Science and the American Dream: Healthy or History?

Neal Lane

I believe that we need to have a dialogue about the future of science in America and the critical role of the science community in determining that future. And today, when I speak of science, I mean all science and engineering, research and education.

I have titled my remarks today "Science and the American Dream: Healthy or History?". The American Dream is about opportunities, aspirations, and a better quality of life. In the past, science has provided an important pathway to that dream. Whether or not this will continue to be true is a question of great concern to me and the subject of my talk.

Interest and support for science in America dates back to the beginning of the Republic. Jefferson was passionate on the subject, and Franklin was a scientist. Substantial funding and major mobilization of science toward national goals dates primarily from World War II.

One primary focus of the American Dream during the cold war was preserving our freedom while securing our safety from annihilation. With the generous funding of science, however, many other advances and benefits fed our national and personal dreams. Improved health, safer work environments, and a higher standard of living for a larger segment of the population became possible. Science and the American Dream were unquestionably healthy!

When America called upon the science community to help protect us during the days of external enemies, we were asking for their knowledge and for their leadership. In those early years, the leadership expected from the scientific community was narrowly defined by the public and for the most part was confined to national labs and campuses. … Science was funded with the generosity of a philanthropist and the faith of a devout parishioner.

What a difference five decades can make. … different times call for different kinds of leadership. Global communications and transportation have made the world a village. Global markets have made it an intensely competitive circle of highly productive participants. In our own country, neglected social problems have become festering national issues. The ballooning of the budget deficit in the 1980s along with the economic drain from interest on the federal debt has energized the electorate to demand greater accountability of all government investment, including science and technology.

In this new environment, leadership from you, the science community, requires a much more public and civic persona. You are needed more than ever to be visible and vocal in your communities. This requires your presence, as scientists, outside the walls of your laboratories and

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In a speech to the AAAS at its annual meeting in February, 1996, Neal Lane used the recent government shutdowns and anticipated decrease in federal support for R&D to exhort the science and engineering community to place more emphasis on communication with the general public. This article consists of excerpts from that speech.

the gates of your universities to a much greater extent than in the past.

Today as always science gets done in the lab, the office, and increasingly on workstations, supercomputers, and the Web. Now, however, science can be funded only if the electorate and their representatives remain convinced of its value and contribution. These understandings and necessary explanations are not well suited to crash efforts in times of a budget crisis. They need to be routine parts of a community discourse on the goals and values of various investments that the nation could or should make. Only then will science and technology's fundamental contribution be inherently valued in today's climate of accountability. Without this understanding among citizens and policymakers, science and the American Dream may be only a memory from the past and not a part of our future.

This nation is getting ready to run an experiment it has never done before—to see if we can reduce the federal budget investment in non-defense R&D by one-third and still be a world leader in the twenty-first century.

In the early years science helped protect us from our enemies. But today when it comes to science, the American people could be their own worst enemy—a little like the old Pogo philosophy of "we have met the enemy and it is us." There is very limited public understanding of science and, more important, of how science and technology contribute to our lives, our aspirations, and our national goals. Perhaps the public's lack of understanding says more about us than about them.

I believe that the new leadership needed from the research community is to carry our understanding of science and its value into the life of our own communities through our teachings, to be sure, but in many other ways as well. We can thereby help to propel America toward those investments that are vital to a vibrant twenty-first century American dream.

… I am aware that we scientists are motivated to teach and do research because it suits our intellectual appetites, our temperaments, and [our] personalities. We are long on curiosity, independence, desire for intellectual rigor, and an all-consuming passion for discovery.

So, you say, what good would such a person be going out into his or her community ?… I would argue that scientists are the only genuinely credible people to deliver the message. I understand that some of you may have neither the desire nor [the] will to do so, but I have little doubt that if you do, the experience will be fulfilling and the results successful. At the very least, providing encouragement and other kinds of support to your colleagues who do take on this noble challenge would be an important contribution [in] itself.

In Stephen Jay Gould's new book of essays, *Dinosaur in a Haystack*, he describes a compelling incident of the public's fascination with science, not their understanding necessarily, but their fascination. He was in New York City on May 10, 1994, at the time of a partial eclipse. … To his delight, "In midtown Manhattan, in the middle of a busy working day, New York stopped to watch the sun."

… The public likes science, but do scientists like the public? I think we need to ask this question of ourselves as a community. We may then better comprehend the discrepancy between public interest and public understanding. As the director of the NSF, an institution that does a great deal of science outreach, I do not have the explanation for this discrepancy, but I am committed to work together with all of you to find it.

I do know one thing: the science that, in large part, defined so much of the American Dream after World War II—that science was healthy, secure in its fruitful future. But the title of my remarks today is "Science and the American Dream: Healthy or History?". Will "science and the American Dream" be a legacy of our past but not the promise of the future? You, the research and education community—a national stronghold—I would even say a treasure—of intellect, creativity, and dogged determination—are an important key, maybe the key to answering that question.

… federal funding for science comes out of the small portion of the budget known as "discretionary funds". This means exactly what it sounds like—up to the discretion of the president and Congress and very vulnerable. Entitlements make up half of the $1.6 trillion federal budget; interest on the national debt, 15 percent; and defense, 18 percent. And what's left? The civilian "discretionary budget" comprises only 17 percent of the total federal budget pie. In that limited discretionary slice of the pie, federal dollars for science and technology are not without stiff competition from other important national needs such as veterans hospitals and housing programs.

Let me illuminate the federal role in research by only one example. According to David Goodstein, vice provost of the California Institute of Technology, federal funding accounts for over

half of Caltech's total budget. In fact, the figure is actually 60 percent of $156 million, while tuition accounts for less than 10 percent. Now, not all universities are in the research business to that extent, but a 33-percent reduction in civilian R&D cannot go unnoticed in its national impact.

In essence, this nation is getting ready to run an experiment it has never done before—to see if we can reduce the federal investment in nondefense R&D by one-third and still be a world leader in the twenty-first century. Nobody knows with certainty what the outcome will be, but it seems like a pretty risky experiment.

When we dramatically reduce science, technology, and education, we are shaking the very underpinning of our societal structure. It is not hard to predict that there will be damage. Our current competitive progress has been the result of more than a decade's work to come from behind in many areas. This new strength that has enabled us to move ahead of Asian and European competitors is surely due in large part to our multifaceted science, technology, and educational system.

Damage or destruction to any part of this intricate system could eventually undermine the whole structure. It is the system in all of its complexity and uniqueness that generates knowledge and national wealth far greater than the sum of its parts.

I believe the American people and many of their elected representatives do not understand this. It is up to us to convey that concept, that understanding, and its value to America's progress and the American Dream.

In addition, the inability or unwillingness of parts of the enterprise to adapt to changing conditions will also damage the whole. Since it is our colleges and universities that educate and train the science and engineering workforce, they will be integral to all the adjustments and adaptations.

All institutions of higher education should examine their academic programs, including those in science and engineering, in the larger context of today's societal needs and problems. The challenge is to prepare all students for adaptability in a dynamic and swiftly changing marketplace in industry, in government, and in the academy. Universities and colleges will need to be consistently alert to their uniquely important role in the functioning of the larger system.

Perhaps you are somewhat impatient with my message this evening. You may believe that I am overreacting to a short-term situation. Perhaps! But my concern is that by the time the damage is done, the moves to reverse it will be much more difficult, and in some cases impossible. The solution to the adage "Good judgment comes from experience, and experience comes from bad judgment" frequently narrows down to one ingredient—leadership.

What we need, I think, is the science community's leadership to educate the nation about the value of science and technology to our national well-being. This may seem an impossible task!

I grant you that these things happen slowly and imperceptibly at the grassroots. They are not about staged visits to Washington representatives, but rather about the collective influence of singular forays into local community life.

Just to give you a flavor of what I mean, the other day I spoke to a group of science faculty and administrators. Afterwards, a physicist came up to tell me of a series of local radio commentaries he had done on science and society over the last two years. Some topics were "Science for Society: The 1995 Nobel Prizes", "Undersea Exploration of the Arctic", "Exploring the Promise of Biomass Energy", and "The Crisis in Federal Support for Science".

Now I admit, not all of us want to do radio commentaries, but there are many ways to create the understanding and convey the value of science. Someone else mentioned to me teaching an adult education class on "science in your daily life". And there are already many examples of scientists working with teachers in the public and private elementary and secondary schools.

Damage or destruction to any part of this intricate system could eventually undermine the whole structure.…In addition, the inability or unwillingness of parts of the enterprise to adapt to changing conditions will also damage the whole.

An important part of our work as scientists is to present our findings in scientific papers for journals and conferences. At the other extreme, however, there are opportunities for talks at community meetings like the Kiwanis Club and the League of Women Voters. (I share your angst, because I have a pending date with the Arlington Rotary Club.)

I will argue that such meetings as these are increasingly important, even though I'm afraid they don't contribute significantly to tenure or other professional advancement, at least not yet.

We have a civic role to play for the nation. Science and technology are integral to all our lives

as citizens, perhaps so integral that we often take them for granted like sunlight or rain. However, nobody understands better than we who are scientists what it takes to build a strong science and technology presence. If we think about it, we might also realize how vulnerable that capacity can become in just a brief time.

In closing, I want to remind you that as scientists, you know from experience that being accountable and being creative and visionary are not mutually exclusive. Science and technology provide an open horizon into the remaining mysteries of the universe, the human mind, the planet's climate, all the potential of electronic computation and communication, and the list goes on. When I speak of the danger of the projected one-third cuts in R&D, I do not exclude the potential of healthy increases in R&D at some future time. Whether that happens, or more optimistically when that happens, will be determined by our engagement in a new dialogue with the American electorate.

I am not unaware of your reluctance and perhaps even feelings of awkwardness to step forward in a new and uncharacteristic pose—the civic scientist. That certainly is not a role I would have felt particularly comfortable with as a young or even not-so-young faculty member. But as I said earlier, different times call for different kinds of leadership.

I am reminded of some sage advice by Alexis de Tocqueville, the astute chronicler of American democracy. He said, "We succeed in enterprises which demand the postitive qualities we possess, but we excel in those which can also make use of our defects." I would like to challenge all of us, myself included, to find our own personal path to bring this message to our citizenry. I do not suggest that progress will be either swift or easy. I am your colleague, ally, and friend in this endeavor and most proud of that association. I know that we are equal to the task.