Rising Above The Gathering Storm: Energizing and Employing America for a Brighter Economic Future

Statement of

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Mr. Chairman and members of the Committee.

Thank you for this opportunity to appear before you on behalf of the National Academies' Committee on Prospering in the Global Economy of the 21st Century. As you know, our effort was sponsored by the National Academy of Sciences, National Academy of Engineering and Institute of Medicine (collectively known as the National Academies). The National Academies were chartered by Congress in 1863 to advise the government on matters of science and technology.

The Academies were requested by Senator Alexander and Senator Jeff Bingaman, members of the Senate Committee on Energy and Natural Resources to conduct an assessment of America's ability to compete and prosper in the 21st century—and to propose appropriate actions to enhance the likelihood of success in that endeavor. This request was endorsed by Representatives Sherwood Boehlert and Bart Gordon of the House Committee on Science.

To respond to that request the Academies assembled twenty individuals with diverse backgrounds, including university presidents, CEOs, Nobel Laureates and former presidential appointees. The result of our committee's work was examined by over forty highly qualified reviewers who were also designated by the Academies. In undertaking our assignment we considered the results of a number of prior studies which were conducted on various aspects of America's future prosperity. We also gathered sixty subject-matter experts with whom we consulted for a weekend here in Washington and who provided recommendations related to their fields of specialty.

It is the unanimous view of our committee that America today faces a serious and intensifying challenge with regard to its future competitiveness and standard of living. Further, we appear to be on a losing path. We are here today hoping both to elevate the nation's awareness of this developing situation and to propose constructive solutions.

The thrust of our findings is straightforward. The standard of living of Americans in the years ahead will depend to a very large degree on the quality of the jobs that they are able to hold. Without quality jobs our citizens will not have the purchasing power to support the standard of living which they seek, and to which many have become accustomed; tax revenues

will not be generated to provide for strong national security and healthcare; and the lack of a vibrant domestic consumer market will provide a *disincentive* for either U.S. or foreign companies to invest in jobs in America.

What has brought about the current situation? The answer is that the prosperity equation has a new ingredient, an ingredient that some have referred to as "The Death of Distance". In the last century, breakthroughs in aviation created the opportunity to move people and goods rapidly and efficiently over very great distances. Bill Gates has referred to aviation as the "World Wide Web of the twentieth century". In the early part of the present century, we are approaching the point where the communication, storage and processing of information are nearly free. That is, we can now move not only physical items efficiently over great distances, we can also transport *information* in large volumes and at little cost.

The consequences of these developments are profound. Soon, only those jobs that require near-physical contact among the parties to a transaction will not be opened for competition from job seekers around the world. Further, with the end of the Cold War and the evaporation of many of the political barriers that previously existed throughout the world, nearly three *billion* new, highly motivated, often well educated, new capitalists entered the job market.

Suddenly, Americans find themselves in competition for their jobs not just with their neighbors but with individuals around the world. The impact of this was initially felt in manufacturing, but soon extended to the development of software and the conduct of design activities. Next to be affected were administrative and support services. Today, "high end" jobs, such as professional services, research and management, are impacted. In short, few jobs seem "safe":

- U.S. companies each morning receive software that was written in India overnight in time to be tested in the U.S. and returned to India for further production that same evening—making the 24-hour workday a practicality.

- Back-offices of U.S. firms operate in such places as Costa Rica, Ireland and Switzerland.

- Drawings for American architectural firms are produced in Brazil.

- U.S. firm's call centers are based in India—where employees are now being taught to speak with a mid-western accent.

- U.S. hospitals have x-rays and CAT scans read by radiologists in Australia and India.

- At some McDonald's drive-in windows orders are transmitted to a processing center a thousand miles away (currently in the U.S.), where they are processed and returned to the worker who actually prepares the order.

- Accounting firms in the U.S. have clients tax returns prepared by experts in India.

- Visitors to an office not far from the White House are greeted by a receptionist on a flat screen display who controls access to the building and arranges contacts—she is in Pakistan.

- Surgeons sit on the opposite side of the operating room and control robots which perform the procedures. It is not a huge leap of imagination to have highly-specialized, world-class surgeons located not just across the operating room but across the ocean.

As Tom Friedman concluded in *The World is Flat*, globalization has "accidentally made Beijing, Bangalore and Bethesda next door neighbors". And the neighborhood is one wherein candidates for many jobs which currently reside in the U.S. are now just a "mouse-click" away.

How will America compete in this rough and tumble global environment that is approaching faster than many had expected? The answer appears to be, "not very well"—unless we do a number of things differently from the way we have been doing them in the past.

Why do we reach this conclusion? One need only examine the principal ingredients of competitiveness to discern that not only is the world flat, but in fact it may be tipping *against* us.

One major element of competitiveness is, of course, the cost of labor. I recently traveled to Vietnam, where the wrap rate for low-skilled workers is about twenty-five cents per hour, about one-twentieth of the U.S. minimum wage. And the problem is not confined to the so-called "lower-end" of the employment spectrum. For example, five qualified chemists can be hired in India for the cost of just one in America. Given such enormous disadvantages in labor cost, we cannot be satisfied merely to match other economies in those other areas where we do enjoy strength; rather we must excel . . . markedly.

The existence of a vibrant domestic market for products and services is another important factor in determining our nation's competitiveness, since such a market helps attract business to our shores. But here, too, there are warning signs: Goldman Sachs analysts project that within about a decade, fully 80% of the world's *middle-income* consumers will live in nations outside the currently industrialized world.

The availability of financial capital has in the past represented a significant competitive advantage for America. But the mobility of financial capital is legion, as evidenced by the willingness of U.S. firms to move factories to Mexico, Vietnam and China if a competitive advantage can be derived by doing so. Capital, as we have observed, crosses geopolitical borders at the speed of light.

Human capital—the quality of our work force—is a particularly important factor in our competitiveness. Our public school system comprises the foundation of this asset. But as it exists today, that system compares, in the aggregate, abysmally with those of other developed—and even developing—nations . . . particularly in the fields which underpin most innovation: science, mathematics and technology.

Of the utmost importance to competitiveness is the availability of knowledge capital—"ideas". And once again, scientific research and engineering applications are crucial. But knowledge capital, like financial capital, is highly mobile. There *is* one major difference: being first-to-market, by virtue of access to new knowledge, can be immensely valuable, even if by only a few months. Craig Barrett, a member of our committee and Chairman of Intel, points out that ninety percent of the products his company delivers on December 31st did not even exist on January 1st of that

same year. Such is the dependence of hi-tech firms on being at the leading edge of scientific and technological progress.

There are of course many other factors influencing our nation's competitiveness. These include patent processes, tax policy and overhead costs—such as healthcare, regulation and litigation—all of which tend to work against us today. On the other hand, America's version of the Free Enterprise System has proven to be a powerful asset, with its inherent aggressiveness and discipline in introducing new ideas and flushing out the obsolescent. But others have now recognized these virtues and are seeking to emulate our system.

But is it not a *good* thing that others are prospering? Our committee's answer to that question is a resounding "*yes*". Broadly based prosperity can make the world more stable and safer for all; it can make less costly products available for American consumers; it can provide new customers for the products we produce here. Yet it is inevitable that there will be relative winners and relative losers—and as the world prospers, we should seek to assure that America does not fall behind in the race.

The enigma is that in spite of all these factors, America seems to be doing quite well just now. Our nation has the highest R&D investment intensity in the world. We have indisputably the finest research universities in the world. California alone has more venture capital than any nation in the world other than the United States. Two million jobs were created in America in the past year alone, and citizens of other nations continue to invest their savings in America at a remarkable rate. Total household net worth is now approaching $50 *trillion*.

The reason for this prosperity is that we are reaping the benefits of past investments—many of them in the fields of science and technology. But the early indicators of future prosperity are generally heading in the wrong direction. Consider the following:

- For the cost of one engineer in the United States, a company can hire eleven in India.

- America has been depending heavily on foreign-born talent. Thirty-eight percent of the scientists and engineers in America holding doctorates were born abroad. Yet, when asked in the

spring of 2005, what are the most attractive places in the world in which to live, respondents in only one of the countries polled indicated the U.S.A.

- Chemical companies closed seventy facilities in the U.S. in 2004, and have tagged forty more for shutdown. Of 120 *new* chemical plants being built around the world with price tags of $1 billion or more, one is in the U.S. Fifty are in China.

- In 1997 China had fewer than fifty research centers managed by multinational corporations. By 2004 there were over six-hundred.

- Two years from now, for the first time, the most capable high-energy particle accelerator on earth will reside outside the United States.

- The United States today is a net importer of *high technology* products. The U.S. share of global high tech exports has fallen in the last two decades from 30% to 17%, while America's trade balance in high tech manufactured goods shifted from a *positive* $33B in 1990 to a *negative* $24B in 2004.

- In a recent international test involving mathematical understanding, U.S. students finished in 27th place among the nations participating.

- About two-thirds of the students studying chemistry and physics in U.S. high schools are taught by teachers with no major or certificate in the subject. In the case of math taught in grades five through twelve, the fraction is one-half. Many such students are being taught math by graduates in physical education.

- In one recent period, low-wage employers like Wal-Mart (now the nation's largest employer) and McDonald's created 44% of all new jobs. High-wage employers created only 29%.

- In 2003 foreign students earned 59% of the engineering doctorates awarded in U.S. universities.

- In 2003 only three American companies ranked among the top ten recipients of patents granted by the *U.S.* Patent Office.

- In Germany, 36% of undergraduates receive their degrees in science and engineering. In China, the corresponding figure is 59%, and in Japan it is 66%. In the U.S., the share is 32%. In the case of engineering, the U.S. share is 5%, as compared with 50% in China.

- The United States is said to have over ten million illegal immigrants, but the number of legal visas set-aside annually for "highly qualified foreign workers" was recently dropped from 195,000 per year down to 65,000.

- At a time when the world's nations are clamoring to obtain science and engineering talent, U.S. law will grant a visa for outstanding foreign students to attend U.S. universities only if they promise they will go home when they graduate.

- In 2001 (the most recent year for which data are available), U.S. industry spent more on tort litigation and related costs than on research and development.

As important as jobs are, the impact of these circumstances on our nation's security could be even more profound. In the view of the bipartisan Hart-Rudman Commission on National Security, ". . . the inadequacies of our system of research and education pose a greater threat to U.S. national security over the next quarter century than any potential conventional war that we might imagine."

The good news is that there are things we can do to assure that America does in fact share in the prosperity that science and technology are bringing the world. In this regard, our committee has made four broad recommendations as the basis of a prosperity initiative—and offers 20 specific actions to make these recommendations a reality. They include:

- "Ten Thousand Teachers, Ten Million Minds"—which addresses America's K-12 education system. We recommend that America's talent pool in science, math and technology be increased by vastly improving K-12 education. Among the specific steps we propose are:
  - Recruitment of 10,000 new science and math teachers each year through the award of competitive scholarships in math, science and engineering that lead to a bachelor's degree *accompanied by a teaching certificate*—and a 5-year commitment to teach in a public school.
  - Strengthening the skills of 250,000 *current* teachers through funded training and education in part-time master's programs, summer institutes and Advanced Placement training programs.
  - Increasing the number of students who take Advanced Placement science and mathematics courses.

- "Sowing the Seeds"—which addresses America's research base. We recommend strengthening the nation's traditional commitment to long-term *basic* research through:
  - Increasing federal investment in research by 10% per year over the next seven years, with primary attention devoted to the physical sciences, engineering, mathematics, and information sciences—without *dis*investing in the health and biological sciences.
  - Providing research grants to early career researchers
  - Instituting a National Coordination Office for Research Infrastructure to oversee the investment of an additional $500M per year for five years for advanced research facilities and equipment.
  - Allocating at least 8% of the existing budgets of federal research agencies to discretionary funding under the control of local laboratory directors.
  - Creation of an Advanced Research Projects Agency—Energy (ARPA-E), modeled after DARPA in the Department of Defense, reporting to the Department of Energy Undersecretary for Science. The purpose is to support the conduct of out-of-the-box,

transformational, generic, energy research by universities, industry and government laboratories.
    - Establish a Presidential Innovation Award to recognize and stimulate scientific and engineering advances in the national interest.

- "Best and Brightest"—which addresses higher education. In this area we recommend:
    - Establishing 25,000 competitive science, mathematics, engineering, and technology undergraduate scholarships and 5,000 graduate fellowships in areas of national need for US citizens pursuing study at US universities.
    - Providing a federal tax credit to employers to encourage their support of continuing education.
    - Providing a one-year automatic visa extension to international students who receive a science or engineering doctorate at a U.S. university, and providing automatic work permits and expedited residence status if these students are offered employment in the US.
    - Instituting a skill-based, preferential immigration option
    - Reforming the current system of "deemed exports" so that international students and researchers have access to necessary non-classified information or research equipment while studying and working in the US.

- "Incentives for Innovation"—in which we address the innovation environment itself. We recommend:
    - Enhancements to intellectual property protection, such as the adoption of a first-to-file system.
    - Increasing the R&D tax credit from the current 20% to 40%, and making the credit permanent.
    - Providing permanent tax incentives for US-based innovation so that the United States is one of the most attractive places in the world for long-term innovation-related investments.
    - Ensuring ubiquitous broadband Internet access to enable U.S. firms and researchers to operate at the state of the art in this important technology.

It should be noted that we are not confronting a so-called "typical" crisis, in the sense that there is no 9/11, Sputnik or Pearl Harbor to alert us as a nation. Our situation is more akin to that of the proverbial frog being slowly boiled. Nonetheless, while our committee believes the problem we confront is both real and serious, the good news is that we may well have time to do something about it—if we start now.

Americans, with only 5% of the world's population but with nearly 30% of the world's wealth, tend to believe that scientific and technological leadership and the high standard of living it underpins is somehow the natural state of affairs. But such good fortune is *not* a birthright. If we wish our children and grandchildren to enjoy the standard of living most Americans have come to expect, there is only one answer: We must get out and *compete*.

I would like to close my remarks with a perceptive and very relevant poem. It was written by Richard Hodgetts, and eloquently summarizes the essence of innovation in the highly competitive, global environment. The poem goes as follows:

Every morning in Africa a gazelle wakes up.
It knows it must outrun the fastest lion or it
will be killed.

Every morning in Africa a lion wakes up.
It knows it must outrun the slowest gazelle
or it will starve.

It doesn't matter whether you're a lion or a
gazelle – when the sun comes up, you'd
better be running.

And indeed we should.

Thank you for providing me with this opportunity to testify before the committee. I would be pleased to answer any questions you have about the report.

Response to House Committee on Science Questions

1. How did the study panel arrive at the recommended 10 percent annual increase in federally-sponsored basic research over the next seven years? What other options did the panel consider and what led to the choice of 10 percent?

After reviewing the proposals for enhanced research funding that have been made in recent years, the committee concluded that a 10% annual increase over a 7-year period would be appropriate. This achieves the doubling that was in principle part of the NSF Authorization Act of 2002 approved by Congress and the President, but would expand it to other agencies and focus that increase on the physical sciences, engineering, mathematics, and the information sciences as well as DOD basic research.

The committee viewed enhanced funding in these fields as urgent. It chose the 10 percent level and 7 year time frame as the best way for these funds to be spent effectively. The base for this doubling (federal funding for the fields listed plus DOD basic research—not including the specified fields so there is no double-counting) was approximately $8 billion in FY 2004.

By taking this action, the balance of the nation's research portfolio in fields that are essential to the generation of both ideas and skilled people for the nation's economy and national/homeland security would be restored. That does not mean that there should be a *disinvestment* in such important fields as the life sciences (which have in fact seen growth in recent years) or the social sciences. A balanced research portfolio in all fields of science and engineering research is critical to US prosperity.

As indicated in the National Academies Committee on Science, Engineering, and Public Policy's (COSEPUP) 1993 report *Science, Technology, and the Federal Government: National Goals for a New Era*

The United States needs to be among the world leaders in all fields of research so that it can

- **Bring the best available knowledge to bear on problems related to national objectives even if that knowledge appears unexpectedly in a field not traditionally linked to that objective.**
- **Quickly recognize, extend, and use important research results that occur elsewhere;**
- **Prepare students in American colleges and universities to become leaders themselves and to extend and apply the frontiers of knowledge.**
- **Attract the brightest young students.**[1]

[1] COSEPUP. 1993. *Science, Technology, and the Federal Government: National Goals for a New Era*. Washington, DC: National Academy Press.

2. How did the study panel arrive at the recommended 8 percent allocation within each federal research agency's budget to be managed at the discretion of technical program managers to catalyze high-risk, high-payoff research? What other options did the panel consider and what led to the choice of 8 percent?

The committee found that at many agencies approximately 1 to 3 percent of a program's budget is to be managed at the discretion of the program managers. The committee believes, as shown through the Defense Advanced Research Projects Agency (DARPA) model, that more risky research that crosses disciplinary lines can be funded by using the "strong program manager" approach as is the case at DARPA. Some committee members believed that 5% was sufficient, others 10%—in the end a compromise was reached at 8%. The committee is flexible about the specific number as long as the goal of catalyzing high-risk, high-payoff research (as opposed to incremental research) is achieved. Experience shows that research investments of this type are exceptionally highly leveraged.

3. Industry and government have both developed numerous energy production and energy efficiency technologies that have not been deployed. How did the study panel arrive at its implicit conclusion that technology development is the greater bottleneck (as opposed to policy) in developing energy systems for a 21st century economy?

The committee believes that both policy and technology play a role in responding to the nation's need for clean, affordable, and reliable energy.

While the implementation of some technologies, such as nuclear energy, is discouraged by policy, we still face environmental and safety challenges only science and engineering research can ameliorate—even if policymakers were willing to deploy that technology today. There are no doubt questions of cost and policy that affect use of various energy technologies. When was the last nuclear plant commissioned? But those policy decisions are often directly linked to technical capabilities or the absence thereof. No 'final' solutions without serious problems are waiting in the wings for policy changes. Nuclear energy is an (the) important potential source of energy but it has security and waste disposal/storage problems that have not been handled satisfactorily. That is a prime example of a policy problem that requires research to unlock it.

Similarly, the nation, as the report indicates, has made substantial strides in efficiency, but much more can be done. Yes there is existing efficiency technology that can be deployed, and, following market forces if oil prices do not return to recent levels will probably be used increasingly.

As a result, the nation will not significantly decrease energy dependence without technology—policy changes alone are insufficient. The production of electricity and mobility on a world wide basis cannot go on for ever in their present form. This country is running a significant risk of remaining substantially dependent on foreign oil.

The history of science and technology suggests that radical new solutions may well be available. The field of energy has not been

viewed as exciting by a generation of engineering students. The time required to effect an energy solution from research to implementation is considerable. The rate of growth of the energy problem (usage) worldwide is likely to have profound effects.

We believe that the Advanced Research Projects Agency (ARPA-E) proposed by the committee can jump start new approaches to high risk / high payoff research of the type that DARPA has historically performed to great effect for the military. It can capture the talents of outstanding young people in industry and academia. DARPA is a demonstrably effective approach to advanced research and development, and Energy is one of the most important challenges to our nation's future.

4. Recent surveys of industry suggest that basic research performed at universities and transformational technological innovation have only a very limited impact on the success of individual companies. Is the impact of research and innovation different for the economy as a whole than it is for individual companies?

There is broad consensus among economists that for decades the growth of the U.S. economy has been driven by technological advances and innovation. These come almost exclusively from two sources -- companies and universities. Companies are devoting fewer and fewer resources to longer-term research that contributes to the common base of technology that is available to all; i.e. work that improves our national capacity but doesn't necessarily directly drive that company's profits. Universities are increasingly the only avenue for the research that will lead to fundamentally new things and to a highly-educated workforce. Most large companies now strive for a large percentage of their products to have been developed within the last two or three years. This requires constant and focused innovation. The immediate crowds out the strategic.

Truly transformational technologies do not come along every day, and cannot be readily predicted. But one thing is certain - if we do not invest in research and advanced training for scientists and engineers, they will not occur at all - at least not in the United States.

Because of this, the committee disagrees with the first premise in the question. Industry gains not only from the new knowledge generated as a result of academic research, but also from the skilled people generated as a result of research.

Although many industries as diverse as the pharmaceutical and banking industry understand the linkage of their business to science and technology, others do not always fully understand the linkages between its day-to-day activities and science and technology. For example, at one point, we thought that the trucking industry was not particularly sensitive to science and technology. But the trucking industry certainly has been able to enhance its competitiveness by using tools such as the global positioning system, advanced lightweight materials, the ability to use the internet, and weather

forecasting to enhance its ability to locate the best route to a destination thus lowering its operating cost. In addition, its competitiveness could be enhanced further if new ways are developed for the industry to be more efficient in its use of fuel and if more affordable fuels are developed.

As a result, when looking at its primary operations, a single company may not see direct use of basic research if it has not licensed a patent, contracted for studies or undertaken its own work. But slightly below the surface the substantial contribution of basic research to essentially every company is evident.

For some industries, research provides them with the talented people they need whose education is influenced in substance, thinking and methods by basic research experience/training. Talented graduates for corporate laboratories are a primary deliverable of basic research operations at universities. Many major companies, in addition, support basic research at universities first and foremost to gain access to these people.

Secondly, essentially every company buys technology whose function and cost are controlled by basic research conducted earlier. So companies that assemble products using others' components may not be involved in basic research directly but their business remains dependent on the basic research behind the component technologies that they use.

Third, basic research creates the new technologies and new enterprises that these companies will sell to, or buy from or even become. Frankly, it is difficult to think of a company that does not use technology at some level, and that technology evolved from basic research.

Fourth, the people generated as a result of the higher education they receive, underpinned by basic research, create whole new industries and jobs. For example, in 1997, BankBoston conducted the first national study of the economic impact of a research university. It found that graduates of the Massachusetts Institute of Technology founded 4,000 firms which, in 1994 alone, employed at least 1.1 million people and generated $232 billion of world sales. Further, if

the companies founded by MIT graduates and faculty formed an independent nation, the revenues produced by the companies would make that nation the 24th largest economy in the world. Within the United States, the companies founded by MIT graduates employed a total of 733,000 people in 1994 at more than 8,500 plants and offices in the 50 states- equal to one out of every 170 jobs in America. Eighty percent of the jobs in the MIT-related firms are in manufacturing (compared to 16 percent nationally), and a high percentage of products are exported.

COMMITTEE BIOGRAPHIC INFORMATION

NORMAN R. AUGUSTINE [NAE*] (Chair) is the retired chairman and CEO of the Lockheed Martin Corporation. He serves on the President's Council of Advisors on Science and Technology and has served as undersecretary of the Army. He is a recipient of the National Medal of Technology.

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SHIRLEY ANN JACKSON [NAE] is president of Rensselaer Polytechnic Institute. She is the immediate past president of the American Association for the Advancement of Science and was chairman of the US Nuclear Regulatory Commission.

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GEORGE M. WHITESIDES [NAS/NAE] is the Woodford L. & Ann A. Flowers University Professor at Harvard University. He has served as an adviser for the National Science Foundation and the Defense Advanced Research Projects Agency.

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

In 1958 he joined the Douglas Aircraft Company in California where he held titles of Program Manager and Chief Engineer. Beginning in 1965, he served in the Pentagon in the Office of the Secretary of Defense as an Assistant Director of Defense Research and Engineering. Joining the LTV Missiles and Space Company in 1970, he served as Vice President, Advanced Programs and Marketing. In 1973 he returned to government as Assistant Secretary of the Army and in 1975 as Under Secretary of the Army and later as Acting Secretary of the Army. Joining Martin Marietta Corporation in 1977, he served as Chairman and CEO from 1988 and 1987, respectively, until 1995, having previously been President and Chief Operating Officer. He served as President of Lockheed Martin Corporation upon the formation of that company in 1995, and became its Chief Executive Officer on January 1, 1996, and later Chairman. Retiring as an employee of Lockheed Martin in August, 1997, he joined the faculty of the Princeton University School of Engineering and Applied Science where he served as Lecturer with the Rank of Professor until July, 1999.

Mr. Augustine served as Chairman and Principal Officer of the American Red Cross for nine years and as Chairman of the National Academy of Engineering, the Association of the United States Army, the Aerospace Industry Association, and 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 currently a member of the Board of Directors of ConocoPhillips, Black & Decker and Procter & Gamble and a member of the Board of Trustees of Colonial Williamsburg and Johns Hopkins and a former member of the Board of Trustees of Princeton and MIT. He is a member of the President's Council of Advisors on Science and Technology and the Department of Homeland Security Advisory Board and was a member of the Hart/Rudman Commission on National Security.

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