Super Collider's demise strikes a blow beyond the walls

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A few weeks ago, our government decided to scuttle our most visible scientific project, the Superconducting Super Collider, or SSC. Sadly, its termination portends the premature death of a field of fundamental research in which America has led the world for a good part of this century. Its size and international prestige have made the SSCs demise a symbol for the future of U.S. science The rest of the world, especially our competitors, will with good reasons conclude that the United States is relinquishing its leadership role at the scientific frontier.

In a society so dependent on being a step ahead in technology, on the scientific education of its work force and on its will to compete, this seems to be a recipe for disaster. At a time of difficult fiscal realities, our country cannot afford to lose sight of the long view; yet we seem to be intent on mortgaging the future for short-term gains.

We must examine the root causes for this turnaround. The case for fundamental research as a necessary element of any thriving technological society has not been made convincingly enough to our fellow citizens. The reality before us is that, increasingly, governmental support of science is predicated on demonstrating its immediate relevancy to society.

The SSC was the first big victim of this attitude; I fear it will not be the last. This trend is also reflected in recent discussions in Washington, aimed at redefining the mission of the National Science Foundation, away from its traditional role of funding basic research, to that of facilitator of technology transfer. It is no coincidence that this attitude has emerged with the end of the Cold War which has put in question the support of all basic science. I do not see the SSCs demise as an isolated event, but as the precursor of an alarming trend.

My greater concern is the effect this attitude is likely to have on the traditional role of universities in this quicksand of changing priorities. Universities have been the traditional keepers and transmitters of knowledge and culture.

Universities have fulfilled this role by teaching and imbuing its students with these values, and by sheltering, training and encouraging scholars to expand knowledge in all domains.

To give but a few examples, universities not only pursue and increase knowledge of the physical world (biology, chemistry, medicine, physics,), of ourselves as human beings (art, music, history, literature,), and of our interactions with one another (economics, linguistics, sociology,).

Much of that knowledge cannot be justified, as Congress would have it, on the grounds of being immediately relevant. I expect universities will be increasingly required to demonstrate the same type of relevancy by those who fund them.

Study of the physical world has led to unimaginable advances, i.e., in the

standards of living, through the invention of machines (steam engine, , computers,), and through advances in medicine which have improved both quality of life and longevity.

Other advances of knowledge in the humanistic realm, show benefits which are much harder to quantify. Some benefit the soul. It was argued long ago that increased knowledge of ourselves was the key for achieving harmony and happiness.

As part of this quest for awareness, understanding our role and place in the physical universe around us was deemed necessary. It is important to humans to know where they fit and belong in this universe, and this requires knowledge of the universe itself.

Advances in fundamental science rarely show immediate benefits. Two technological wonders, the uses of electricity and the buoyancy of airplanes, are both based on laboratory studies started over 200 years ago, at a time when their technological uses could not have been imagined. For some reason, in the late 20th century, we have come to expect immediate results from basic research, in fact immediate results from anything.

Does the termination of the SSC signal that the United States is turning way from this spirit of exploration?

I view the SSC, not as an expensive tool for the use of a few physicists, but as a giant microscope which would have allowed the whole human race a glimpse of nature it has never seen before. It is not easy to evaluate the impact of opening this new window on our physical world.

Historical precedents to demonstrate such increases in knowledge will be important in ways seldom imagined at the time of discovery. Of the uses the discoveries the SSC would have made, we can only guess, but we do know that it would have told us about the makeup of the universe a few seconds after the Big Bang.

In that sense, the SSC was part of our origins, for understanding our universe, our role in it, and ultimately for understanding ourselves.

In Washington this quest was determined to be too onerous for the wealthiest society on the planet! Are we entering a time of regression away from the path which started in the Renaissance, a path where natural curiosity exploration in all domains was thought to be necessary and important to further the human condition?

Does the demise of the SSC have a greater nefarious symbolic meaning: the signal that the United States is turning away from this spirit of exploration and quest of the unknown, and beginning to look inwards? Such a turn occurred in China in the 25th (*sic*) century when she stopped exploring and turned inwards. China has not yet recovered 450 years later.

Universities are likely to be isolated in the present climate of relevancy. Yet, this is precisely the time, when universities are at their most valuable, that they acquire their greater importance. Universities keep and nurture what seems to be irrelevant to many; yet such are parts of our heritage and culture; what

is deemed irrelevant at one time often becomes overwhelmingly important at another.

So it is no surprise that universities are presently under attack by the very same forces which clamor for relevancy. We live in a throw-away society. Bent on this course for the relevant, this society will end up throwing itself away.

I believe that the preservation of our universities in their traditional role is essential to the survival of this country.

What can we do to change this course? We must convince our people that universities are a necessary and important part of their wellbeing and that of their children. There is a widening gap between those at the intellectual and technological frontier and the bulk of the society.

In a democracy, such a gap can only have one result, a progressive alienation between the two, and eventually a revolution against the frontiers, and a turn inwards. I fear that the SSC decision is an omen of this alienation.

We need to educate beyond the walls of academia. We must communicate the joys and thrills that come with rising above and conquering intellectual challenges.

We must emphasize that human beings need not feel lost and irrelevant, in a technological world, that they can exist and thrive in harmony with its realities.

We must teach appreciation of the difficulties and challenges of producing any technologically advanced useful device, such as a car, refrigerator, a NMR imager or a computer.

Successful marketing of any device often depends on simplicity of use, no matter how complicated the internal workings. Few of us can even begin to appreciate the complexity or the tortuous path by which any such device has come to existence. This complexity lies not only in the actual manufacturing, but more subtly in interdependence between basic and applied science over long periods of time, and on the availability of a reservoir of a very sophisticated work force.

This message has not been communicated to those who pay us to educate their children. Thus many seem to believe that such complex tasks can be turned off and then back on at will. One cannot simply mothball scientific projects because their most important component is the people that make it work.

In a world where scientific and technological progress is fast paced, mothballing people condemns them to obsolescence, robbing country of their talents forever.

Too many of our people are employed below their abilities; we are being increasingly subjected to forms of entertainment (sports, television, movies) that only seldom challenge and motivate us. This state of affairs can last only as long as the society can sustain itself. We cannot hope to keep our standards of living without thinking to and investing in the future. Our survival as a competitive society depends on the education of our children, on producing ideas, on thinking of and presenting solutions to the problems facing our society and our planet. As keepers of the flame, it is up to us in the universities to rekindle it.