For example, one recent study concluded that, in 2005, roughly 43 percent of U.S. higher educational institutions' engineering and computer science degree recipients were temporary residents, and that temporary residents received 59 percent of the doctoral degrees awarded in those fields that year. *See Science and Engineering Indicators 2008*, *supra* note 7, at Apx. Tables 2-30 & 2-32.

[11] *See* Jacob Funk Kirkegaard, *The Accelerating Decline in America's High-Skilled Workforce: Implications for Immigration Policy* (2007), at 23 (citing Aurora (2007)),

[12] The Business Roundtable, *Tapping America's Potential: The Education for Innovation Initiative* (2005), *available at* http://www.businessroundtable.org/pdf/20050727002TAPStatement.pdf.

C. Lifelong Learning

Governments at all levels are rightly focused on promoting job growth and skills training, encouraging the development of local industry, and enhancing their global competitiveness. But meeting these objectives is a long-term effort that cannot be accomplished by government alone. The private sector shares responsibility for providing continuing education to enhance skills and improve employment prospects for our citizens.

Information technology workers now account for a significant percentage of the U.S. labor force. The U.S. Department of Labor projects that, by 2014, nearly one-third of new jobs will be in the fields of computer systems design and services, and that one-sixth will be in the information sector.[13] The success of many business enterprises will depend on the degree to which the available pool of workers possesses the right combination of science, technology, and engineering skills.

During the last decade, Microsoft has launched a wide range of commercial and philanthropic programs aimed at providing IT skills training to U.S. workers. Our commercial offerings include IT skills training and certification in cooperation with hundreds of commercial partners, and the Microsoft IT Academy, which provides online IT training programs and other resources to accredited educational institutions across the United States.

Through our flagship digital inclusion programs – Partners in Learning and Microsoft's Unlimited Potential Community Technology Skills Program – we provide technology access and training to all types of learners, no matter where they happen to be on the continuum of IT skills and knowledge. We offer skills training for schoolchildren, for teachers who need to learn how to incorporate technology as part of their classroom instruction, and for community learners.

In 2006, Microsoft joined with the U.S. Department of Labor to provide $3.5 million in cash and software to 20 of the Department's One-Stop Career Centers, which are located throughout the country. We also donated our innovative Digital Literacy curriculum to those Centers. We have similar partnerships with the Boys and Girls Clubs and the National Urban League.

Although IT skills are in high demand, it can often be difficult for qualified job seekers with limited experience to connect with potential employers. To address this challenge, Microsoft recently launched the Students to Business (S2B) program, which is designed to help companies connect with and hire talented university or post-graduate students for jobs or internships in the technology industry. Through the S2B program, Microsoft collaborates with universities and businesses to provide students with specialized IT training and internship opportunities and helps match qualified job candidates with open positions at thousands of Microsoft partner companies so that students are able to find the

[13] Daniel Hecker, *Occupational Employment Projections to 2014*, Monthly Labor Review (2005), at 72, *available at* http://www.bls.gov/opub/mlr/2005/11/art5full.pdf.

right job for their IT capabilities. Microsoft S2B also helps match students to internships. Because IT professionals who have had one or more internships as students tend to secure better jobs when they enter the workforce, the S2B program provides IT students with a range of opportunities to build their experience and strengthen their resumes.

All of these steps are important, but to achieve the kind of wide-ranging changes that are necessary, government and business must work together. As a nation, our goal should be to ensure that ultimately every job seeker, every displaced worker, and every individual in the U.S. workforce has access to the education and training they need to succeed in the knowledge economy. This means embracing the concept of "lifelong learning" as part of the normal career path of American workers, so everyone in the workforce can use new technologies and meet new challenges.

II. Revamping Immigration Rules for Highly Skilled Workers

The second set of policies that we must consider if we are going to address the shortage of scientists and engineers centers on our immigration rules for highly skilled workers. Today, knowledge and expertise are the essential raw materials that companies and countries need in order to be competitive. We live in an economy that depends on the ability of innovative companies to attract and retain the very best talent, regardless of nationality or citizenship. Unfortunately, the U.S. immigration system makes attracting and retaining high-skilled immigrants exceptionally challenging for U.S. firms.

Congress's failure to pass high-skilled immigration reform has exacerbated an already grave situation. For example, the current base cap of 65,000 H-1B visas is arbitrarily set and bears no relation to the U.S. economy's demand for skilled professionals. For fiscal year 2007, the supply ran out more than four months before that fiscal year even began.[14] For fiscal year 2008, the supply of H-1B visas ran out on April 2, 2007, the first day that petitions could be filed and 6 months before the visas would even be issued.[15] Nearly half of those who sought a visa on that day did not receive one.[16]

This situation has caused a serious disruption in the flow of talented STEM graduates to U.S. companies. Because an H-1B petition generally can be filed only for a person who

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[14] United States Citizenship and Immigration Services Press Release, *USCIS Reaches H-1B Cap* (June 1, 2006) (indicating that the H-1B cap for FY 2007 was reached on May 26, 2006), *available at* http://www.uscis.gov/files/pressrelease/FY07H1Bcap_060106PR.pdf.

[15] United States Citizenship and Immigration Services Press Release, *USCIS reaches FY 2008 H-1B Cap* (Apr. 3, 2007) (indicating that more H-1B petitions were filed on April 2, 2007 – the first day on which petitions could be filed that year – than there were H-1B numbers available under the cap), *available at* http://www.uscis.gov/files/pressrelease/H1BFY08Cap040307.pdf.

[16] United States Citizenship and Immigration Services Press Release, *USCIS Updates Count of FY 2008 H-1B Cap Filings* (Apr. 10, 2007) (stating that USCIS had received approximately 120,000 H-1B petitions subject to the cap as soon as petitions could be filed, and that those petitions would be subjected to a lottery to determine which 65,000 would be accepted and adjudicated), *available at* http://www.uscis.gov/files/pressrelease/H1Bfy08CapUpdate041007.pdf.

holds a degree, when May/June 2007 graduates received their degrees, the visa cap for fiscal year 2008 had already been reached. Accordingly, U.S. firms will be unable to hire those graduates on an H-1B visa until the beginning of fiscal year 2009, or October 2008.

As a result, many U.S. firms, including Microsoft, have been forced to locate staff in countries that welcome skilled foreign workers to do work that could otherwise have been done in the United States, if it were not for our counterproductive immigration policies. Last year, for example, Microsoft was unable to obtain H-1B visas for one-third of the highly qualified foreign-born job candidates that we wanted to hire.

If we increase the number of H-1B visas that are available to U.S. companies, employment of U.S. nationals would likely grow as well. For instance, Microsoft has found that for every H-1B hire we make, we add on average four additional employees to support them in various capacities. Our experience is not unique. A recent study of technology companies in the S&P 500 found that, for every H-1B visa requested, these leading U.S. technology companies increased their overall employment by five workers.[17]

Moreover, the simple fact is that highly skilled foreign-born workers make enormous contributions to our economy. A recent survey by Duke University and the University of California − Berkeley found that one quarter of all start-up U.S. engineering and technology firms established between 1995 and 2005 had at least one foreign-born founder.[18] By 2005, these companies produced $52 billion in sales and employed 450,000 workers.[19]

The United States will find it far more difficult to maintain its competitive edge over the next 50 years if it excludes those who are able and willing to help us compete. Other nations are benefiting from our misguided policies. They are revising their immigration policies to attract highly talented students and professionals who would otherwise study, live, and work in the United States for at least part of their careers. To address this problem, I urge Congress to take the following steps.

First, we need to encourage the best students from abroad to enroll in our colleges and universities and, if they wish, to remain in the United States when their studies are completed. One interim step that could be taken would be to extend so-called Optional Practical Training (OPT), the period of employment that foreign students are permitted in connection with their degree program. Students are currently allowed a maximum of 12 months in OPT before they must change their immigration status to continue working in the United States. Extending OPT from 12 to 29 months would help to alleviate the crisis

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[17] National Foundation for American Policy, *H-1B Visas and Job Creation* (2008), *available at* http://www.nfap.com/pdf/080311h1b.pdf.

[18] Vivek Wadhwa *et al.*, *America's New Immigrant Entrepreneurs* (2007), *available at* http://memp.pratt.duke.edu/downloads/americas_new_immigrant_entrepreneurs.pdf.

[19] *Id.*

employers are facing due to the current H-1B visa shortage. This only requires action by the Executive Branch, and Congress and this Committee should strongly urge the Department of Homeland Security to take such action immediately.

Second, Congress should create a streamlined path to permanent resident status for highly skilled workers. Rather than allowing highly skilled, well-trained innovators to remain for only a very limited period, we should encourage a greater number to become permanent U.S. residents so that they can help drive innovation and economic growth alongside America's native-born talent. While some foreign students will undoubtedly choose to return home after graduation, it is extremely counterproductive to prevent them from remaining here to contribute their talents and expertise to our economic success if that is what they would like to do.

Third, Congress should increase the cap on visas. The current cap is so low that it virtually assures that highly skilled foreign graduates will leave the United States and work elsewhere after graduation. By increasing the number of visas granted each year, Congress can help U.S. industry meet its near-term need for qualified workers even as we build up our long-term capability to supply these workers domestically through education reform.

Ultimately, however, if we are to align our immigration policy with global realities and ensure our place as the world's leading innovator, Congress must make additional changes to our employment-based immigration system.

The current system caps employment-based visas − or "green cards" − at 140,000 per fiscal year. Because that number includes spouses and children of applicants, the actual number of visas available for workers is far fewer than 140,000. Moreover, the number of green cards issued to nationals of any one country cannot exceed 7 percent of the total number of visas issued in a given fiscal year. These two factors have caused multi-year backlogs for thousands of highly skilled individuals and are having a chilling effect on America's ability to attract and retain great talent.

I urge Congress to pass legislation that does away with per-country limits and significantly increases the number of green cards available in any fiscal year. Failure to do so will add to the already years-long wait for green cards and only encourage talented foreign nationals who are already contributing to innovation in U.S. companies to leave and take their talents elsewhere. Innovation is the engine of job growth; if we discourage innovation here at home, economic growth will decline, resulting in fewer jobs for American workers.

I want to emphasize that the shortage of scientists and engineers is so acute that we must do both: reform our education system *and* reform our immigration policies. This is not an either-or proposition. If we do not do both, U.S. companies simply will not have the talent they need to innovate and compete.

III. Increasing Federal Funding for Basic Scientific Research

Another fundamental goal of a strategy for innovation excellence should be to increase federal funding for basic scientific research. Federally funded research supports the education of the next generation of scientists and engineers, those who will largely determine whether the United States remains innovative and globally competitive. Federally funded research also provides the raw material that U.S. companies transform into commercially successful products. Thanks to the Bayh-Dole Act and related legislation, universities and other recipients of federal research funds have strong incentives to ensure that the results of their research do not just end up sitting on a shelf, but instead are licensed to industry under terms that promote the development of useful new products.

Countless products and technologies that we take for granted today had their origins in research conducted with federal funds. Government support was critical, for instance, to the development of public-key encryption technology, which became the foundation for most email applications, digital certificates, and virtual private network software, as well as non-Internet technologies such as ATMs and credit card machines. Research initially conducted by NASA has been applied to improve the safety and effectiveness of angioplasties and breast cancer detection. Funding from the NSF led to the development of Magnetic Resonance Imaging. And of course, the Internet itself has its genesis in ARPANET, a project of the Defense Department's Advanced Research Projects Agency. There are many other examples.

The leaders of U.S. scientific institutions recognize the importance of federal funding for basic scientific research. As NSF Director Arden Bement has noted, "[m]ore than a dozen major studies have now concluded that a substantial increase in federal funding for basic scientific research is critical to ensure the preeminence of America's scientific and technological enterprise."[20]

Unfortunately, federal research spending has been stagnant or shrinking over the past several decades. According to the Task Force on the Future of American Innovation, "[a]s a share of GDP, the U.S. federal investment in both physical sciences and engineering research has dropped by half since 1970. In inflation-adjusted dollars, federal funding for physical sciences research has been flat for two decades. . . ."[21] This stagnation in spending comes at a time when other governments, such as in China and the EU, are increasing their public investments in R&D.

Passage of the America COMPETES Act potentially represents a welcome reversal of this trend, and again I support this Committee's call to Congress to fully fund America

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[20] National Science Foundation Press Release, *National Science Foundation Requests $6.85 Billion for Fiscal Year 2009*, (Feb. 4, 2008), *available at* http://www.nsf.gov/news/news_summ.jsp?cntn_id=111084&govDel=USNSF_51.

[21] Task Force on the Future of American Innovation, *Measuring the Moment: Innovation, National Security, and Economic Competitiveness*, at 9 (2006), *available at* http://futureofinnovation.org/PDF/BII-FINAL-HighRes-11-14-06_nocover.pdf.

COMPETES. Many important programs are at risk if this Act is not fully funded. For example, the Act extends funding for two important NIST initiatives – the Manufacturing Extension Partnership and the Technology Innovation Program, both of which have proven track records of producing return on investment and creating jobs. I also urge Congress to establish a mechanism to measure and report on the Administration's progress on implementing the initiatives established or funded by America COMPETES.

As a nation, our goal should be to increase funding for basic scientific research by 10 percent annually over the next seven years. We also need to ensure that the private sector has greater visibility into the status and progress of federally funded research projects so that companies can collaborate more effectively with universities and other publicly funded researchers.

IV. Providing Incentives for Private-Sector R&D

The fourth critical element of a strategy for innovation excellence should be to strengthen incentives for private-sector R&D. Private companies are often in the best position to engage in the kinds of applied research and development that yield useful new products. Yet the inevitable pressure on companies to generate profits and maximize shareholder value may deter them from investing heavily in R&D, particularly since these investments are often viewed as riskier than other investments.

While understandable, the reluctance of U.S. companies to invest more heavily in R&D is deeply troubling. If one looks at the personal computer industry, for instance, much of the foundational work for the industry was done in the private sector, at venerable institutions such as Bell Labs and Xerox PARC. Companies today, however, often seem less willing to invest heavily in R&D – or at least seem to focus most of their spending on development and relatively little on true research.

If the United States is to remain a leading innovation economy, U.S. industry must invest more in R&D. To spur this needed investment, Congress should reinstitute the R&D tax credit, which expired last year, and make that tax credit permanent. Doing so would help convince American businesses that longer-term R&D investments – especially those that might take years before they generate any profits – are worthwhile.

I appreciate the importance of such R&D incentives through my work at Microsoft. Last year, Microsoft invested over $7 billion in R&D. The R&D tax credit provides an important incentive to encourage Microsoft – like thousands of other U.S. companies – to increase our R&D investment in the United States. The credit is a positive stimulus to U.S. investment, innovation, wage growth, consumption, and exports − all contributing to a stronger economy and a higher standard of living. As other countries recognize the long-term value of private-sector R&D and offer permanent and generous incentives to attract R&D projects, it is vital that the United States renews its commitment to U.S.-based R&D by enacting a seamless, permanent R&D tax credit.

Conclusion

I believe this country stands at a crossroads. For decades, innovation has been the engine of prosperity in this country. Now, economic progress depends more than ever on innovation. And the potential for technology innovation to improve lives has never been greater. If we do not implement policies like those I have outlined today, the center of progress will shift to other nations that are more committed to the pursuit of technical excellence. If we make the right choices, the United States can remain the global innovation leader that it is today.

These four policy prescriptions – strengthening educational opportunities, revamping immigration rules for highly skilled workers, increasing federal funding for basic scientific research, and providing incentives for private-sector R&D – should in my view be top priorities as Congress and the Administration consider how to maintain the nation's leadership in science, technology, and innovation.

I want to conclude by again congratulating this Committee on its 50th anniversary and commending the Committee for its tremendous efforts to advance the state of science and technology innovation in America. I am convinced that the U.S. IT industry – like many other innovative American industries – would not be the global leader it is today without the initiatives this Committee helped design and implement.

Thank you for the opportunity to share my perspective on these issues with you this morning. I'd be happy to respond to any questions you may have on these topics.

Biography of Bill Gates

William (Bill) H. Gates is chairman of Microsoft Corporation, the worldwide leader in software, services and solutions that help people and businesses realize their full potential. Microsoft had revenues of $51.12 billion for the fiscal year ending June 2007, and employs more than 78,000 people in 105 countries and regions.

On June 15, 2006, Microsoft announced that effective July 2008 Gates will transition out of a day-to-day role in the company to spend more time on his global health and education work at the Bill & Melinda Gates Foundation. After July 2008, Gates will continue to serve as Microsoft's chairman and an advisor on key development projects. The two-year transition process is to ensure that there is a smooth and orderly transfer of Gates' daily responsibilities. Effective June 2006, Ray Ozzie has assumed Gates' previous title as chief software architect and is working side by side with Gates on all technical architecture and product oversight responsibilities at Microsoft. Craig Mundie has assumed the new title of chief research and strategy officer at Microsoft and is working closely with Gates to assume his responsibility for the company's research and incubation efforts.

Born on October 28, 1955, Gates grew up in Seattle with his two sisters. Their father, William H. Gates II, is a Seattle attorney. Their late mother, Mary Gates, was a schoolteacher, University of Washington regent, and chairwoman of United Way International.

Gates attended public elementary school and the private Lakeside School. There, he discovered his interest in software and began programming computers at age 13.

In 1973, Gates entered Harvard University as a freshman, where he lived down the hall from Steve Ballmer, now Microsoft's chief executive officer. While at Harvard, Gates developed a version of the programming language BASIC for the first microcomputer - the MITS Altair.

In his junior year, Gates left Harvard to devote his energies to Microsoft, a company he had begun in 1975 with his childhood friend Paul Allen. Guided by a belief that the computer would be a valuable tool on every office desktop and in every home, they began developing software for personal computers. Gates' foresight and his vision for personal computing have been central to the success of Microsoft and the software industry.

Under Gates' leadership, Microsoft's mission has been to continually advance and improve software technology, and to make it easier, more cost-effective and more enjoyable for people to use computers. The company is committed to a long-term view, reflected in its investment of approximately $7.1 billion on research and development in the 2007 fiscal year.

In 1999, Gates wrote *Business @ the Speed of Thought*, a book that shows how computer technology can solve business problems in fundamentally new ways. The book was

published in 25 languages and is available in more than 60 countries. *Business @ the Speed of Thought* has received wide critical acclaim, and was listed on the best-seller lists of the New York Times, USA Today, the Wall Street Journal and Amazon.com. Gates' previous book, *The Road Ahead*, published in 1995, held the No. 1 spot on the New York Times' bestseller list for seven weeks.

Gates has donated the proceeds of both books to non-profit organizations that support the use of technology in education and skills development.

In addition to his love of computers and software, Gates founded Corbis, which is developing one of the world's largest resources of visual information - a comprehensive digital archive of art and photography from public and private collections around the globe. He is also a member of the board of directors of Berkshire Hathaway Inc., which invests in companies engaged in diverse business activities.

Philanthropy is also important to Gates. He and his wife, Melinda, have endowed a foundation with more than $28.8 billion (as of January 2005) to support philanthropic initiatives in the areas of global health and learning, with the hope that in the 21st century, advances in these critical areas will be available for all people. The Bill and Melinda Gates Foundation has committed more than $3.6 billion to organizations working in global health; more than $2 billion to improve learning opportunities, including the Gates Library Initiative to bring computers, Internet access and training to public libraries in low-income communities in the United States and Canada; more than $477 million to community projects in the Pacific Northwest; and more than $488 million to special projects and annual giving campaigns.

Gates was married on Jan. 1, 1994, to Melinda French Gates. They have three children. Gates is an avid reader, and enjoys playing golf and bridge.