Science in the National Interest

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Where will the United States of America be in science and technology in the year 2000? Where will we be in the year 2020? What do we need to do in order to get there, not only in terms of developing our intellectual capacity and enhancing and sustaining our research capacity, but also knowing the national goals that we will want to accomplish in the best interest of the United States of America?

I chair the subcommittee on appropriations called Veterans Affairs, Housing and Urban Development (HUD), and Independent Agencies. It's an $88-billion portfolio that oversees 25 different agencies. Outside of Senator Inouye's subcommittee on defense, it has the largest amount of discretionary spending of any subcommittee in the federal appropriations process. Within the Appropriations Committee, the big three in terms of the amount of discretionary spending are Defense, my subcommittee, and Labor–Health and Human Services. I have the responsibility for funding the departments of Veterans Affairs and HUD, the National Space Agency, the Environmental Protection Agency (EPA), the Federal Emergency Management Agency, the National Science Foundation (NSF), and other agencies ranging from Jack Gibbon's Office on Science and Technology Policy to Arlington Cemetery, the Consumer Products Safety Commission, Selective Service, National Neighborhood Reinvestment, and many others. The four agencies that play a substantial role in funding of science are NASA, NSF, EPA, and the Department of Veterans Affairs, which has a substantial research budget in the area of applied and clinical life science research.

Congress first passes the President's budget through the Budget Committee. The Budget Committee establishes something called the 602(a). This is the total amount of money we appropriators can spend without the Senate reaching a 60-vote supermajority to waive the Budget Act. Then, the Appropriations Committee chair divides the 602(a) among 13 subcommittees. We vie, we deal, and we duke it out to get something called the 602(b). That is the allocation that every subcommittee gets, and it varies according to our need. We then look at every agency that we need to fund, and we appropriate within the 602(b). The authorizing committees set the policy, but when it comes to the money, they are advisory to the Appropriations Committee.

The budget from the 602(b) is about $88 billion for my subcommittee. Thirty-six billion dollars out of this $88 billion immediately goes to the VA for the pensions, disability benefits, and so on, including $16 billion for veterans' health care. The remainder is used to fund the other agencies. We then establish priorities in the appropriations subcommittee, look for a synergistic and cumulative effect of what we do fund, and then work with others in other subcommittees to accomplish that.

So this is why the appropriators are essentially the investment brokers, or the bankers, for the federal budget. We are looking, particularly under the Clinton Administration, to make those public investments to achieve national dividends. We look at immediate, compelling, human needs of our society, but also the long-range needs of the United States of America.

In 1994, we are at a defining moment in American history. We have seen the collapse of Communism. We have seen the end of the Cold War. Yet we believe there is another war, and that is the war for America's economic future. With this president and vice president, we want to make sure that we aggressively claim the markets in the new world order, yet lay the groundwork that we will always, now and into the next century, continue to be an economic superpower. Our political, dynamic, democratic energy and our ability to be a military superpower stems from our economics.

This new world order has profound repercussions for federal science policy. For the last half century—whether in high-energy physics or high-performance computing—federal science has grown, and largely been driven, by one overarching strategic objective, and that is America's national security. The largest funding for scientific research was strategically driven. It was driven by the Department of Defense. It was to make sure that we could win the Cold War and stop a nuclear holocaust from eclipsing this magical and wonderful planet Earth. Now, with the Berlin Wall coming down, so is the wall in research and development funds and science and scientific funding. We want that wall to come down. Just as we developed the smart weapons to win the Cold War, we want to be able to have the smart science and the smart technology to win the new wars in the economic arena.

This change, we know, has created a new crisis in the scientific community. It means that old assumptions about how to organize itself and how to spend increasingly limited dollars are really challenging scientists and engineers as they think about a new century of democracy. But it also means that the old funding that was relied upon, Department of Defense funding, has shrunk. Those who then say, "Why are we going into strategic research?" should remember that the basis of their funding in many of those agencies was defense-based or defense-linked. Unless we develop a new strategy that fits in with the realities of the new world order, I am concerned that science and science funding run the risk of being left out and left behind. And so will the United States of America.

There is a new mood in the Congress. There is an obsession with balancing the budget. There are those people in the U.S. Senate and in the House of Representatives who are what I call "cut-cruisers," the "budget hawks." They're out looking for pork, whether it's in honeybee research, a Lawrence Welk museum, or a Superconducting Super Collider. I do not put these items in the same category, but many of my colleagues do. Look what happened to the Super Collider. I voted to keep the Super Collider, and have consistently done that because of its importance in basic physics research. But my colleagues saw another situation. They saw that by one vote on their part, they could cut $8 billion from the budget and not keep one homeless person out of a shelter, not keep one veteran from having his disability benefits, and not keep one school child from having a school lunch program. The Super Collider represented what has happened in science. A wonderful scientific idea, funded with the best intentions, but gone awry. At every turn, there was another cost overrun, a technical complication, or the hubris of the people who ran it who refused to see the situation facing them. No one could adequately articulate how it fit into our national strategy.

Without a national strategy in science, and the will to see that this strategy gets implemented, federal science funding is sure to become a continuing target of opportunity for the narrow-minded cut-cruisers in Congress. Now how do we deal with this?

I believe we need to articulate a vision for where science is and where it is going throughout the federal government. People knew how important it was to win the Cold

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War. We now have to show how important it is to win the economic war. And that is why last year in my subcommittee I tried to elevate this debate by calling for a comprehensive reevaluation of how NSF does business. I was following on Walter Massey's report of the Commission for the Future of the NSF.

I believe there is a new paradigm emerging on how science is conducted and how it is organized. It is based upon the principle that science should lead to the new ideas that lead to the new technologies, which should lead to the new jobs, particularly in manufacturing. I believe that manufacturing is truly the engine of our economy and our industrial strength. Our efforts to generate manufacturing jobs must have a sense of urgency because as a nation the United States is losing ground, time, and opportunities. To regain this ground we have lost over the last two decades, we've got to seek new models of collaboration between the universities and the private sector. We must focus our science investments more strategically around national goals that are important to economic growth. We must train our scientists and engineers, whether they are undergraduates or Ph.D. candidates, so that they are ready to work in strategic areas in the private sector. And we must prepare our best and our brightest for the challenge of the uncertainties brought on by a new global market.

I like to go out and about and listen to what people are saying. First of all, I listen to students. I talk to kids majoring in physics, engineering, molecular biology, and a variety of other things. They do not know who's going to hire them. They know that they've been told: "Get out there and get these advanced degrees because it is the way of the future," and yet they are scared to death. They think there is a myth out there. They hear about how we continually need more of—and we could list every area of scientific exploration—and yet they wonder where are they going to work. The universities are concerned about their funding, but very often professors are more interested in producing other Ph.D.'s who are going to work in universities, rather than in a variety of opportunities in our society.

Looking at that situation and to promote the right change in the scientific community, I set a goal to follow on what President Clinton wanted in his budget, which was to ask that 60% of what NSF funds go for strategic research. And everybody's kind of vibrating over that. "What does she really mean?" and "Why did she say that?" I've gotten everything from accolades to rather tart, somewhat hysterical, criticism. By strategic research, I do not mean only applied research. I do not mean project-based research, like the tremendously interesting clean car initiative that the President has embarked upon. I mean investments in science that are focused around important national goals. Some of these have been identified in the Federal Coordinating Council for Science, Engineering, and Technology process: climate change, advanced manufacturing, biotechnology, and high-performance computing.

Strategic research does not mean that every NSF grant must result in six patents or four commercial licensing agreements. Nor does it mean that every proposal must guarantee a private sector payoff in a number of years. That's not what I'm talking about at all. I am saying that we should spend more than half of our basic research dollars in areas that we have identified as strategic. And that our investments in science will become a new superhighway of ideas and technology to achieve those national goals.

I believe the best model for what I am talking about for strategic research is in the National Institutes of Health (NIH). NIH is grouped around strategic areas to treat and cure diseases and illness. It is crucial to our national well-being and it touches the day-to-day lives of the American people. NIH is not organized like a university. We do not have the National Institute for Molecular Biology; we have a National Cancer Institute, in which the most stunning research is going on in molecular biology and cellular biology, from the basic stuff of life itself all the way up to applied research. And the private sector then adds its value to that for biomedical products and pharmaceuticals, giving us a cornucopia of opportunities not only for the United States of America, but actually something to export around the world. It saves lives, it generates jobs, and it enhances our standing in the global market. When I'm talking about strategic research, that's what I mean. What are our national goals? And then what elements in the research community are needed to achieve these goals, from basic to more applied research? It is a continuum that I'm talking about to achieve those strategic goals.

I believe that science should continue to be the place where we do break new ground. And do what delights scientists and mesmerizes the world—the surprise of new discovery. When we look now at the reauthorization of the NSF, it is a way to think about how to organize it over time. Should we keep it organized as it is, or should it be organized as a series of institutes—in climate change or high-performance computing, for example? At the same time, we should not so bind ourselves that we cannot be nimble and agile and move where scientific opportunity takes us. So when we look at the NSF, we need to deal with these kinds of issues. The NSF has a great impact on every other scientific agency. The so-called "60% solution" is based on the Clinton Administration's budget request for the NSF in 1994. We didn't pick winners or losers; we just tried to lay out that framework.

Finally, as we begin to set out on a research agenda that has a strategic focus, we must build in rigorous milestones and evaluation of our efforts. In areas like manufacturing or high-performance computing, we need to ask ourselves: (i) what goals we seek to achieve; (ii) what are the specific benchmarks by which we can measure our progress in achieving these goals, and (iii) how do the federal investments we make parallel the priorities we have set in these areas. Federally funded scientists and engineers must be accountable to the public, to the Congress, and to the President. These measurable benchmarks will allow researchers to evaluate their own progress in concrete terms and to spot problem areas that need to be addressed. Concrete arguments will be much more effective than many of the vague, philosophical justifications for this funding that we have been hearing from the scientific community.

In terms of the future, we have to look at our funding as a public investment. Maybe not in an immediate practical application, because it does not work that way. If we try to make it work that way we will shortchange ourselves because the whole issue of discovery is you do not know where it will take you. But you do need a national goal.

There is something that has developed in our scientific community over the years, which is a sense of entitlement: that it is the job of the United States of America to fund every Ph.D. to pursue any area of intellectual curiosity. I believe that the very nature of a scientist is to be curious, and to be endlessly curious. That's the nature of why people go into science. And we want to continue to do that. But the United States of America needs to say to its scientific community, let's think of ourselves as one country and one community. Scientists are part of that. While you pursue individual excellence, join with us as one country in pursuing goals to be accomplished. It will not lead to you being intellectually stifled, but it will lead to us all moving together toward the same future. The science community needs to know that the taxpayers are asking where is their money going? And if the money is wisely spent, dealing with cost overruns and clearly setting objectives, they will back it. And I will be there to back it. And we will be able to do it.