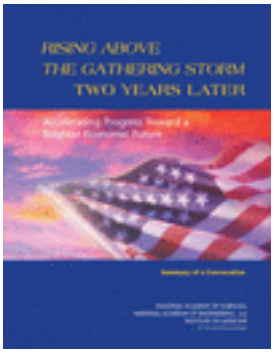
Rising Above the Gathering Storm: Two Years Later



ISBN: 0-309-12872-2, 24 pages, , (2009)

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THE NATIONAL ACADEMIES
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RISING ABOVE THE GATHERING STORM TWO YEARS LATER

Accelerating Progress Toward a Brighter Economic Future

Summary of a Convocation

Thomas Arrison, Rapporteur

Planning Committee for the Convocation on
Rising Above the Gathering Storm Two Years Later

Committee on Science, Engineering, and Public Policy

NATIONAL ACADEMY OF SCIENCES,
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Washington, D.C.
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NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This project was supported by the National Math and Science Initiative. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the organizations or agencies that provided support for the project.

International Standard Book Number-13: 978-0-309-12871-1
International Standard Book Number-10: 0-309-12871-4

This report is available online from the National Academies Press, 500 Fifth Street, N.W., Lockbox 285, Washington, D.C. 20055; (800) 624-6242 or (202) 334-3313 (in the Washington metropolitan area); Internet, http://www.nap.edu.

Suggested citation: National Research Council. 2009. *Rising Above the Gathering Storm* Two Years Later: *Accelerating Progress Toward a Brighter Economic Future.* Washington, D.C.: The National Academies Press.

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Printed in the United States of America

ACKNOWLEDGMENT OF REVIEWERS

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Academies' Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for quality and objectivity. The review comments and draft manuscript remain confidential to protect the integrity of the process.

We wish to thank the following individuals for their review of this report: Charles Brown, Rochester Area Colleges' Center for Excellence in Math and Science; Gail McClure, Arkansas Science & Technology Authority; Cherry Murray, Lawrence Livermore National Laboratory; Jennifer Poulakidas, The National Association of State Universities and Land-Grant Colleges; Rick Remis, Imagine West Virginia; and William Spencer, SEMATECH.

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the content of the report, nor did they see the final draft before its release. Responsibility for the final content of this report rests entirely with the author(s) and the institution.

PHOTOGRAPHS

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Summary of a Convocation

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Rising Above the Gathering Storm: Context for the "Two Years Later" Convocation

In October 2005 the National Academies released a report that New York Times columnist Thomas L. Freidman called *"a new New Deal urgently called for by our times."*[1]

Written by a nonpartisan committee of business leaders, university presidents, and prominent scholars, including three Nobel Prize winners, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* urged the United States to make the investments needed to *"compete, prosper, and be secure in the global community of the 21st century."*

The report recommended 20 specific implementing actions in four broad areas:

K-12 Science and Mathematics Education: *Increase America's talent pool by vastly improving K-12 science and mathematics education.*

Science and Engineering Research: *Sustain and strengthen the nation's traditional commitment to long-term basic research that has the potential to be transformational to maintain the flow of new ideas that fuel the economy, provide security, and enhance the quality of life.*

Science and Engineering Higher Education: *Make the United States the most attractive setting in which to study and perform research so that we can develop, recruit, and retain the best and brightest students, scientists, and engineers from within the United States and throughout the world.*

Incentives for Innovation: *Ensure that the United States is the premier place in the world to innovate; invest in downstream activities such as manufacturing and marketing; and create high-paying jobs based on innovation by such actions as modernizing the patent system, realigning tax policies to encourage innovation, and ensuring affordable broadband access.*

[1]Thomas L. Friedman (2005), "Keeping Us in the Race," *The New York Times*. October 14. Unless otherwise indicated, all other quotations and statements in this report were given at the convocation by participants.

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Charles Vest and Norman Augustine

On April 29, 2008, about 500 representatives of business, government, and academia met in Washington, D.C., to review the efforts taken to achieve the goals laid out in *Rising Above the Gathering Storm*. The convocation was organized by the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine with support from the National Math and Science Initiative. "A number of significant events have taken place since the *Gathering Storm* report was released," said Norman Augustine, who chaired the committee that wrote the report. Unfortunately, he added, most of those positive events have occurred in other countries. Governments around the world are boosting their support of science and engineering research, invigorating precollege science and math education, and investing in institutions of higher education. Meanwhile, the United States has made little progress in strengthening its education, research, and innovation systems. "It would be a cruel outcome if the *Gathering Storm* report were to motivate others to become more competitive while we did little," said Augustine.

Although global developments and trends in states and localities remain very important for the future of U.S. innovation, there were limits to what could be covered thoroughly in a one-day meeting. One of the breakout sessions covered state initiatives, but discussion at the convocation focused primarily on U.S. priorities and the federal policy context.

The following summary reports the main themes that emerged from the presentations and discussion sessions at the convocation. After a brief overview of the initial reception of the *Gathering Storm* report, the summary is organized around the report's four major recommendations. While progress has occurred in each of the four areas, many key steps have yet to be taken. "Competitiveness is very much on the agenda," said Augustine. "The problem is to convert that interest into action."

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The Overall Response to *Rising Above the Gathering Storm*

Rising Above the Gathering Storm "continues to resonate among many segments of industry, government, academia, and the public," said Charles Vest in his introductory remarks at the convocation. The report received widespread media coverage when it was released and generated extensive discussions among policymakers and business leaders. President Bush incorporated key ideas from the report into his American Competitiveness Initiative, which he announced during his 2006 State of the Union address a few months after the report was released. Congress included many of the report's recommendations in the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act, or the America COMPETES Act, which was passed by a large bipartisan majority and signed into law in August 2007.

Meanwhile, many states acted on the recommendations contained in *Rising Above the Gathering Storm*, and a convocation of state leaders and other stakeholders at the National Academies in September 2006 highlighted state achievements and catalyzed multistate collaborations. The private sector also responded to the report. For example, the National Math and Science Initiative (NMSI), which sponsored the "Two Years Later" convocation, was created after the report's release to address the nation's shortcomings in math and science education. All of these follow-up activities helped maintain the momentum created by the report to build the intellectual and economic foundations needed to ensure the United States' standard of living and national security.

However, several factors have limited progress. The America COMPETES Act authorized expenditures and programs in research and in education, but appropriations of the funds needed to implement most of the recommendations of *Rising Above the Gathering Storm* have not yet been forthcoming. Meanwhile, short-term concerns have distracted policymakers from the essential task of investing in the nation's future. The "Two Years Later" convocation was held in part to identify these obstacles and demonstrate how they can be overcome. "The time for action is now," said Vest.

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Without a dramatic increase in investment in basic research and reform of our K-12 educational system, it's very likely that America's children of tomorrow will enjoy a lower quality of life and standard of living than did their parents. . . . The key to competing is innovation — our ability to create new knowledge, turn that knowledge into products and services, and put those products and services into the marketplace.

—**NORMAN AUGUSTINE,** former Chief Executive Officer of Lockheed Martin Corporation

The enemy I fear most is complacency. We are about to be hit by the full force of global competition. If we continue to ignore the obvious task at hand while others beat us at our own game, our children and grandchildren will pay the price.

—**CHARLES VEST**, President of the National Academy of Engineering

We are not looking forward. We are looking backward. We have one of the highest per capita incomes in the world, and we think that we have an entitlement to continue with that. But if you have enough visas in your passport, you get an entirely different perspective.

—**CRAIG BARRETT,** Chairman of the Board, Intel Corporation

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K-12 Science and Mathematics Education

The recommendations in *Rising Above the Gathering Storm* appeared in order of the importance ascribed to them by the authoring committee, and improving K-12 science and math education remains the most pressing issue facing policymakers today, said Deborah Stine, Specialist in Science and Technology Policy at the Congressional Research Service, who was study director for the committee that wrote the report. Specifically, the report recommended efforts to attract undergraduate students majoring in science and math into teaching, to upgrade the skills of existing teachers, and to expand access to more demanding Advance Placement and International Baccalaureate science and math courses in U.S. high schools. U.S. students continue to perform below average on international comparisons of science and mathematics achievement.

From left to right, Bob Schieffer, Sally Ride, Craig Barrett, and G. Wayne Clough

Furthermore, the performance of U.S. students on international comparisons declines as students progress from elementary school to middle school to high school. Partly as a result, the proportion of U.S. high school students who choose to obtain science and engineering degrees in college remains lower than in many other countries.

In the abstract, parents agree that science and mathematics are important, said Sally Ride, CEO of Sally Ride Science. "But parents don't see it as important for *their* son or daughter, and kids don't see it as important for themselves." The challenge is to convert an abstract concern into actions that have an effect on every U.S. student.

Teacher Recruitment, Training, and Support

School systems throughout the country struggle to hire teachers who are qualified to teach science and mathematics. "More than 60 percent of the math teachers in this country teaching fifth through eighth graders are not either a math major or certified in math," said Ride. "And in the physical sciences, it's even worse." As a result, teachers

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We are now holding schools accountable for the achievement of every single child beginning in elementary school, . . . which is the only way we will close and attend to the untenable achievement gap that we have in our country.

—**MARGARET SPELLINGS,** Secretary of the Department of Education

As a father of 5 kids and a grandfather of 12, I have never been more worried for our country than I am today.

—**FRANK WOLF,** U.S. Representative from Virginia

We have to get over the notion that there is a "math gene," because there isn't. . . . All children need to develop conceptual understanding of particular topics, become proficient in that mathematics, and be able to use that to solve important problems.

—**FRANCIS (SKIP) FENNELL,** Professor, McDaniel College

tend to rely heavily on textbooks and avoid the open-ended explorations that are the most effective way to learn science and math. Not surprisingly, many students gradually lose interest — for example, more girls are interested in math at the beginning of middle school than at the beginning of high school. "The longer our kids stay in school, the less they like science and math," said Ride.

The problem of underqualified teachers is especially severe at schools that serve large numbers of minority and low-income students. Research shows that the strongest influence on the performance of students in a class is whether they have a teacher with a bachelor's degree in the subject they teach. Yet schools serving minority and poor students typically have the least qualified teachers.

The America COMPETES Act authorized a program called Teachers for a Competitive Tomorrow, which is modeled in part after the UTeach program at the University of Texas. The UTeach program encourages undergraduate students to take courses in science, mathematics, and engineering while also earning a teaching certificate. According to Secretary of Education Margaret Spellings, after four years 82 percent of the program's graduates are still teaching, and almost half of those teach in schools where the majority of students receive free or reduced-price lunches.

The Teachers for a Competitive Tomorrow program also would support current teachers to return to college to receive a science or mathematics degree. And the America COMPETES Act includes a provision supported by Representative Rubén Hinojosa of

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Texas that would create partnerships between high-need school districts and colleges, universities, and private sector companies to improve high school laboratories.

The private sector is also supporting teacher recruitment and training programs. NMSI, with support from ExxonMobil, the Michael and Susan Dell Foundation, and the Bill & Melinda Gates Foundation, has made grants to 13 universities — from 52 that applied — for programs similar to UTeach. The ultimate goal, said NMSI CEO Tom Luce, is "to make sure that these programs are available in all 50 states."

In addition, the America COMPETES Act authorizes the Math Now program that has been proposed by the administration but not yet funded. The program would use the recent report of the National Mathematics Panel to strengthen math education in elementary and middle schools so that students enter high school ready to take challenging math coursework. Teacher training would be an essential part of this program, because "teachers matter a lot," according to Professor Francis (Skip) Fennell of McDaniel College. "We need people who know the subject and love the subject delivering it every day as early as the first grade or even earlier."

Preparation for College

Students who take high-level courses in high school are much more likely to do well in college. According to Spellings, "A high school student who passes an Advanced Placement exam is three times more likely to earn a college degree than those who do not. If a student is African American, just taking and passing AP exams makes it four times more likely that that child will receive a college degree."

Sen. Kay Bailey Hutchison

Individual schools, school districts, and states have been encouraging larger numbers of students to take AP courses so that they are better prepared for college-level work. For example, the O'Donnell Foundation has supported a program that provides teachers with training to deliver AP courses in the Dallas public schools, and the program has been so successful, according to Senator Kay Bailey Hutchison of Texas, that it has received federal funding as well.

The administration has proposed that such programs be expanded, and the America COMPETES Act authorized such an expansion. Adequate appropriations now need to be

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Schools with a high proportion of minority students have the least qualified teachers and the fewest tools to work with. That has to change. It has to change not because we would like it to change, and not even because we want equal rights. It has to change because those children are the future of this country and its survival. . . . This is our war for today — right here on our shores — to educate our young people.

—EDDIE BERNICE JOHNSON,
U.S. Representative from Texas

It takes years or decades to build the capability to have a society that depends on science and technology. You need to generate the scientists and engineers, starting in elementary school and middle school. You have to fund the fundamental research that those scientists do. You have to generate the engineers who can turn those scientific breakthroughs into products and services. And then you have to have the right environment for innovation.

—SALLY RIDE, Chief Executive Officer of Sally Ride Science

secured for the expansion, since "this is where the rubber is going to hit the road," Hutchison said. In addition, NMSI is working to replicate programs like the one in Dallas in other districts and states. For example, when NMSI issued a request for proposals to promote AP classes and train AP teachers, 28 states applied, and NMSI was able to fund 7 grants. "That means there are 21 states already on a waiting list that Congress can help us fund," said Tom Luce.

Support for Basic Research

Rising Above the Gathering Storm called for the federal government to increase its investment in long-term basic research by 10 percent each year over the next seven years. The administration responded to this recommendation in its American Competitiveness Initiative, which established a trajectory to double the collective budgets of the National Science Foundation (NSF), the laboratories of the National Institute of Standards and Technology (NIST), and the Department of Energy's Office of Science over ten years. In turn, the America COMPETES Act authorized funding that would achieve this doubling in seven years.

However, the FY 2008 appropriations bills severely disappointed the expectations of research supporters. According to Augustine, the 2008 appropriations process experi-

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enced a "systems failure," with most federal research and development (R&D) programs receiving substantially less than in the President's budget request and in Congressional authorizations. "Regrettably," said NSF director Arden Bement, "the funding has failed to appear. . . . As often happens in politics, the short term squeezed out the long term."

The consequences for some federal agencies and research performers have been severe. According to Steven Chu, director of Lawrence Berkeley National Laboratory, despite authorization bills backed by both parties, the appropriations for basic research were much less. "In constant dollars (adjusted for inflation), the budgets of the Department of Energy's Office of Science from 2006 through 2008 were almost flat. For fiscal 2008, this meant that essentially no new proposals for solar energy research were funded by the DOE Office of Science, and many programs received cutbacks." The National Science Foundation was able to support 1,000 fewer new research grants in 2008 and 230 fewer graduate research fellows, with more than 3,000 faculty researchers, graduate students, postdoctoral fellows, and undergraduates affected. Many new high-impact centers in areas such as physics, materials science, and chemical innovation also could not be funded. "The nation's colleges and universities have been particularly hard hit," noted Bement. "The four-year period from 2004 through 2007 may represent the first continuous decline in federal investment and basic R&D in colleges and universities in the past 25 years."

From left to right, Charles Vest, Arden Bement, and Rep. Rush Holt

This basic research is an essential underpinning of future economic prosperity, many speakers at the meeting pointed out. Many 20th-century technologies, such as the transistor and biotechnology, sprang directly from basic research. These technologies are often transformative, noted Chu, in that they become the foundations of multiple industries and great wealth.

The funding needed to boost basic research is not a large amount in the context of the federal budget. As University of Maryland President C.D. Mote, Jr. observed, the federal government recently put together a multi-billion-dollar package to shore up the mortgage industry. "Ironically, that amount of money would have funded the entire

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Other countries are dedicating themselves and devoting resources to get their share of the high-technology pie — and there's nothing wrong with that, that's good. But we have to be able to compete and maintain our own share of that pie, because that is where the high-wage jobs lie and where the standard of living of our country will be set.

—**G. WAYNE CLOUGH,** Secretary of the Smithsonian Institution and former President of the Georgia Institute of Technology

Investments in research and education are where the future battle for international economic leadership will be fought, and where the United States is drifting. While the storm continues to gather, we are still at sea.

—**ARDEN BEMENT,** Director of the National Science Foundation

Just as DARPA gave us the Internet, ARPA-E can give us alternative, clean, renewable fuels that can make America energy-independent and can make us a much stronger nation.

—**BART GORDON,** U.S. Representative from Tennessee

The research areas that will transform the landscape and give us totally new choices and totally new technologies have always historically been basic research. . . . Continued support of that research should be a very high priority.

—**STEVEN CHU,** Director of Lawrence Berkeley National Laboratory

Productivity growth depends on two things: a well-trained work force, and new ideas. Each of those requires investment. I would argue that we are under-investing in research and development in every sector of our economy, drastically under-investing. . . . It is a societal problem. It is not just a congressional problem or an administration problem.

—**RUSH HOLT,** U.S. Representative from New Jersey

Rising Above the Gathering Storm report, every piece of it, for a decade. So it's not a matter of money. It's a matter of will."

The *Gathering Storm* report also called on the federal government to provide research grants to early-career researchers, support research instrumentation and facilities, allocate funding to high-risk, high-payoff research, institute awards to stimulate scientific and engineering advances, and create an Advanced Research Projects Agency-Energy to address environmental, energy, and security issues. The America COMPETES Act calls for support of high-risk research and authorized ARPA-E, but appropriations have not yet been made to enable these actions.

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Science and Engineering Higher Education

In contrast to precollege education, U.S. colleges and universities are world leaders in science and mathematics education. But proportionately fewer U.S. students take advantage of these institutions than is the case in other countries. *Rising Above the Gathering Storm* recommended efforts to expand the pool of U.S. citizens earning degrees in science, technology, engineering, and mathematics (STEM), as well as steps to allow the United States to remain an attractive place for talented foreign students to earn STEM degrees. As Secretary of the Smithsonian and former Georgia Institute of Technology President G. Wayne Clough pointed out, "twenty years ago the United States was almost number one in the world [in undergraduate degree production], with about 39 percent of our people getting a two-year or four-year degree in college. Today we're tenth and falling rapidly as other nations push past us."

Many students in U.S. colleges and universities pursuing science and engineering degrees are from other countries. As Sally Ride observed, the number of U.S. students with engineering Ph.D.s is declining as foreign students increase their presence in engineering graduate programs, and the same trend can be seen in many scientific disciplines. At the same time, other countries are increasing their investments in higher education, which will entice more foreign students to remain in their own countries for graduate school. Students in other countries "are every bit as good as the students in this country," said Clough. "What they lack, for now, is the masters and Ph.D.-level education. But that will come, because those countries are investing in those areas."

According to Craig Barrett, "The United States has the best technical universities in the world, and after we educate other countries' students in science and engineering, we make it difficult for these same students to stay and work in the United States." While visa processing for students and visiting scholars has improved in the last few years, strict limits remain on the number of foreign scientists and engineers who are allowed to work in the United States. Furthermore, the problem of recruiting and retaining sufficient scientists and engineers will become especially severe in the next one to two decades as large numbers of U.S. scientists and engineers educated in the 1950s and 1960s retire.

As minority groups come to represent a larger fraction of the U.S. student population, outreach and support for members of those groups will become increasingly important to increase their representation in the science and engineering workforce. For example,

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America needs to draw on all its talent, especially a growing population of minority students who continue to be under-represented in STEM fields.

—**RUBÉN HINOJOSA,** U.S. Representative from Texas

In the two and a half years since the release of this report, we still have not taken up the key steps that are needed to meet the intent of [its] goals. After a surprising amount of positive public attention and a lot of work by a lot of people, we are not moving to where we need to go, and there is no imminent momentum to change this direction. The world is running away from us.

—**C.D. MOTE, JR.,** President of the University of Maryland

We may have the greatest higher education system in the world — and the statistics tend to bear that out — but we also know that we're part of the problem at higher education institutions. We're discouraging too many students from getting STEM degrees. There's too high a dropout level from the enthusiastic freshman entrants who want to major in STEM to the number who graduate with STEM degrees.

—**WILLIAM BONVILLIAN,** Director of the MIT Washington Office

Rep. Hinojosa described the Hispanic Engineering, Science, and Technology (HESTEC) program at the University of Texas-Pan American. HESTEC has become a model program for promoting science, technology, engineering, and mathematics careers among predominantly Hispanic students in South Texas. In the seven years since HESTEC was founded, the engineering school at UTPA has grown from 100 students to 1,200, Hinojosa said. The reauthorization of the Higher Education Act includes a program called Youth Engagement in STEM Partnerships that is designed to replicate the success of HESTEC at minority-serving institutions across the country. The America COMPETES Act also emphasizes increasing the numbers of minorities and women in STEM fields and expanding minority-serving institutions' participation in education, research, and development.

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Incentives for Innovation

Rising Above the Gathering Storm called on policymakers to improve the innovation environment in the United States by strengthening intellectual property protection, making permanent the research and development tax credit and enacting other tax incentives, and ensuring ubiquitous broadband Internet access. Progress on all of these fronts has been disappointing, according to Gail Cassell, Vice President of Scientific Affairs at Eli Lilly & Company. The U.S. Patent and Trademark Office continues to be plagued by enormous backlogs of work. As a result, the PTO has tried to shift some of the work burden onto patent applicants, which has further weakened the patent system. Aspects of patent reform are being debated in Congress, but no action has yet been taken.

The record on tax incentives is worse. The existing R&D tax credit had expired and not been renewed at the time of the convocation, though it was renewed retroactively later in 2008. Other countries are offering not only R&D tax credits but other tax incentives to companies that establish or enlarge R&D operations. These incentives have contributed to decisions by U.S.-based companies to establish R&D facilities in other countries.

Finally, progress on providing more widespread broadband Internet access has been minimal. "A number of nations, as we know all too well, are ahead of the United States in providing broadband access for home, school, and business," Cassell said.

Shortcomings in the environment for innovation in the United States are already having a major effect. For example, Barrett pointed out that Intel used to make 90 percent of its venture capital investments in the United States. Now, Intel splits its venture capital investments in half between the United States and Asia. "Anyone in the audience from the United States who says that the Chinese or Indians are not entrepreneurial, not creative, that they don't want to rival the United States in business startups has not been to India or China," Barrett said.

Fundamental structural deficiencies in public policies add to future uncertainties. For example, Representative Frank Wolf of Virginia warned of unfunded obligations and a "tsunami of debt" that could bankrupt the country. "In 1962, mandatory spending on Social Security, Medicare, Medicaid, and interest on the national debt comprised less than one-third of the federal budget. Today it is two-thirds," he said. The non-defense, discretionary portion of the budget, the source of funding for many of the priorities identified in *Rising Above the Gathering Storm*, is gradually being crowded out. Wolf is working with other policymakers to establish a bipartisan commission charged with

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making a set of recommendations on government funding that would be subject to a single up-or-down vote, similar to the commission asked to designate military bases for closing. Without such a step, said Wolf, "I can't help but wonder what sort of future today's partisan Washington is leaving to our children and grandchildren."

In addition to its weaknesses, the United States has particular strengths in innovation, speakers at the convocation noted. One is our historical openness to new immigrants and new ideas. "Openness has traditionally been the sign of our confidence," said Secretary of Commerce Carlos Gutierrez. "When we are confident as a nation, when we know we can compete, we are open. I'm talking about openness to investments, openness to trade, and openness to people. We have always been at our best when we have been open."

From left to right, Sec. Margaret Spellings, Sec. Samuel Bodman, and Sec. Carlos Gutierrez

The United States also has a long history of successful innovation. Many companies based on new technologies that became world leaders were founded in the United States. Today, U.S. companies and the U.S. workforce continue to have a flexibility that is needed to adapt to new circumstances. Teams of "scientists, engineers, marketers, managers, distributors, and creative thinkers" can be founts of creativity, said Deborah Wince-Smith, President of the Council on Competitiveness. "Let me also make the case that marketing, entertainment, artists, cultural anthropologists, even archeologists — people who look at the world in a different way — need to be brought together as part of our skill base."

A history of cooperation between the public sector and private sector is another great strength of the U.S. innovation system. "Maybe that is the secret of our success," said Sen. Hutchison. "Our academics are not just sitting in ivory towers talking to each other. They're talking to people in the private sector who are doing research or thinking of ideas." SEMATECH, which began as a public-private collaborative effort to improve the manufacturing competitiveness of the U.S. semiconductor industry, is an excellent example of an effective and cooperative applied research program. According to George Scalise, President of the Semiconductor Industry Association, "The consortium included semiconductor component, semiconductor equipment, and materials suppliers in a suc-

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cessful effort that developed the tools and processes that vaulted the United States into the technology and market share leadership of the worldwide component and equipment industries."

State Initiatives

Another bright spot for innovation in the United States has been an upsurge of activity in the states. "If the federal government is stuck in the red zone, I'd say the states are scoring touchdowns right now," said University of Michigan President Emeritus James Duderstadt. "There is considerable activity at the state level, particularly in STEM education at the K-12 level, in higher education, and in research."

Representative Bart Gordon

The most successful states have had leadership from their governors and a long-term strategic framework with short-term actions that can be embraced, according to Duderstadt. Important ideas often bubble up from the grassroots level, and leadership at the top is needed to implement those ideas. Grassroots political activities are also crucial for building awareness of state programs and for bringing pressure to bear on federal policymakers. For example, advisory groups drawing from the business community, higher education, the media, and other groups can have an important influence on state policy.

Some state policies may involve paradigm shifts, according to Duderstadt. Examples include moving to 12-month appointments for teachers or distributing some federal research support to build capacity as well as to take advantage of established capacity.

States also have made progress by sharing successful strategies among themselves. And federal policymakers can learn important lessons from the states. "Frequently what happens in the states leads what happens in this town," said Duderstadt.

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Whether we are in the private sector or in academia, the non-profit world or in government, we all have a responsibility to make the case for the power of innovation to address our most pressing challenges, be they to our national security, to our health and well-being, or to our economic competitiveness.

—**SAMUEL BODMAN,** Secretary of the Department of Energy

Intellectual property is a key element in our nation's economic expansion and has helped make American workers the most productive in the world. Almost one-half of our economy is somehow tied to intellectual property.

—**CARLOS GUTIERREZ,** Secretary of the Department of Commerce

The bottom line is that other nations are following our lead and catching up. Not only are they making research a high priority but they are providing incentives to stimulate innovation in the private sector and to lure members of the U.S. private sector — and, I might add, our scientists — to their countries.

—**GAIL CASSELL,** Vice President of Scientific Affairs for Eli Lilly

There is a lot happening in states and in industries that is coming up as opposed to coming down from Washington.

—**TOM LUCE,** Chief Executive Officer of the National Math and Science Initiative

I truly believe we need a White House Council on Innovation and Competitiveness, not an innovation foundation that is housed in one agency or department. The White House provides the cross-cutting analysis and integration of all agencies, so that tax policy, regulation, R&D investment, and workforce training can be aligned for the nation and the innovation economy.

—**DEBORAH WINCE-SMITH,** President of the Council on Competitiveness

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Conclusion

Dramatic historical events can inspire great achievements. Following the Soviet Union's 1957 launch of Sputnik, the United States made a commitment to science and technology and to mathematics and science education. Twelve years later, the nation landed a manned spacecraft on the moon.

Today, the issues associated with climate change and dependence on foreign sources of oil pose an equally great challenge, and several speakers at the symposium urged that energy security be the rallying cry for a new national commitment to science, technology, engineering, and mathematics. "The goal," said Senator Lamar Alexander of Tennessee, "would be to find ways to help our country, which consumes 25 percent of the energy in the world, to achieve clean energy independence and do it at a price families can afford."

Sen. Lamar Alexander

Such a goal could unleash the creative power of governments, businesses, and students, Craig Barrett said. "The future is not going to be oil or natural resources," he said. "The future is the brain power of your workforce. The future is ideas." A national goal also could attract bipartisan support, as did the America COMPETES Act. "This is still the only country in the world where people can say with a straight face that anything is possible and really believe it," said Sen. Alexander. "These are precisely the ingredients that America needs during the next five years to place ourselves firmly on a path to clean energy independence and in doing so to make our jobs more secure, to help balance the family budget, to make our air cleaner and our planet safer and healthier, and to lead the world to do the same."

More than two years after its publication, the *Gathering Storm* report continues both to inspire and to guide the actions of policymakers, business leaders, and educators. Several speakers proposed that the continuing influence of the report be augmented, perhaps by convening regular meetings to monitor progress. As a new administration prepares to take office, continued attention to the recommendations in *Rising Above the Gathering Storm* will serve the nation well.

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Gathering Storm is much more than a report. It is an action plan that needs to be implemented.

—**TOM LUCE,** Chief Executive Officer of the National Math and Science Initiative

It's been striking to me, listening this morning, to hear Democrats and Republicans speaking with a common voice about what we need by way of a new direction.

—**DAVID FERRERO,** Senior Program Officer for the Bill & Melinda Gates Foundation

Many students, professors and scientists across the country are lining up and saying that the energy problem is a national and international crisis. They want to enlist, but the recruiting stations remain closed.

—**STEVEN CHU,** Director of Lawrence Berkeley National Laboratory

We have a comparative advantage on the world stage. We still have the most innovative nation on this planet; we have a strong science and technology base built over many years; we have a free market and an entrepreneurial economy; and we built all this on a substrate of democracy and a diverse population. If we get our act together, nobody can beat us at this game. But that means we have to consciously as a nation invest in the things that will allow our people to build on our advantage.

—**CHARLES VEST,** President of the National Academy of Engineering

Today the problems are more complex [than they were in the 1950s], and more global. They'll require a new, educated workforce, one that is more open, collaborative, and cross-disciplinary.

—**KRISTINA JOHNSON**, Provost of the Johns Hopkins University

We are quite literally at the center of a very historic effort to make our energy supplies cleaner, more diverse, more affordable, and more secure. Getting there will not be easy. This is very hard work. But together, I believe we can do it. I have tremendous faith in this country, in our scientists, in our engineers, and in our ability to come together to innovate and to lead.

—**SAMUEL BODMAN,** Secretary of the Department of Energy

I tend to be struck by how far we have come. . . . But I'm also struck by how far we have to go. It's very doable. It's just going to take some work.

—**NORMAN AUGUSTINE**, former Chief Executive Officer of Lockheed Martin Corporation

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APPENDIX

Convocation Agenda

***Rising Above the Gathering Storm* Two Years Later:**
Accelerating Progress Toward a Brighter Economic Future

JW Marriott Hotel, Washington, DC
April 29, 2008 (Tuesday)

7:00 AM Breakfast

8:00 Welcome from the Organizing Committee

Charles Vest, President, National Academy of Engineering
Norman Augustine, Convocation Chairman and CEO Emeritus, Lockheed Martin
Tom Luce, CEO, National Math and Science Initiative

8:20 Opening Panel: Meeting the Competitiveness Challenge

Bob Schieffer, Chief Washington and Capitol Hill Correspondent, CBS News (Moderator)
Craig Barrett, Chairman of the Board, Intel
Sally K. Ride, Chief Executive Officer, Sally Ride Science
G. Wayne Clough, President, Georgia Institute of Technology

9:00 Congressional Perspectives

Honorable Kay Bailey Hutchison, U.S. Senate (Texas)
Honorable Rush Holt, U.S. House (New Jersey)
Honorable Bart Gordon, U.S. House (Tennessee)
Honorable Lamar Alexander, U.S. Senate (Tennessee)
Honorable Rubén Hinojosa, U.S. House (Texas)
Honorable Frank Wolf, U.S. House (Virginia)
Honorable Eddie Bernice Johnson, U.S. House (Texas)

11:00 Federal Cabinet Member Perspectives

Honorable Margaret Spellings, Secretary of Education
Honorable Samuel Bodman, Secretary of Energy
Honorable Carlos Gutierrez, Secretary of Commerce

Noon Lunch

1:00 PM Overview of Issues

K-12: Tom Luce, CEO, National Math and Science Initiative
David Ferrero, Senior Program Officer for Education, Bill & Melinda Gates Foundation
Francis (Skip) Fennell, Professor of Education, McDaniel College and Past-President, National Council of Teachers of Mathematics

Research: Arden L. Bement, Jr., Director, National Science Foundation
Steven Chu, Director, Lawrence Berkeley National Lab

Higher Ed: C.D. Mote, Jr., President, University of Maryland, College Park
Kristina Johnson, Provost, Johns Hopkins University

Innovation: Deborah Wince-Smith, President, Council on Competitiveness
Gail Cassell, Vice President, Scientific Affairs, Eli Lilly

2:30 Breakout Groups

1. American COMPETES: Moderator: Deborah Stine, Specialist in Science and Technology Policy, Congressional Research Service – Ballroom, Salons III and IV

2. State Strategies: Moderator: James Duderstadt, President Emeritus, University of Michigan – Russell Room

3. Higher Education: Moderator: William B. Bonvillian, Director, MIT Washington Office – Dirksen Room

4. K-12: Moderator: Tom Luce, CEO, National Math and Science Initiative – Hart and Cannon Rooms

5. Research and Innovation Environment: Moderator: George M. Scalise, President, Semiconductor Industry Association – Rayburn Room

3:30 Breakout Groups Report

4:00 Comments from the Floor

5:00 Adjourn

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