

*The author outlines a national effort to ensure U.S. competitiveness in the global economy.*

# The Next Big Surprise



Lamar Alexander is U.S. senator from Tennessee.

## Lamar Alexander

September 11th came as a big surprise to this country. We weren't expecting what happened, and we weren't prepared for it. As General Carl Stiner, former head of U.S. Special Forces, recently reminded me, we should have seen the warning signs.

In 1992, a U.S. military training mission in Saudi Arabia was bombed, and 43 American soldiers were killed. In 1993, the World Trade Center in New York was targeted; six people were killed and 1,000 were injured. In 1995, a National Guard training mission in Saudi Arabia was bombed, and five soldiers were killed. In 1996, the bombing of the Khobar Towers in the same nation killed 19. Bombings of the U.S. embassies in Kenya and Tanzania killed 224 in 1998. And in 2000, the *USS Cole* was attacked off the coast of Yemen killing 17. Today, our government is mobilized in an unprecedented effort to make sure terrorism never surprises us again.

In the meantime, we have been ignoring the next big surprise—that in 10 or 20 years other countries may close the economic gap between themselves and the United States. As there were with 9/11, there are warning signs. Indian cities like Bangalore have become magnets for companies that once were found only in Silicon Valley. Last year, when I was in Japan, Tokyo

was abuzz because China had surpassed Japan as the second largest oil-guzzling nation in the world. (The United States is first.) In 2003, China launched its first man into space. The U.S. share of worldwide high-tech exports has been in a 20-year decline; from 1980 to 2001, our share fell from 31 percent to 18 percent. At the same time, the global share for China, South Korea, and other emerging Asian countries increased from just 7 percent to 25 percent. China graduates almost four times as many engineers as the United States and offers lucrative tax breaks to companies that conduct research and development (R&D) there. India is pouring money into technology parks to lure Indian citizens who attended American graduate schools. South Korea graduates nearly the same number of engineers as the United States, even though it has only one-sixth the population and one-twentieth the GDP. These are sobering statistics.

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When I was in Europe in March 2004, I heard that British Prime Minister Tony Blair and German Chancellor Gerhard Schroeder were working to model their universities on American institutions. In 1998, Europe graduated more Ph.D.'s than the United States; the goal is for Europe to graduate five times as many Ph.D.'s as the United States in the next five years. In February, the European Union affirmed that its economic development strategy is directly linked to reforms in higher education.

The United States, with only 5 percent of the world's population, has 30 percent of the world's wealth. That's an astounding figure. The people of China, India, Brazil, and other countries around the world have noticed, and they don't see any reason for the United States to continue to hold such a lead over them. They are undertaking calculated, concerted efforts to improve their competitiveness in the global marketplace, especially when it comes to science and technology.

America prospered during the latter part of the twentieth century like no other country had before, and at

least part of that success reflected our commitment to educating and supporting several generations of American innovators. According to Nobel laureate economist Robert Solow, nearly half of our nation's economic growth since World War II can be attributed to advances in science and technology. So, what must America do to maintain leadership in the global economy? How can we succeed in an increasingly competitive marketplace?

If we are to continue to enjoy our prosperity, we will have to make new, strategic investments in science and technology and education in the twenty-first century. Here are a few ways we can maintain our competitive edge.

### **Increased Funding for Research in the Physical Sciences**

As I noted earlier, nearly half of our nation's economic growth since World War II can be attributed to advances in science and technology. If we want that growth to continue, we must invest in the research that fuels those advances at national laboratories and universities. This means a stronger investment in fundamental research in the physical sciences and a sustained commitment to regaining international leadership in areas such as advanced scientific computing at dedicated national user facilities.

In recent years, investment has shifted away from research in the physical sciences and engineering to the life sciences. Product development and applied research now attract more than 80 percent of the \$240 billion spent annually on R&D by the public and private sectors. Only 18 percent is devoted to basic research—a number we need to increase if we are to remain competitive in the long run.

Many proposals have been made about how to do this. Last year, Senator Carl Levin and I sponsored a bill to double the funding for the U.S. Department of Energy (DOE) Office of Science over the next five years. In April 2005, 67 senators joined with me to ask Congress for a 7 percent increase over the President's funding request for the DOE Office of Science. Not many proposals in the Senate attract that level of support during tight budget times, and our request was honored. On the House side, Congressman Frank Wolf of Virginia recently proposed that funding be tripled for federal basic science programs and that the government pay the interest on undergraduate loans for students who agree to work in science, math, or engineering for a five-year period after graduation.

### **Coordinated Federal Programs to Optimize Innovation**

Unfortunately, the need for more investment in research isn't our only problem. According to a recent report issued by the National Commission on Energy Policy, an "insufficiency in investment [in energy-related R&D] is compounded by shortcomings in the government's management of its energy-technology innovation portfolio." The commission also noted that "Recommendations for strengthening the organization and management of the government's energy research, development, demonstration, and deployment programs have emerged from every major recent study."

Let me give you an example of why the commission may be right. From 1993 to 2001, we poured billions of dollars into the Partnership for Next Generation Vehicles (PNGV), which was supposed to result in American leadership in the deployment of hybrid vehicles. PNGV was led by a consortium of the Big Three automakers, while domestic manufacturers like Toyota, Honda, and Nissan, that wanted to participate in the program, were left out. Yet on America's roads today you see lots of Toyota and Honda hybrids but not many hybrids from the Big Three. That approach simply didn't work.

The recently passed Energy Bill took a different approach that I hope will be more successful. In that bill, we provide grants to domestic automobile manufacturers to encourage the production of hybrid and advanced diesel vehicles; these grants apply to all domestic producers, regardless of where their company headquarters are located. I think that's a better approach in this specific case, and it illustrates a larger point—that we must ensure that our incentives for R&D are geared to producing the maximum benefit to American producers and consumers.

Implementing best management practices in research programs will also be key to success in the future. I recently spoke about R&D management with Dr. Tony Tether, director of the Defense Advanced Research Projects Agency (DARPA), a successful U.S. Department of Defense organization that invented the Internet, stealth technology, and some aspects of global positioning system (GPS) technology. DARPA is generally recognized as a success in terms of its ability to bridge the "innovation gap" between scientific discovery and technology implementation.

Dr. Tether believes that the key to DARPA's success is people. To maintain an entrepreneurial atmosphere and the flow of new ideas, DARPA steadily rotates in

and empowers very highly qualified program managers based on "Experimental Personnel Authority"; most program managers serve only four years. The practice is based on the belief that new ideas come from new people. New program managers are also able to redirect the work of their predecessors—and even undo it if necessary. The combination of new people, a flat organizational structure in which expert program managers are empowered to make decisions, and the fact that DARPA has no dedicated laboratories or facilities to support and maintain, have ensured that DARPA has very few institutional interests other than innovation. I hope we can apply some of these same practices in other federal organizations that manage R&D portfolios aimed at bridging the innovation gap.

### **Reform of U.S. Immigration and Visa Policies**

Getting the "people question" right requires more than good management policies. It also requires attracting the best and brightest minds to study and work in our country. That's why our immigration policy must not only preserve American security but must also welcome talented individuals from around the world. Since September 11, 2001, we have clamped down on entry into our country, and our policies have become stricter. As a result, international applications to American graduate schools declined by 28 percent from 2003 to 2004. Applications from China fell by 45 percent and from India by 28 percent. Scientific conferences are increasingly being held outside the United States. We must reverse this trend.

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Much of the trouble has arisen from the Visa Mantis clearance process for students and researchers who might be studying sensitive technology. Early this year, the State Department took an important step in the right direction by announcing a change in that process that will extend the validity of clearance for the duration of

study (up to four years) for students who remain enrolled in the same program here in the United States. The average time for Visa Mantis clearance has dropped from 77 days to 14 days, and our embassy in Beijing reports that Chinese student visa applications this year are up 15 percent. These are dramatic improvements.

Yet more can be done. I recently co-chaired a roundtable with key senators and senior administration officials, including the Deputy Secretary of Homeland Security, to see what additional steps can be taken to improve our visa policy so that we attract, rather than discourage, the best and brightest foreign students and researchers to study here, work here, and even eventually live here as American citizens.

One idea that was suggested was making comparable changes for researchers by making the Visa Mantis clearance last for the duration of a given research project. Another idea was to find a way to eliminate the requirement that talented students and researchers demonstrate an intent to leave the United States after studying or working here. Study visas serve that purpose now for students, and H-1B visas serve that purpose for skilled workers. But we need to do more.

### **Enabling States to Pay for Higher Education**

In addition to our commitment to attracting talented students, we must also maintain our overall commitment to higher education. When I was governor of Tennessee, 50 cents of every dollar we spent went toward education. Today that number is down to 40 cents. Why? Because states are bearing an increasingly large burden for Medicaid—Tennessee’s program is called TennCare. Tennessee now spends 31 cents of every dollar on health and social services; when I was governor it was only 15 cents. Much of that increase is the result of ongoing, unsustainable growth in Medicaid spending.

As a senator, I hope to be a Paul Revere for federalism and wake people up to the fact that what we do in Washington, D.C., can have significant effects on state spending. States are significantly restrained by federal regulations and the federal courts. We must make sure that when we pass laws in Washington, we are not sending the bill for implementing those laws to governors and mayors back home. Those are unfunded mandates, which the Republican Congress made a commitment to curbing 10 years ago when it passed the Unfunded Mandate Reform Act.

The other significant pressure on state funding decisions comes from the federal courts. The courts protect

our rights, and it’s important that they do so, but they should not be making policy decisions we elect our local leaders to make. I have introduced the Federal Consent Decree Fairness Act to slow down what two New York Law School professors have called “democracy by court decree”—the judicial management of state and local policies. Passage of this bill would level the playing field for state and local governments trying to regain control over programs that have been taken over by the federal courts.

States have traditionally paid a certain cost for universities located within their borders. But as state budgets are being “crunched,” states are contributing less overall to education. To compensate, universities have been raising tuition. Only by getting the federal government off the backs of state and local governments can states hope to continue providing significant funding to universities.

### **Unintended Consequences of Federal K-12 Education Standards**

A lot of thought has been focused on what can be done in higher education and research investments to improve the competitiveness of the United States, but we also need to take a step back and address problems where creative thinking starts, in young children in their most formative years. As the federal government sets standards and encourages states to ensure that all children succeed, we must make sure that K-12 schools also continue to challenge and inspire students who are high achievers, particularly students who excel in math and science. K-12 schools must provide them with experiential, in-depth learning, which is essential for innovation.

### **Conclusion**

I have focused on just five of many areas where we can launch a national effort to ensure that the United States remains competitive in the global economy. The rest of the world is no longer content to allow 5 percent of its population to have 30 percent of its wealth. If we don’t begin to adapt quickly to global changes, the next big surprise for the United States will come 10 or 20 years from now when we wake up and realize our standard of living is slipping. The challenge before us is complex and urgent. We all need to work together to ensure that our current prosperity is passed on to the next generation.