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Science In Jeopardy

America's position as the undisputed world leader in scientific and engineering research is in jeopardy. The threat lies in congressional budget pressure to cut billions from the fundamental component of basic research. If this happens, America may lose one of its most valuable assets—its technical preeminence. And it may take generations to reclaim that leadership.

Fifty years ago, a conscious decision to establish a federally sponsored program linking government and universities in fundamental research helped usher in a period of optimism and prosperity never before seen. This partnership simultaneously trained the next generation of inquiring minds, expanded humankind's base of knowledge and led directly to improvements in our quality of life and standard of living. It also produced major advances in many areas of science and engineering and led to whole new branches of science—molecular biology, cybernetics, solid-state physics—and whole new industries—aerospace, pharmaceuticals, biotechnology, magnetic resonance imaging and computers.

In 1945, Vannevar Bush wrote in a presidential report that "without scientific progress, no amount of achievement in other directions can insure our health, prosperity and security as a nation in the modern world." A little more than 10 years later Sputnik was launched. The little radio beeps it sent back served as a wake-up call for U.S. science. We marshaled our resources, redesigned our education system with an emphasis on science and math and, by superb efforts in science and engineering, were able to put men on the moon before the end of the next decade. We could not have made this magnificent achievement without our investment in federal support for university-based research. We went on to develop the best system of graduate education in science and engineering in the world.

There are countless examples of the societal benefits of scientific applications that were born of basic research. The 30-year, \$5 billion federal investment in computer research produced the technological breakthroughs that led directly to development of many computer and communications industries, which now account for \$500 billion of our gross domestic product and employ millions of Americans. We can attribute the open, non-proprietary design of the Internet to a federally funded program originally ~~decided~~ to help scientists and engineers

communicate with each other.

Scientific and engineering research has also led to applications that help us contend with the elements. A network of weather satellites now warns of approaching storms. My own institution, Caltech, is collaborating with the U.S. Geological Survey on a system to monitor and study earthquakes. This work could eventually lead to an early warning system that could save lives. The House has passed an appropriations bill that would effectively terminate this productive partnership.

Without government-funded basic research it is doubtful the late Dr. Jonas Salk would have created the vaccine for the worldwide scourge of polio. Basic research has also led to treatments and devices that extend the lives, and the quality of lives, of millions of Americans with heart disease. Other examples abound.

Congress is currently focused on budget cutting. But some of these cuts do not make economic sense. We must remember that saving billions of dollars by not funding research pales in comparison with the *trillions* of dollars that could be saved by developing new medical treatments, new energy sources, and new methods of cleaning up environmental waste. One of the worst cases of "waste, fraud and abuse" that a society can commit is the failure to invest in its own future sustainability.

We have a long tradition of supporting a broad spectrum of research, a policy that has developed excellent leaders in science and engineering and has paid rich dividends to our society. We have a parallel tradition of facilitating useful applications by industries in the private sector. Our leading competitors, Japan and Europe, have now established similar policies to foster partnerships that provide support for basic research by linking universities, government and industry.

Cutting funding for basic research would jeopardize our ability to compete in the global marketplaces of the future. Without first-class science, we can look forward only to a second-class economy and a second-class standard of living. Let us think twice before allowing the heat of the moment to dictate the shape of our future.

The writer is president of the California Institute of Technology.