

# **America's Competitiveness**

**Statement of**

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**and**

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Committee on Science, Engineering, and Public Policy  
Division on Policy and Global Affairs  
The National Academies:  
National Academy of Sciences, National Academy of Engineering,  
Institute of Medicine**

**Before the**

**Democratic Steering and Policy Committee  
U.S. House of Representatives**

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Chairmen Miller and DeLauro and members of the Committee, I am particularly appreciative of this opportunity to participate in what could, because of its widespread impact, be one of the more important hearings to take place this year. I appear before you as a private citizen, a retiree who has elected to devote much of his time to what is likely to be a seismic issue for our nation's future: "Can America effectively compete in the new world economy?"

I am not an economist...I am an aerospace engineer. But I have accumulated a not inconsiderable amount of scar tissue in my seven-three years. Warren Buffett tells me, if you were lucky enough to be born in America, you have already won the lottery. That was certainly true in my case—but it may not be true for my grandchildren.

My remarks this morning draw heavily upon the unanimous findings of the study known as the "Gathering Storm" report, commissioned on a bipartisan basis by the Congress and conducted by the National Academies of Science, Engineering and Medicine, institutions that count 195 Nobel Laureates among their current membership. The "Gathering Storm" committee comprised twenty members: university presidents, CEO's from industry, former presidential appointees, Nobel Laureates, and experts in K-12 education. We are honored that two of our members have been nominated by President-elect Obama for positions in his cabinet.

Today, our nation faces an economic challenge unlike any that we have experienced since I was a child. Our leaders are addressing this threat with great diligence. The sums involved in its resolution are measured in units that most of us cannot even comprehend. But there is yet another insidious threat to our nation's well-being, and that is the deterioration of our citizenry's ability to compete for jobs in the evolving global marketplace. While we certainly cannot ignore our immediate, immense challenges, neither can we ignore the more fundamental trends that if continued will surely undermine our nation's economic strength, quality of life, and the tax revenue base that permits our government to provide us with healthcare, national security, and more. To do so would be equivalent to a physician treating a patient's pneumonia but ignoring the fact that they also are suffering from cancer. In short, we need *not* a one-pronged attack but a two-pronged attack on the problems we confront—one for the short term and one for the longer term. It is the latter that I would like to address today. The lengthy delay between the actions we take and the results we achieve requires that we move quickly and decisively...if indeed we are not already too late.

A variety of studies have concluded that between 50 and 85 percent of the growth in America's Gross Domestic Product over the past half-century has its root in advancements in science and engineering. Correspondingly, it has been estimated that two-thirds of the increase in productivity in America in recent decades is also attributable to advancements in science and engineering. Only four percent of America's workforce is comprised of scientists and engineers, but this four percent contributes disproportionately to the creation of jobs for the other ninety-six percent. One cannot sustain an economy simply by trying to make money with money...at some point workers have to produce food, manufacture medicine and build houses.

There are of course many factors that affect America's declining competitiveness. Prominent among these are:

- The cost of labor. An employer can hire nine assembly workers in Mexico for the price of one in the United States. Not long ago I visited a factory in Vietnam where twenty assembly workers can be hired for the price of one in the U.S. Similarly, five chemists can be hired in China, or eight engineers in India, for the price of one in the U.S.
- Overhead costs. Starbucks spends more on healthcare than on coffee. General Motors more on healthcare than steel. All worthy undertakings; all added costs at the bottom-line.
- Education. America is widely acknowledged as having one of the worst K-12 education systems in the world, yet spends more on it per student than all but two other nations. The more our children are exposed to our educational system, the more poorly they perform on international tests. *The Washington Post* summarizing the results of the most recent of these tests noted that America's students continued to stagnate in science but that there was one bright spot: fourth grade math. Here, it was reported, our students "jumped" ahead. Putting aside the fact that most firms don't hire fourth-graders, a little arithmetic would have revealed that at the rate we "jumped" ahead, in just another 85 years we will have caught up with the children of Hong Kong—unless, of course, they should improve in the meantime.
- Science and Engineering Talent. In the recent period of burgeoning science and technology the number of engineers and physical scientists we graduate has declined by 20 percent. The number of U.S. citizens achieving PhD's in engineering has declined by 34 percent. Two-thirds of the students who receive PhD's in engineering from *U.S.* universities are *non-U.S.* citizens.
- Investment in Research. The private sector has, to a considerable degree, abandoned the playing field when it comes to basic research due to market pressures to produce next-quarter profits. The remnants of the legendary Bell Labs, home of the transistor and laser and the icon of American industrial research, have now been sold to a French firm. The federal government's investment in the physical sciences has been stagnate for over twenty years. Investment in the bio-sciences, after a five-year period of significant growth, is again declining.

The world's corporations, including those in America, have found a solution to these circumstances: "Don't build your research laboratories or plants in the United States. In the words of Intel's Howard High, "We go where the smart people are. Now our business operations are two-thirds in the U.S. and one-third overseas. But that ratio will flip over (in) the next ten years."

The National Academies "Gathering Storm" report offers twenty specific actions to help revise the current trends. The two highest priority actions are to graduate 10,000 new teachers each year with primary degrees in math or science, and to double real federal investment in fundamental research within seven years.

What has happened since these recommendations were made and the needed Authorizing legislation passed overwhelmingly in both the House and Senate? Well, a new research university was established with an opening day endowment equal to MIT's after 142 years; next year over 200,000 students will study abroad, mostly pursuing science or engineering degrees, often under government-provided scholarships; government investment in R&D is set to increase by 25 percent; an initiative is underway to make the country a global nanotechnology hub; an additional \$10B is being devoted to K-12 education, with emphasis on math and science; the world's most powerful particle accelerator will soon begin operation; a \$3B add-on to the nation's research budget is being implemented; and a follow-on to the Gathering Storm study has been completed.

These actions are, of course, taking place in Saudi Arabia, China, the U.K., India, Brazil, Switzerland, Russia and Australia, respectively.

Meanwhile, in the United States, prior to the current economic crisis, one premier national laboratory announced the imposition of two-day a month "unpaid holidays" on its science staff; several laboratories began laying-off researchers; the U.S. portion of the international program to develop plentiful energy through nuclear fusion was reduced to "survival mode;" America's firms continued to spend three times more on litigation than research; and many young would-be scientists presumably began reconsidering their careers.

Many Americans take for granted our nation's overall leadership, including in science and engineering. But perhaps so too did the citizens of Spain take for granted their world leadership in the sixteenth century; or the citizens of France in the seventeenth; or of Great Britain in the nineteenth century. Now it is our turn. History teaches that leadership must be earned—and re-earned every day. We cannot continue to live off past investments, investments such as those that were made when the need for a better educated populace led to the creation of Land Grant Institutions; when the collapsing economy in the Great Depression prompted a huge civil works program; when the aftermath of World War II led to the G.I. Bill; when the shock of Sputnik triggered significant reinvestment in education and science. Unfortunately, the threat we now face offers no sudden wake-up call: no Pearl Harbor, no Sputnik, no 9/11.

Today's young adult generation of Americans is the first in memory, perhaps in history, to be less well educated than their parents. Absent decisive action on our parts today's children are likely to be the first ever to have a lower sustained standard of living than their parents. The stimulus package now being addressed will hopefully help the present generations, but it needs to be accompanied by an investment on behalf of our children.

Churchill said that you can always count on the Americans to do the right thing, after they have tried everything else. This time we may get only one chance.

Thank you.

## Compete or Become Irrelevant

- “Where nations once measured their strength by the size of their armies and arsenals, in the world of the future knowledge will matter most.”  
*Bill Clinton – President*
- “We’re standing pat while the rest of the world is passing us by. If we continue on this path, our chances of being the leader in the knowledge economy in the decades to come are between slim and none.”  
*William E. Kirwan – Chancellor, University System of Maryland*
- “The foreign names kept coming—‘Hong Lu, Ku Xie, Tao Yuan, Fu Tang’—I thought the entire class of doctoral students in physics were going to be Chinese, until ‘Paul Shane Morrow’ saved the day...my complaint...was that there wasn’t someone from the Immigration and Naturalization Service (there) stapling green cards to the diplomas of each of the foreign-born PhDs.”  
*Thomas L. Friedman – Author, “The World Is Flat...”*
- “If the U.S. doesn’t get its act together, DuPont is going to go to the countries that do.”  
*James Jarrett – VP, Intel Corp.*
- “If companies were run like many education systems, they wouldn’t last a week.”  
*Thomas Donohue – President, U.S. Chamber of Commerce*
- “When I compare our high schools to what I see when I’m traveling abroad, I’m terrified for our workforce of tomorrow.”  
*Bill Gates – Founder, Microsoft Corp.*
- “If you don’t solve (the K-12 education problem), nothing else is going to matter all that much.”  
*Alan Greenspan – Chairman, Federal Reserve*
- “We go where the smart people are. Now our business operations are two-thirds in the U.S. and one-third overseas. But that ratio will flip over (in) the next ten years.”  
*Howard High – Spokesperson, Intel Corp.*
- “We had more sports exercise majors graduate than electrical engineering grads last year. If you want to be the massage capital of the world you’re well on the way.”  
*Jeffrey R. Immelt – Chairman and CEO, General Electric Corp.*
- “The worldwide competition of overall national strength is actually a competition for talents, especially for innovative talents.”  
*President Hu – People’s Republic of China*

- “We as a country have chosen not to compete...we’ve killed investment banking and now we are killing engineering...it’s our future and we are throwing it down the drain.”  
*Craig Barrett – Chairman, Intel Corp.*
- “...in today’s integrated and digitized global market, where knowledge and innovation tools are so widely distributed...: Whatever can be done, will be done. The only question is will it be done by you or to you.”  
*Thomas L. Friedman – Author, “The World Is Flat...”*
- “It’s not just that kids need to go to school, they need to learn in school.”  
*Emiliana Vegas – World Bank*
- “Where is Sputnik when we need it?”  
*Bill Gates – Founder, Microsoft Corp.*
- “Will America lead...and reap the rewards? Or will we surrender that advantage to other countries with clearer vision?”  
*Susan Hockfield – President, MIT*
- “...our present crisis is not just a financial meltdown crying out for a cash injection. We are in much deeper trouble. In fact, we as a country have become General Motors—as a result of our national drift. Look in the mirror: G.M. is us.”  
*Thomas L. Friedman – Author, “The World Is Flat...”*
- (The way to move forward is) “through science, science, science, and science, with science and technology to rebuild our infrastructure, make it green and reduce our dependence on foreign oil, to use science for innovation, to grow our economy, creating good paying jobs, educating people to be competitive, science to make America healthy, and science to preserve the planet by stopping global warming, and science to protect the American people.”  
*Nancy Pelosi – Speaker of the House*
- “Our record at fixing our K-12 education system is virtually unblemished by success.”  
*Norman R. Augustine – Retired Chairman & CEO, Lockheed Martin Corp.*
- “We’re well on our way to becoming ‘America, the land of the free and the home of the unemployed.’”  
*Norman R. Augustine – Retired Chairman & CEO, Lockheed Martin Corp.*

**NORMAN R. AUGUSTINE** was raised in Colorado and attended Princeton University where he graduated with a BSE in Aeronautical Engineering, magna cum laude, and an MSE. He was elected to Phi Beta Kappa, Tau Beta Pi and Sigma Xi.

In 1958 he joined the Douglas Aircraft Company in California where he worked as a Research Engineer, Program Manager and Chief Engineer. Beginning in 1965, he served in the Office of the Secretary of Defense as Assistant Director of Defense Research and Engineering. He joined LTV Missiles and Space Company in 1970, serving as Vice President, Advanced Programs and Marketing. In 1973 he returned to the government as Assistant Secretary of the Army and in 1975 became Under Secretary of the Army, and later Acting Secretary of the Army. Joining Martin Marietta Corporation in 1977 as Vice President of Technical Operations, he was elected as CEO in 1987 and chairman in 1988, having previously been President and COO. He served as president of Lockheed Martin Corporation upon the formation of that company in 1995, and became CEO later that year. He retired as chairman and CEO of Lockheed Martin in August 1997, at which time he became a Lecturer with the Rank of Professor on the faculty of Princeton University where he served until July 1999.

Mr. Augustine was Chairman and Principal Officer of the American Red Cross for nine years, Chairman of the National Academy of Engineering, President and Chairman of the Association of the United States Army, Chairman of the Aerospace Industries Association, and Chairman of the Defense Science Board. He is a former President of the American Institute of Aeronautics and Astronautics and the Boy Scouts of America. He is a current or former member of the Board of Directors of ConocoPhillips, Black & Decker, Proctor & Gamble and Lockheed Martin, and was a member of the Board of Trustees of Colonial Williamsburg. He is a Regent of the University System of Maryland, Trustee Emeritus of Johns Hopkins and a former member of the Board of Trustees of Princeton and MIT. He is a member of the Advisory Board to the Department of Homeland Security, was a member of the Hart/Rudman Commission on National Security, and has served for 16 years on the President's Council of Advisors on Science and Technology. He is a member of the American Philosophical Society and the Council on Foreign Affairs, and is a Fellow of the National Academy of Arts and Sciences and the Explorers Club.

Mr. Augustine has been presented the National Medal of Technology by the President of the United States and received the Joint Chiefs of Staff Distinguished Public Service Award. He has five times received the Department of Defense's highest civilian decoration, the Distinguished Service Medal. He is co-author of *The Defense Revolution* and *Shakespeare In Charge* and author of *Augustine's Laws* and *Augustine's Travels*. He holds 23 honorary degrees and was selected by Who's Who in America and the Library of Congress as one of "Fifty Great Americans" on the occasion of Who's Who's fiftieth anniversary. He has traveled in over 100 countries and stood on both the North and South Poles of the earth.

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