STEVEN MULLER

TECHNOLOGY AND SOCIETY IN THE TWENTY-FIRST CENTURY

Technology is not neutral. It affects how we behave, how we interact, even how we think, as we adapt to the changes it visits upon every facet of our lives. Especially it conditions our values. It often holds great potential for alienation. In the coming century, technology will continue to grow at a headlong pace. Will we be technology's masters or will technology hold us in its dominion? Much is said about the benefits of technology—what it does for us. But what does it do *to* us? That is an urgent question, and the people who create new technology should now begin to think carefully about its impact on our society and our culture.

On 15 May 1992, APL's Milton S. Eisenhower Research Center sponsored a colloquium held in the Kossiakoff Center. The keynote speaker was Steven Muller, Chairman of The 21st Century Foundation and President Emeritus of The Johns Hopkins University. This is Dr. Muller's address, edited for publication.

It is a pleasure to be back at APL and a particular pleasure and privilege to share in the fiftieth anniversary. For fifty years, the Laboratory has rendered major and distinguished service in the area of national security and has become a vital and outstanding component of The Johns Hopkins University. APL began during World War II and played a remarkable role in the development of new technology that helped to achieve victory in 1945. During the cold war that followed, APL served above all as a major scientific and technological resource for the United States Navy. Few would have predicted that the fiftieth anniversary of APL would be celebrated in the wake of the end of the cold war and that we therefore would now be celebrating also decades of successful efforts to maintain the American strength and power that led to the disintegration of the Soviet empire. Problems of national security remain, but the most formidable adversary has collapsed. The fiftieth anniversary also comes at a turning point for the Laboratory. Its national security mission will adapt to the new environment, and its work beyond the demands of national security may well expand.

Under these circumstances, it is an additional pleasure to be here as the guest of the Milton S. Eisenhower Research Center, which itself just passed its forty-fifth anniversary—it was formally established on 1 April 1947.

Most of you who have been here awhile know that it was my great privilege to have served as Provost with Dr. Eisenhower from 5 April 1971, the day of his second coming—"Milton's second coming," when he returned to the Presidency of Johns Hopkins, which he had held earlier from 1957 to 1967, at an hour of great need for the University—until the end of January 1972. And then, on the 1 February 1972, I became his successor in the Presidency.

To know Milton Eisenhower was to love and respect him, and I remember a very proud and sentimental occasion for me on 19 September, 1979, when the Research Center was formally renamed in Milton Eisenhower's honor and in his presence. Robert Harvey, who was then Chairman of the Board of Trustees, introduced Dr. Eisenhower by saying, "Few men are granted the opportunity to lead great institutions; even fewer are able to inject their personalities into the very foundations of an enterprise and lift it to new and higher levels. It has been this Laboratory's good fortune to have such a man." Those words remain as true now as they were then. I recall a lot of conversations with Milton Eisenhower, and their tenor is to a very large extent captured in a passage from a letter he wrote to Walter Berl, in which he stated his concern "that we are neglecting aspects of national life which threaten the moral, intellectual, and economic power of the nation. It is *total* strength that must concern us. I honestly believe that we will be more secure if we divert some of our efforts to problems of crime, juvenile delinquency, education, health, and so on."

The Research Center was founded by R. E. Gibson, A. Kossiakoff, F. T. McClure, and L. R. Hafsted to carry on long-term research complementary to present and future tasks of the Laboratory, to establish APL as a contributor

to fundamental research, and to provide an opportunity for the enhancement of professional competence and scientific wealth of the staff through participation in fundamental research programs. The Center continues to pursue these goals with distinction, and, I guess I would say in present circumstances is a greater asset than ever to the Laboratory and the University.

I also recall the meeting of the Trustees Committee for the Laboratory at the time the Milton S. Eisenhower Research Center was named. R. W. Hart, who was then the Center's Chairman, declared that its purpose was to develop fundamental understanding in fields of science that are important to the Laboratory. He referred to the Center as APL's window into science. The Research Center serves the Laboratory and the University superbly by maintaining a very wide and unfettered scope of activity.

That emboldens me to talk to you about something you normally would not be afflicted with. Using academic freedom in the true and finest sense, I would like to share with you some concerns about the interaction between society and technology in the new century whose dawn is in the offing. This is not a scientific discourse. It is more reflective and rather wide ranging.

We can take it for granted that the explosion, or exponential growth, of science and technology will contin-ue unabated in the century ahead. Humanity will therefore continue to engage in an adaptive interaction with science and technology. The question that I would like to begin with is, as we go into another century of explosive growth in science and technology, who or what will change more? Will humanity change more than the science and the technology, or will the technology continue to change by evolving more than its human, we are tempted to say, masters? You might say that in this century it is already perfectly clear that whereas science and technology have changed, people basically have not. But I would put it to you that such a conclusion is subject perhaps to some review and argument and then ask the further question: In this next century, as technology continues to advance, who will be master and who will be servant, or even victim? We pay a lot of attention to what technology enables us to do. We pay less attention to what it does *to* us. The reason, of course, is that the new technology comes in and is almost instantly put to use and our adaptation takes place afterwards. Only when changes are rather firmly established can we even notice, let alone assess, them. I do believe, however, that it behooves us at this stage to start paying more attention not to what technology is doing *for* us but what it is doing *to* us, and I'd like to begin with some simple sketches that are at least very familiar and easy to follow, having to do
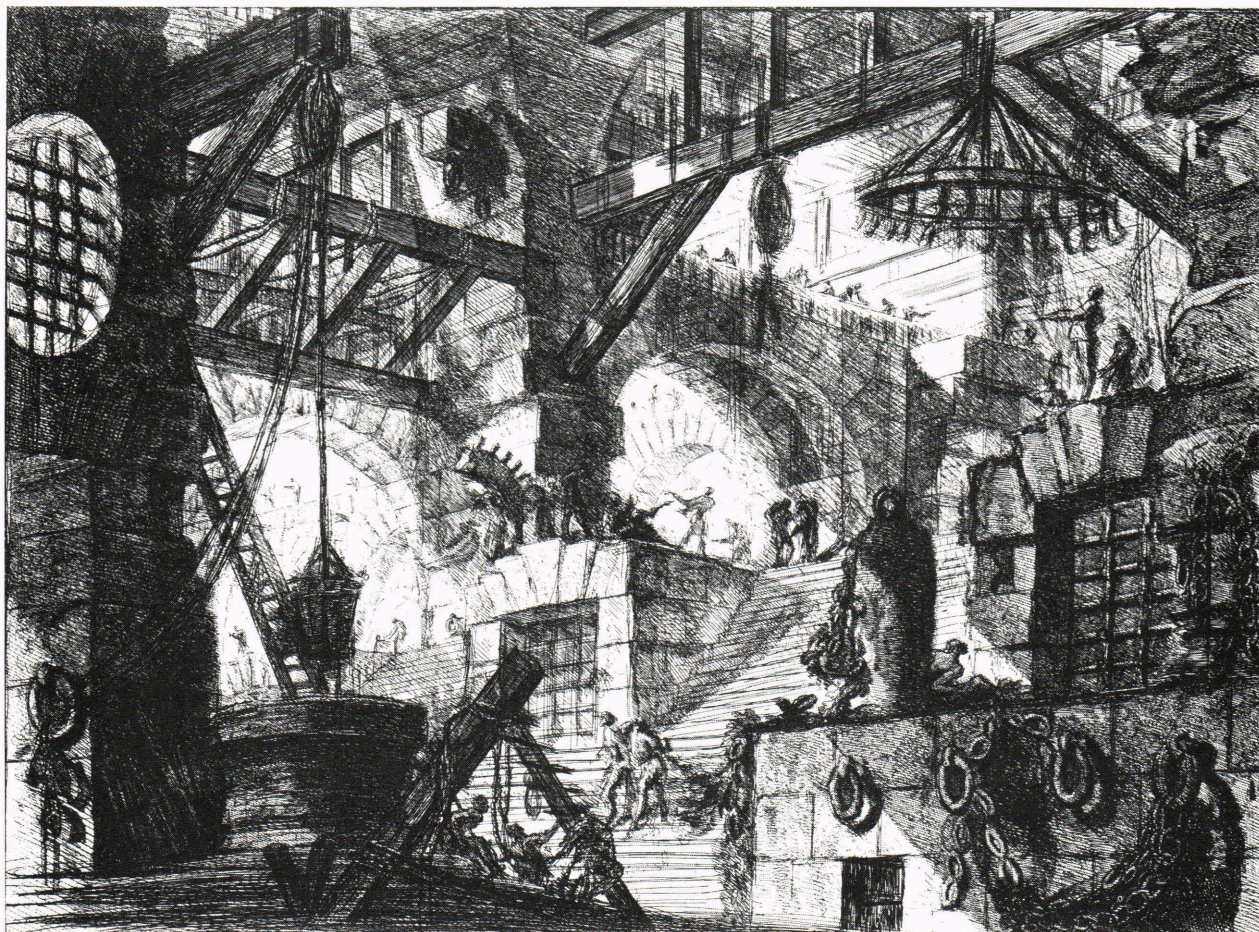
The illustrations are from *Carceri d'invenzione* (c. 1745; "Imaginary Prisons"), a series of etchings by Giambattista Piranesi.

with the changes in the human condition that have occurred pretty much in my lifetime, that is, in the last fifty to seventy-five years.

For one thing, the pace of human behavior in technologically advanced societies has tremendously accelerated. There are some interesting phrases that reflect that, and some interesting phenomena. Can you imagine instant food before the technological revolution? Instant food is accompanied by a demand also for instant relief, for instant gratification, for an instant response. We are becoming accustomed to a very, very quick response pattern from our environment. Our attention span is shorter. If Dr. Gilman, the first President of Hopkins, were here, he might give a speech about two and a half hours long, because that was the norm in his day. Not today. Television refers to sound bites. Most humor now is one-liners. The day of the leisurely anecdote is gone. People are now accustomed to a very rapid pace in communication and in entertainment. We have enormous mobility in technologically advanced societies; we get from one place to another very quickly—never quickly enough, we always want to do it even more quickly—and that sets a great pace for people. Communication is virtually instantaneous. I know otherwise pleasant people who become extremely irritable when their computer is slow to respond, which means they have to sit there for thirty seconds—an eternity. We now have fax communications, so that on occasion you can get an answer to your letter before the postman delivers the original of the letter you have answered. We have instant access to information. We don't have to spend a lot of time searching for it. We have retrieval systems that call it up for us.

With all this time-saving technology, the time for reflection should be available, but the habit of reflection is dying from the human condition, beginning to wither away, because reflection is a slow process, it violates our shrunken attention span. Interestingly the word that we use for reflective time tends to be "downtime." We have to have downtime to be reflective, the connotation being that reflection is not productive. It is just resting in between doing something. Reflecting, therefore, is regarded as a kind of waste of time.

We are addicted to stimulation. Among the other gifts that technology has bestowed on us is that the modern democratic, the modern technological, society has democratized leisure. We all have leisure, which once was available only to an aristocracy supported by servants. The problem is that with a shrunken attention span and a lack of physical fatigue, thanks to our wonderful tools that do most of the hard work, we have not only democratized leisure, but we have recreated boredom. If there is one thing the human being loathes it is boredom, and the shorter the attention span the more loathsome the prospect of boredom. So we have a leisure industry that makes it possible for us to keep fit, not through work but through play designed to make us fit, be it aerobic dancing or jogging. The housewife of seventy years ago, who kept a kitchen clean and shopped and baked, didn't need aerobics; coal miners didn't need to go jogging, either.

We also have an entertainment industry—clearly the most prized asset we have, since we measure things by money and entertainment people are the most highly paid of all—and that entertainment industry is designed to keep us from boredom, to give us instant stimulus. There is also a part of our entertainment industry on which we frown, involving the addiction to more direct stimulants, the abuse of substances or the acquisition of stimulus from substances.

Let us take a quick glance at the field of health and what we now call wellness. We have the miracle of technologically advanced medical care. It works faster, doctors know a lot more, they can do a lot more. It also costs a lot more. The introduction of new medical technology of course has brought new expense. It is miraculous that we can now do laser surgery or magnetic resonance imaging or scans of various kinds—all wonderful, but not cheap. The fact that we live longer increases costs. More perfect medicine cures a lot of things, heals a lot of things, but it does not stop one ultimately from dying. We may live longer, but the longer we live, the more subject we are to additional disease, and the treatment of additional disease costs more. It is cheaper for society if the average maximum age is sixty than if the average maximum age is eighty or ninety, because whatever people do in the remaining twenty or thirty years after sixty, they are going to be sick some of the time and they are going to require medical care. So to the extent that we are expanding our life span, we are increasing medical costs. The whole question of affordable care is giving us enormous difficulty. We have the technical resources available to provide the best of what is now possible for everybody, but to do that would be ruinously expensive. On what basis do you exclude people—by the ability to pay, by race, religion, sex, age, profession? These are decisions we find very difficult to make. What we have adapted to is an expectation that the new medical technology will be at our service, that it will provide additives, curatives, that it will prevent or induce or alleviate many things. And we have targeted ways of doing all that without always being aware—and *knowing* that we're not always aware—of the side effects or consequences. In fact, if we waited fully to evaluate the consequence of every kind of medication on the human body, we would have far less medication. We don't wait, and as a result, we keep finding out more about the process and more about how vulnerable we are despite the power of this new technology.

Next let us consider the power of the image. In the nineteenth century, we got photography, a technological development, and through a rapid developmental sequence of photography, film, tape, and now the computer we have become habituated to images in a way we never were. Human beings have always painted images or had icons and images, but our forebears didn't have lifelike images that talked in living color, acted in living color, or that were as omnipresent as images are today. The consequences are in many ways extraordinary, but we are often scarcely conscious of them. For instance, eye con-

tact with another person is very important; it is part of the basis of a lot of human interactive behavior. But if you watch a television news broadcast nightly or almost nightly, you may well have more illusory eye contact with Peter Jennings or Dan Rather or Tom Brokaw than you have real eye contact with most of your friends, if not indeed all of your friends, and most members of your family. That eye contact with Tom Brokaw is unreal, because you see a image of Tom Brokaw and Tom Brokaw doesn't know who you are. It is interesting that if you then were to run into Tom Brokaw or Peter Jennings, you would be tempted to say "Hello," because a person with whom you've had that much eye contact is very familiar to you. In fact, you see more of the pores in that person's face than in the face of the person you're married to or the faces of your children, whom you do not usually view close-up all the time. There is an illusion of intimacy here which is in a way quite destructive.

We should also take note of the power of the image and the word combined, because we have an industry that devotes itself to marrying words and images: the advertising industry. It is apparent that the best teaching for the largest number of people is being done by advertising, using the power of image and word. You may not remember much of what you learned either in school or in college, but even now—years later—if I say, "Where's the beef?" some of you will remember the image of that ad. We can still quote ads for products that no longer exist. The combination of verbal and visual images—"I ate the whole thing!"—remains in people's minds; it is a powerful teaching tool. We are already a step beyond television; we are about to enter the realm of computer-generated and -enhanced total environments where you will put on a helmet and find yourself in a different world. One will be able to experience vicariously a cruise up the Amazon and see the jungle as though one were sitting there, or at least to experience vicarious participation in a movie or a game. That technology is just around the corner.

What are some of the side effects? To begin with, this new technology has largely destroyed representational art. We still go to museums or galleries where it is on show, but very few people are still in the business of creating rep-

resentational art. Basically what we have is increasing illusion, and with that comes increasing alienation. We live in a society, a worldwide society, where there are more people than ever, and yet we tend to be more and more by ourselves. We have individualized mass consumption. That means we have developed menus that can be individually selected from offerings designed for everybody. We have reduced the need for real human contact, and almost everything that the technology enables us to do tends to be in the direction of individual alienation and isolation. For example, we have public transportation, but we prefer the car, which is often used by just a single person. We can carry with us cassettes and earphones that play music for our ears only. So we can be anywhere, in any company, on the subway, on the train, on the bus, walking down the street, maybe even at a dinner party—and yet be listening to our own private music. Such alienation goes very deep. We are accessible

to each other, but by telephone more and more. And although the telephone is a way of keeping in touch it is not the same thing as real human contact. Our need, desire, or opportunity actually to touch living people is diminishing. Our ability to consume individually, sometimes in the company of others but without ever really being in contact with them, is increasing.

There are all kinds of other illustrations of alienation. A comparison of the space in the typical American home between fifty years ago and today would be very instructive. The advance of technology has now elevated the bathroom to be the most expensive room in the house; it has increased in size because we tend to spend more time there. But the dining room, in contrast, has largely disappeared, except as a combination consumer and information center, because people no longer eat full-scale meals together. That says something about human contact. It says something about alienation. It says something about a shortened attention span. The bedroom tends to be as large as or larger than the living room, if there still is a living room.

Let us now try to reach a somewhat deeper level in our consideration of changes in human behavior that have resulted from human adaptation to technological advance. Let us look briefly at the contemporary city. Most of us are familiar with cities whether we live in them now or not, and in the aftermath of what happened in Los Angeles there is once again renewed concern over what can be done about the city. Have people really asked themselves why we ever had cities to begin with and what their future is in the age of technology that we now enjoy? The city was there to concentrate labor, to concentrate sanitation, to concentrate communication, and to some degree to concentrate culture. Today, however, labor need not be concentrated, and it is cheaper to assemble labor in limited concentrations outside the city than in the city. Sanitation and other utilities are available everywhere in modern advanced technological societies. Communication? You can have your computer, your fax, your phone, your other communications equipment anywhere. Culture? Do you really want to risk being mugged and catching a cold from sitting in an auditorium in the inner city, where you have to pay for parking, when you can get the best of whatever you want on television: music, ballet, opera, theater? People are beginning to move away from the city. To some degree concentration is still desirable, so we have what a *Washington Post* reporter has called fringe cities, the fringe cities that we all see outside major cities. If you ask what is going to bring back the core city, that is a very difficult question to answer, because there is no longer a persuasive rationale for it. Unfortunately, the rationale against it is altogether too persuasive, because the city is now essentially populated by people who are economically unable to leave. They are not necessarily the neighbors everybody craves. They are becoming poorer and poorer as their economic base shrinks.

Is it going to take an act of will to bring the city back? What is going to persuade people that the city is an environment they really want to have? I suggest that it is going to be very difficult to do that, because the advent of a technology that makes everything accessible outside the city argues against the survival of the city. Perhaps, seeing some other technological miracles such as Disney World or Disneyland, one may wonder whether the only viable future for the city is to become in effect an urban museum with enormous tourist traffic. What will happen then to the people who are condemned to live there, cheek-by-jowl with the tourist attraction? The future of the city in the next century may be a question less of urban reform than of urban survival. The fundamental question then is not political or racial, but just this: What is the rationale for a large urban aggregation in a highly advanced technological society?

We must now also glance at the political process. Today we have political campaigning by image. We no longer see candidates, we see their images. We have the illusion that we know exactly what Mr. Clinton or Mr. Bush looks like. We know what they look like on television. A lot of the images, however, are twice removed because they are doctored images, paid-for films, which show the candidate in certain lighting and under certain favorable conditions saying certain favorable things—as opposed to a live candidate confronting living questioners. We have the ability now to poll. Polling is delightful, so important in a democracy because it enables us to measure constantly the state of apathy and ignorance in the public. The pinnacle of contemporary technological democracy may be discovered in the proposal of Ross Perot, who has stated that when we have great national issues we should have an electronic town meeting where, presumably, the largest number of apathetic and ignorant people will express the fact that they don't know and don't care, on which basis we will then reach an informed decision. Before you chuckle too much, think how one exercises leadership in this environment. When you try to say to people, "Here's how it is, here's where we ought to go," in an environment where others are lying in order to seem as attractive as possible, do you really believe that honesty comes off best? If that were so, we might all have spent four happy years under President Mondale. Can one imagine a politician winning today, campaigning for more taxes, more burdens? What we have is leadership reacting to those being led and leading people where they seem to want to go. The problem is, most people really don't know where they want to go.

Technology has begun to undercut our political process, but there is something even darker, which has to do with new technology aimed at increasing our security. That technology is initially comforting. When one goes to the theater, there is an underground garage and on the way up and down there is a TV camera watching and in the garage there is another such camera. We also have other technology if we want it: Caller ID, which tells us who is calling on the phone. We can all be located by beepers. We have portable phones. Have you ever thought how useful all that is if you want total surveillance? We

now have the technology to maintain surveillance on everybody, all the time. We have microphones sensitive enough to listen to almost any sound. We can put miniature cameras anywhere. We can put bugs on people and track them by sound, by electronic signal, by radio activity. It is possible now to virtually eliminate the possibility of private or unsupervised behavior. One might ask, "Yes, maybe, but who would want to do such a thing?" Then one read about the Stasi, the secret police in East Germany, where one-third of the population spent a good deal of its time reporting on the other two-thirds. And that may have been the Boy Scout age of the new surveillance technology. It is possible, if you control the media and you control that surveillance technology, to have total surveillance over everybody; and it is possible with high-speed computers even to sort out the conversations you want to hear from the incredible number of conversations that you don't want to hear. Is that going to be put to use by somebody sometime? How do we know it won't?

There are also questions about human engineering. The first thought that phrase may bring to mind is genetic engineering. But that may not be the greatest danger. We are already into the business of engineering human moods. We have pharmacopsychology and pharmacopsychiatry. Nowadays it is possible for you to take drugs for mood adjustment; and pretty soon, signals will be directed at your brain that will eliminate depression and keep you pretty much on a constant level of feeling pretty good. The risk is that we may all become extremely tranquil because we will in fact be tranquilized.

Interesting things are happening to our life-styles. Have you considered that, as we have a longer life span—and as technology changes the content of jobs—people increasingly have serial careers? One no longer works at one thing. One does one thing for a certain portion of one's life, then comes a change. And in another sector of our lives, although we don't often discuss it, we are in effect practicing serial marriage, as well. Fewer and fewer people marry only once. The disconnect between marriage and children is increasing, and if the purpose of marriage is less closely linked to family and children, then why don't serial marriages and serial careers make sense? We are doing that kind of social engineering to ourselves.

We have now touched on a lot of points very impressionistically. Our observations should be the subject of study for what we call the social sciences. We have two problems here. I have already alluded to one. The social and human phenomena we have been discussing *follow* the technological change. Only a decade or more after the technological change does one begin to see the results of human adaptation. So any of this analysis and evaluation in terms of social studies takes place substantially after the fact and tends to analyze and describe what by then we have already done. The other problem is that by calling this field "social science" we are describing something that is to some degree not working and may largely be a self-contradiction. Social science is the effort by people engaged in social studies to be scientific, and the easy way for them to satisfy at least themselves that they are scientific is by counting everything. They have the technology to count. And we have incredibly good data now as to how we behave, because whatever can be counted will be further quantified and analyzed. The problem is that the analysis is also merely quantitative. We have very little reflective analysis. The people who are determined to be good social scientists are less and less inclined to expose themselves to criticism by departure from a quantitative base of data and discussion. As a result, we are getting an unsatisfactory performance from the people engaged in social studies who observe us, count us, quantify what they see, and manipulate the numbers—but are not prepared to go beyond that. This is a special problem because our society is so confused about its values. Is progress a value? On what are we unwilling to compromise? Individually, some of us are still able to answer this question, but our society as a whole has great difficulty answering it.

The saving grace of a quantitative approach is that you can always measure numbers. But how can you measure qualitative success or qualitative achievement or qualitative anything if you have no standard of quality? And in a society uncertain of its values, acceptable common standards of quality are very hard to find. Through three or four centuries now of scientific and technological innovation, we have assumed that the scientists and technologists who innovate add enormous creativity to our society, but that they are not responsible for the consequences of their creation. Can we continue to exonerate them from that responsibility? I would think that the people most qualified to think reflectively about the impact of new technology and science are the people who create it. They have one enormous advantage. They are not insecure about being scientists. They don't have to prove that they are scientific. They are also aware of the services to which their innovation can be put. My great concern is that if they don't begin to think about the consequences, no one will, and that undigested adaptive changes in human behavior in response to technological innovation are to some degree unavoidable—not necessarily dangerous, not necessarily evil, but so unpredictable that one should be concerned about them. They are first of all interesting; but they are unpredictable. They may have unforeseen consequences.

Somebody ought to think about that. Somebody ought to think about the kind of human behavior that calls the future of the city into question, or that affirms serial careers and serial marriages, or that has to cope with increasing alienation and individualization. Somebody ought to think about the reliance on illusion and the conduct of a democratic process in which everybody participates but everybody participates only electronically. The question I would like to ask in closing is this: Is the day coming when the Milton S. Eisenhower Research Center ought to think about social science and social analysis?

THE AUTHOR

STEVEN MULLER is Chairman of The 21st Century Foundation and President Emeritus of The Johns Hopkins University. He is Distinguished Professorial Lecturer at the Paul H. Nitze School of Advanced International Studies of The Johns Hopkins University in Washington, D.C. He served as the tenth President of The Johns Hopkins University from 1 February 1972 to 30 June 1990. Between 1972 and 1983, Dr. Muller also served as President of The Johns Hopkins Hospital.

Dr. Muller is a director of several corporations. In addition, he is Vice Chairman of the Board of Trustees of the American Institute for Contemporary German Studies, a Director of the Atlantic Council, Trustee of St. Mary's College (Maryland), and a Fellow of the American Academy of Arts and Sciences. He is a member of the American Association of Rhodes Scholars, the Council on Foreign Relations, and the International Institute for Strategic Studies.

Dr. Muller is the author of a textbook in comparative government and numerous professional articles in that field. In recognition of his contributions to German-American relations, he was awarded the Commander's Cross of the Order of Merit by the President of the Federal Republic of Germany in 1980. In 1988, he was named *Commendatore* by the President of Italy.

In past years, Dr. Muller served as Chairman of the Association of American Universities, Chairman of the Association of American Medical Colleges panel on medical education; founding Chairman of the National Association of Independent Colleges and Universities, and a member of two Presidential Commissions. He was also a member of the NASA Advisory Council, and served as Chairman of the Council's Task Force on NASA–University Relations; a member of the Board of Editors of *Daedalus*; a Trustee of the German Marshall Fund; and a director of numerous other organizations.

Before coming to Johns Hopkins as Provost in April 1971, Dr. Muller served from 1966 until 1971 as Vice President for Public Affairs at Cornell University.

Dr. Muller was graduated from the University of California at Los Angeles in 1948. From 1949 to 1951, he was a Rhodes Scholar at Oxford University in England, where he received a B. Litt. degree in politics in 1951. He received his Ph.D. from Cornell in 1958. He served in the United States Army Signal Corps during 1954 and 1955.

Dr. Muller was born in Hamburg, Germany, in 1927 and first came to the United States in 1940. He has been a naturalized citizen of the United States since 1949.