MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Report of the President
For the Academic Years 2002–2004

Moving On

The moving hand writes; and, having writ, moves on.
—The Rubaiyat of Omar Khayyam

Universities endure. Their work is never complete. To paraphrase Vannevar Bush, they forever seek the endless frontier. The role of individuals is transient. We make our contributions, do our work, exert our influence, pursue our passions, chase our dreams, teach and learn, succeed and fail, give substance to the present, help shape the future, and then move on.

And as we move on, we should reflect on our times and what we have learned—but only for the purpose of helping ourselves, and others, to travel more wisely into the future. Having had the rare privilege of serving as president of MIT for nearly 14 years, through the change from the twentieth to the twenty-first century, I am indeed compelled to reflect on what I have learned. It is far too soon for me to claim more than a hint of understanding of the institutional legacy my colleagues and I leave, and that is for others to determine in any event.

Excellence

I have learned about excellence.

Faculty

Most of us go through life adding incrementally to knowledge, polishing a concept here or there, doing an experiment, contributing a few leaves—or, if we are lucky, a twig—to the tree of knowledge. But there are the few who fundamentally change what we know or can do.

Tom Everhart, when he was president of Caltech, once observed to me that "one truly excellent scientist is more valuable than 1,000 very good scientists." MIT is blessed with a remarkable number of excellent scholars, teachers, and researchers. The joy of serving as president of the Institute is to be in constant contact with such people. And the challenge is to work effectively with colleagues, who in any given conversation or situation, will know infinitely more about the topic at hand than you could ever learn. Of course, academic administrators and leaders enjoy this, but must cope with how to make wise decisions in such an environment.

At an MIT memorial service for the late Claude Shannon, Professor Robert Gallager observed that when one studies the outstanding work of others, for example, Shannon's application of Boolean algebra to describe computing, the natural reaction is "I wish I had thought of that!" But, said Gallager, when he was introduced to Shannon's concept of information channels and the mathematical theory of information, the only possible reaction was "How did he ever think of that? I never could have." That is an elegant illustration of what scholarly excellence is. It is also an overly modest statement about Bob Gallager's own contributions.

MIT history is replete with radical thinkers like Claude Shannon who have truly founded or transformed major fields of scholarship or technology —Noam Chomsky in linguistics, Paul Samuelson in economics, Norbert Wiener in cybernetics, and Tim Berners-Lee with the World Wide Web, to name but a few. I am confident that the current generation of MIT faculty includes many others whose contributions will prove in time to be of fundamental and lasting value. They set the stage for institutional excellence.

How do we maintain such individual excellence as the institution progresses? I believe that the primary mechanism is the much-maligned tenure system. Yes, tenure. When we make the hard decision to award tenure to a colleague, we are setting the standards of the institution for the next thirty or so years, so we do so with great care and a sense of responsibility. It is a hard-edged system within a community that thrives on collegiality. We first give enormous choice and opportunity

to new faculty members, but several years after that, the tenure system focuses our minds on a clear, informed evaluation of the quality and impact of each candidate's accomplishments in research, scholarship, teaching, and to a lesser extent, service.

Many in the corporate world criticize tenure as simply job security and sinecure. But they are wrong. In a serious university, tenure is first and foremost a strong form of evaluation and accountability. Only between 30 and 50 percent of those who enter as assistant professors are ultimately tenured.

Higher Education in America

Excellence also extends beyond individual scholars and institutions—it extends to systems. A basic question I have been asked innumerable times, especially when traveling abroad, is, Why is America's system of higher education so good? It is, as has been said all too often, the envy of the world.

I think there are seven primary reasons for the excellence of US higher education relative to that in other countries:

All those who believe that it is important for the United States to have the best system of higher education in the world must be constantly vigilant.

By the way, the tenure system is still justified, in my opinion, by the protection it provides against political interference in controversial scholarship. Undoubtedly, the system has been abused from time to time, but in first-rate institutions its implementation is one of our most important obligations, and it is a primary means for maintaining long-term excellence.

To paraphrase Winston Churchill's famous characterization of democratic government, the tenure system is the worst possible academic system—except for all the others.

Institutional excellence is more than a simple sum of the contributions of individual scholars. We are an academic community in which interaction and synergy define us to be far more. Good colleagues beget more good colleagues. Excellent students come to MIT to be taught by excellent faculty, and excellent faculty work at MIT in large measure because of our stellar students. Excellent faculty and students can accomplish their goals only when enabled by appropriate resources and skilled and committed staff. If any link in this chain is broken, there is danger of a downward spiral. Balancing all these factors is the prime responsibility of provosts, deans, department heads, and other academic leaders as they allocate resources.

- We have a broad diversity of institutions ranging from small liberal arts colleges to Ivy League schools, to the great land grant universities, and to somewhat more focused institutions like MIT or Caltech. This diversity provides a wealth of environments and opportunities, from which individual students can select a school that best matches their needs and capabilities.

- We offer new assistant professors a wide-open field of freedom to choose what they teach and the topics of research and scholarship they engage. We reject the hierarchical systems of many other nations in which junior faculty are subservient to, and indeed apprenticed to, senior professors. We therefore enjoy a constant flow of new ideas, passions, and approaches that keep us fresh and robust.

- In our research universities we meaningfully weave together teaching and research. This too brings a freshness, intensity, and constant renewal that is a critical component of institutional excellence.

- We welcome to our nation and our institutions students, scholars, and faculty from other countries. It is not possible to overstate the intellectual and cultural richness that immigrants have brought to US campuses. They have joined us to create what we are. Even the constant flow of international visitors to our campuses, and our faculty to theirs, is critically important.

- We have an implicit national science and technology policy that recognizes the support of frontier research in our universities as an important responsibility of the federal government. This policy is intended to provide financial support to researchers, in whatever institution they are located, based on their merit in a competitive marketplace of ideas. It has the additional feature, elegant in its simplicity, that funding for infrastructure is attached to grants and contracts, and therefore flows to the researchers with the most meritorious ideas and track records.

- We have a tradition of individual philanthropy through which our alumni and others who believe in excellent education support our colleges and universities. They enable talented students from families of modest means to attend even the most costly schools. We have tax laws that encourage and enable such support, to an extent that is unique in the world.

- We have a system of free competition for faculty and students. Such inter-institutional competition, though it may be the bane of academic administrators' daily lives, drives excellence.

As has been explained in my reports during the last thirteen years, most of these seven factors are constantly in danger. The political winds shift and change—raising barriers to international flow of students and scholars, corrupting the merit-based, peer-reviewed award of federal research funds through rampant "pork barrel" congressional earmarking of projects and facilities, and raising the specter of price controls on higher education rather than emphasizing financial aid for needy students. Some private foundations and philanthropists blow hot and cold on supporting the academic enterprise, and often suppress creative forces by being overly prescriptive. Governing boards, especially in public institutions, occasionally attempt to interfere inappropriately with the freedom of faculty to choose the subjects of their research and teaching.

All those who believe that it is important for the United States to have the best system of higher education in the world must therefore be constantly vigilant and advocate effectively for sustaining these elements of success.

Perseverance

I have learned about perseverance.

Continuity and Change

Universities are about change. They look backward to learn and preserve the lessons of the past; they are engaged in the affairs of the present; and they look forward to shape and invent the future. MIT, by its nature and founding mission, is strongly focused on the present and future.

In 1991, as our new MIT administration set its foundations, the Academic Council held a retreat. We devoted the first half of our time together to envisioning what we thought the world would be like ten or twenty years in the future, and we devoted the second half to identifying the characteristics MIT should develop in order to map onto our emerging view of the future.

We summarized our thoughts, only partially tongue in cheek, in the acronym NIRRD. This stood for Nimble, International, Robust, Resourceful, and Diverse. (I admit that the second R actually stood for Rich, but we thought it prudent to use gentler language to display our understanding that excellence requires financial resources.) So while we would continue to respect MIT's famous Nerd Pride, the celebration of focused brilliance and technical prowess mixed with irreverence for the more mundane social norms, we would set our larger plans and strategies toward relevance and opportunity for service to a changing world.

All this is to say that both change and continuity are important for universities, but we must get the balance right. Stewarding both continuity and change requires perseverance. Perseverance is crucial because people and externalities will try to change what should be continued, and continue what should be changed. It is all understandable, and usually well intentioned, but individuals and institutions must try to make wise choices and then stick with them. They must also know the difference between thoughtful perseverance and simple stubbornness.

Scientific Accomplishment

In 2001 MIT physics professor Wolfgang Ketterle shared the Nobel Prize for his creation of a Bose condensate, an ultra-cold form of matter dominated by quantum effects. This was a testimony to Professor Ketterle's prodigious scientific knowledge and technical skills. But arrival at this Holy Grail of atomic physics was also a culmination of scientific and collegial perseverance through several decades. The origin of the MIT group formalized as the Center for Cold Atoms is in our second-world-war Radiation Laboratory, and traces through several "generations" of physicists at Harvard and MIT. This group persevered as the field of atomic physics oscillated in and out of scientific popularity, building superb laboratories and cadres of faculty, students, and researchers.

Dan Kleppner is the intellectual and organizational "father" of the current group, and Dave Pritchard led it into a new level of experimental sophistication through his path-breaking development of laser trapping. When a faculty position in the area became available, the group and the Physics Department waited for several years until they were confident that they had identified the best person to fill it. That person was Wolfgang Ketterle, then a postdoctoral researcher in the group. Of course other leading institutions, including in his native Germany, recognized Ketterle's excellence, so keeping him at MIT would be a challenge. So close-knit and collegial was this research group that Professor Pritchard literally gave control of his own laboratory and major research grant to Ketterle. Ketterle stayed at MIT, and eight years later shared the Nobel Prize with two other researchers, both of whom had been educated in the MIT group.

After returning from the Nobel ceremonies in Stockholm, Ketterle walked into Dave Pritchard's office, said, "I have something for you," and gave his Nobel medal to his mentor and colleague. This postscript to perseverance is also a testimony to the deep sense of humanity that still permeates much of the scientific world.

Cultural and Institutional Change

Lou Gerstner, who during ten years as chairman and CEO of IBM, led one of the most remarkable turnarounds in US business history, spoke in 2003 at the MIT Sloan School of Management. In the discussion that followed his talk, a student asked him what he had learned during those ten momentous years. Gerstner replied, "I learned that culture is everything."

A deep sense of humanity still permeates much of the scientific world.

He went on to explain that he had once thought that institutional culture was just one of a long list of functions one learns about in business school—finance, marketing, governance, auditing, and so on. He found that management could deal straightforwardly with most of those matters, but changing a company's culture requires an entirely different level of perseverance, and success is never guaranteed in advance. I would add that for the most part, success only comes if the underlying idea behind the change is appropriate.

I think often of three examples of cultural or institutional change at MIT that require perseverance: building a renewed sense of community, achieving diversity, and charting new architectural directions.

In 1996 then–dean for students and undergraduate education Rosalind Williams and I worked together to

establish and charge a presidential Task Force on Student Life and Learning. This was a group of distinguished MIT faculty members from a wide variety of disciplines and academic traditions who devoted enormous thought and effort to establishing an improved framework for student life and learning at MIT that would make sense for our times and for the future as best as they could envision it. They engaged large numbers of students, faculty, alumni, and many other stakeholders, and in 1998 they issued a very important report. Their central conclusion was that MIT, traditionally considered to rest on two pillars, Research and Teaching, should build its future on three pillars—Academics, Research, and Community.

"Community" sounded soft and unfamiliar to MIT ears, including my own. We were more used to rigor, intensity, metrics, and hard work. But as leaders of the faculty, students, alumni, and staff continued to think, they slowly but surely began to understand the wisdom of the Task Force in promoting this dimension—raising our sights to more truly become a community of scholars with a more holistic view and increased commonality of purpose that gave greater weight to life beyond the classroom and laboratory.

Over a period of about three years, the term "community" slowly became common in hallway conversation and in meetings, despite the fact that any ten MIT people would likely have ten different definitions of the word. The evolving concept of community became a major factor in restructuring our housing system, orienting our first-year students, allocating our budgets, structuring the administration, designing our buildings, and in how we think about each other. We continue to debate the relative merits and roles of micro-communities and macro-community. But after six years of perseverance, I believe that MIT is well into a journey that will create an even greater, more supportive, and enjoyable academic community, while making no compromises in its rigor and academic excellence.

Diversity

Diversity, of all the attributes of American universities, is the one that requires the greatest perseverance to establish and maintain. Diversity has a broad connotation in academia—variety in disciplines, missions, pedagogical styles, world views, motivations; and in assembling a student body—variety of specific talents, economic and social backgrounds, geographic origin, educational preparation, life experiences, cultural and religious heritage, demonstrated creativity, personal accomplishments, and so on. But here I want to concentrate on diversity of race and gender, because we are an institution in which science and engineering are central, and women, African Americans, Latinos, and Native Americans have long been underrepresented in these fields.

MIT has a particular responsibility to educate a diverse scientific and engineering workforce and leadership for our nation.

I believe deeply that such diversity is important to the quality of education of all students, and that MIT has a particular responsibility to educate a diverse scientific and engineering workforce and leadership for our nation. (We made these points in an amicus brief during the crucial US Supreme Court consideration of affirmative action in student admission at the University of Michigan. Joining us in this brief were Stanford University, IBM, DuPont, the National Academy of Sciences, the National Academy of Engineering, and the National Action Council on Minorities in Engineering.)

When I began my career as a teaching fellow and then as a young assistant professor at the University of Michigan in the 1960s, it was extraordinary if I had more than one African American student in my classes every couple of years. In fact, it was extraordinary if I had more than one or two women students in a class. And if I had either, it was a near certainty that they would be one of the best two or three students in the class, because only through unusual drive and commitment would these students have come to study engineering.

In that context, when I consider that in 2004 MIT's undergraduate student body is 42 percent women, 6 percent African American, 12 percent Hispanic American, 2 percent Native American—as well as remarkably diverse in so many other dimensions as well—it seems to me that a miracle has happened.

But that is just the point. It is not a miracle. It is not a natural occurrence. It is the result of determined, conscientious effort, over more than three decades, often against seemingly insurmountable odds; it is the result of institutional leadership and occasional courage; it is a result of the determination of innumerable families and communities. The goal was as simple as it was profound: to give bright young people from every range of our society the opportunity to succeed.

I also conclude that despite the length of this journey, our nation is a better place than it was three decades ago. The perseverance to get where we are today has been great; the perseverance that will be required to achieve similar diversity in our graduate-student population and in our faculty will be even greater.

Why? Because the efforts to do so place academia at the nexus of a complex of historical, social, political, legal, and philosophical forces that not only militate against success; they continually change. It deals with the congruence, or lack of congruence, between the interests of individuals and the interests of society. And of course our community has a wide range of views on the topic. I would have it no other way. But surveys show that we have an extremely strong consensus on the goal and value of diversity.

We must continue this important quest. In my view, we must persevere for the foreseeable future in employing appropriate forms of affirmative action, and we must continue MIT's historical leadership in outreach and mentoring to inspire and enable young people of color to pursue rigorous education in science, engineering, mathematics, and management. And we must continue to find the strength within ourselves, and within our institutional frameworks, to eradicate the subtle and not so subtle biases that can cause the career experiences of women and men to differ in irrational and unfair ways.

Race still matters in America. And women and men can still experience seemingly identical careers very differently. I look forward to the day when the proverbial playing field is truly level, when we can have a pure meritocracy that is color blind and gender blind. But we are not there yet. Reaching that day will require Perseverance with a capital P.

Campus Renewal

Campuses evolve in momentous bursts. Roughly every 25 years, need, opportunity, and economic forces seem to converge to make possible major renewal of campus buildings and infrastructure.

Need is brought about by physical decay, evolving technology, student and faculty expectations, advancing instrumentation, changing forms of artistic expression, new pedagogies, and interinstitutional competition. Opportunity stems from new faculty with new ideas, changing scientific and scholarly directions, the evolving needs of society, dynamic patterns of federal research policy and support, and the innate drive to move to still higher levels of excellence. Economic forces derive from—well, the health of the economy and stock markets.

All of these forces, and many others, converged for MIT in the late 1990s and gave us an historic opportunity to renew our campus through both new construction and the renovation of existing facilities. We took vigorous advantage of that moment, moving forward with a building agenda to match and enable our aspirations in student life and community, and in our future-oriented research and academic agenda. The upshot is that almost 25 percent of today's MIT campus has been constructed since 1990.

One could view this as an enormous cost. Indeed, new construction since 1998 has totaled over $1 billion. But those of us among the faculty, administration, and trustees who planned and executed this campus renewal believe that it has been an essential investment in MIT's future excellence and leadership. The new and renovated buildings serve essential functions for teaching, research, and campus life.

As we enter the twenty-first century, our architectural boldness echoes MIT's heroic creation of its Cambridge campus at the beginning of the twentieth.

But this renewal has been about more than functionality. It has also been about architectural boldness, livable, inspirational spaces, and our search for a new sense of community. Frankly, as we enter the twenty-first century, our architectural boldness echoes MIT's heroic creation of its Cambridge campus at the beginning of the twentieth, and in the same spirit in which MIT invested in Baker House, Kresge Auditorium, and the Chapel in the 1950s. The "Student Street" in the Ray and Maria Stata Center will indeed take us to a new level in inspirational and congenial spaces for teaching, study, discussion, dining, and mingling. And I defy anyone to cite a facility that has more rapidly and effectively transformed the sense of campus community for students, faculty, and staff than the Al and Barrie Zesiger Sports and Fitness Center.

But just as a strong economy and unprecedented investment returns gave us courage to pursue a new campus vision, and gave many extraordinary donors the confidence to help us realize that vision, so too did the subsequent economic downturn create a back-pressure against it. Therein lies another personal lesson about perseverance.

There is a premium to be paid in commissioning some of the greatest architects of one's times—people like Frank Gehry, Steven Holl, Fumihiko Maki, Kevin Roche, and Charles Correa. And major gifts become more elusive when an economy cools. MIT was subjected to these forces. On top of that, soon after several of these projects were started, Boston-area construction costs rose at an historically unprecedented rate, driven by the massive "Big Dig" project that saturated the markets across our region and well beyond. For almost two years, in many trades, one could not find even two subcontractors to compete on price. Furthermore, when the economy began to decline, the construction markets did not immediately follow suit, because the "Big Dig" had guaranteed government funding.

Pressures mounted to stop our projects, and to replace bold designs with more utilitarian structures before proceeding. We engaged, as we had a responsibility to do, in debates about what debt levels we could afford, and whether we had sufficient gifts, or could expect them in the future. We had to continually remind ourselves of the important role that federal reimbursement for the costs of research facilities would play as we moved into important new fields of research.

I had seen this before. In the early 1990s MIT prepared to construct the wonderful new South Laboratory Building at the MIT Lincoln Laboratory. It had taken eight years to arrange the proper federal funding and the private financing for this large project. But then the nation went into a deep recession, and Lincoln Laboratory was downsizing substantially as the "Reagan Buildup" in the Department of Defense passed through its peak and moved to a large decline follow-

ing the end of the cold war. There was an almost unanimous opinion that it would be a mistake both symbolically and functionally to start construction under these circumstances.

But we realized that it would take many years to restart the project, especially in light of the federal complexities, and that the real symbol should be that we believed that the Lab had a bright future. So we plowed ahead. As it turned out, it was indeed the start of a renaissance, and the MIT Lincoln Laboratory is very healthy today, and is conducting much of its work in this attractive, state-of-the-art facility.

In the early 2000s MIT again decided that the long view—the new academic agenda, and the quest for inspiration and community—would dominate. The buildings are not ends in themselves; rather they are the structures that will enable our students and faculty to realize their dreams and contribute to society. MIT's evolving campus is the reflection of a bold university that is confident of its future.

In other words, we must persevere.

Boldness

I have learned about boldness.

Boldness does not come naturally to me. Indeed, I have observed that for the most part, academics save their boldness or radicalism for their intellectual endeavors, rather than for their day-to-day lives and behavior, or for the organizations they inhabit. And universities are inherently conservative institutions. They should be, for there is much that is good and important within them that must be conserved.

But there are instants when both institutions and individuals must decide whether or not to strike out in new directions, or to seize a moment. The conclusions they come to at such junctures make all the difference. Boldness, courage—call it what you will—seems not at all to have a mysterious origin. Rather it is the simple application of core values at a critical moment in time. The values may be institutional, or personal. Hopefully they are both at once.

MIT has taken many bold, perhaps even courageous, steps at the turn of the century: the decision to publish all of our course materials online, to be freely available to anyone in the world; the public acknowledgement that the senior women faculty in our School of Science had been marginalized and the determination to change that situation; the dedication to visionary architecture that is marking our evolving campus; the decision to offer health benefits to same-sex partners; the confidence that launched a $1.5 billion fundraising campaign. These decisions were reflections of a spirit of courage and values that has marked MIT from its beginning. To illustrate more fully what I mean by institutional boldness or courage, I will take one case in point. It was literally a "case," involving a lawsuit against MIT by the Department of Justice on the matter of student financial aid.

These decisions were reflections of a spirit of courage and values that has marked MIT from its beginning.

Student Financial Aid and the Justice Department

My first lesson in boldness at MIT came early.

In May 1991 US attorney general Richard Thornburgh brought a formal complaint against the eight Ivy League universities and MIT, charging that they illegally colluded in the Overlap Group—a set of colleges and universities that held meetings to assure that financial aid to students applying to more than one of these institutions was awarded only on the basis of financial need. The next week he left the administration to run for the US Senate. This was a bizarre application of the Sherman Antitrust Act. Indeed, it was the first time that a nonprofit organization had been sued under this act. That fact undoubtedly added to the zeal of Justice Department attorneys, who sensed a new legal frontier to pursue.

The other eight institutions signed a consent decree—essentially a way of saying that they had done nothing wrong, but wouldn't do it again.

As a neophyte president, I was lobbied kindly but firmly by more experienced fellow presidents I greatly admired not to challenge the Justice Department. The stakes, and potential treble damages, they said, were too high to risk in a court battle.

Then the moment came—I was on the phone in my study talking with Thane Scott, a fine young attorney, and Constantine Simonides, a remarkable MIT administrator and a spiritual force in the Institute. They explained that time had run out. I had to tell them whether to sign a consent decree or go to court.

After a long pause, I said, "We are going to court."

What was this decision all about?

The Justice Department would claim that the institutions were conspiring to set financial-aid levels in a noncompetitive way, but what really was at stake was the future of a view that the role of financial aid is to enable those who would not otherwise be able to attend a fine university to do so.

MIT believed strongly that there was an important principle to be upheld, and so did I. It had been well articulated by my predecessor, Paul Gray, during his term in office.

MIT had long believed, and believes today, that undergraduate financial aid exists to enable bright students who come from families of modest means to attend college. We admit students on the basis of their merit and we distribute financial aid on the basis of their need. For many years prior to 1991, the eight Ivy League schools, MIT, and about forty other institutions had been mutually committed to these principles. Every year we compared data on the financial need of those students who had been admitted to more than one

of our institutions. Using a common methodology, we compared the judgments of our financial-aid officers on each of these families' ability to pay a share of the cost of their child's education. We made no common decisions about what tuition to charge or how much aid to provide, but we did make a common assessment of their need.

What happened?

There was a protracted and dramatic legal battle. Economic experts argued, newspapers editorialized in our favor, and eloquent witnesses testified about the virtues of MIT's system of merit-based admission and need-based financial aid. We predicted that if we did not prevail, the nation's financial aid system would spin apart, and more and more financial aid would become "merit-based," that is, given to very good students who did not actually need it in order to recruit them to campuses.

MIT lost the case in the US Circuit Court in Philadelphia. Within hours, to the utter astonishment of the Justice Department, I held a press conference and announced that we would appeal the ruling. The three-judge appellate court heard our arguments, and ruled on September 17, 1993. There were three legal points in question. The court ruled unanimously in favor of MIT on two points, and split two to one in MIT's favor on the third point. It remanded the case back to the lower court. For all intents and purposes, we had won a strong victory. On this basis, we negotiated a settlement with the Justice Department that defined terms under which limited agreements and after-the-fact data comparisons could be effected by colleges. These ground rules were further expanded and refined in subsequent reauthorizations of the Higher Education Act.

The appeal hearing, normally a very brief and dry affair, had some real drama. The distinguished jurist Leon Higginbotham, who had served as chief justice of that very court until only a few weeks before the hearing, had asked to present the amicus briefs to the court. He later stated publicly that in his career the two legal endeavors he was most proud of were representing Nelson Mandela and testifying on behalf of MIT. Why? Because he deeply believed that the decades of commitment by the Overlap schools to merit-based admission and need-based financial aid had been a fair and powerful tool in advancing talented underrepresented minorities in American society.

Nonetheless, the Ivies remained under the consent decree for a decade, use of merit aid grew across the country, federal grants were increasingly replaced by loans. All these factors have combined to cause a massive shift of financial support away from the poorest students and families to those with somewhat higher incomes. Despite the very real pressures on middle-class families during the last dozen years, I consider that the world of financial aid is less noble and fair than it once was.

In 2001 a group of 28 leading universities and colleges, including Cornell, Stanford, Yale, and MIT, signed a public document committing themselves to merit-based admission and to a common methodology for measuring need. This is an attempt to nudge the system back in the general direction of its pre-1991 configuration. It is helpful, but the merit-aid approach is strong in many other universities. Many colleges and universities now bargain with parents, matching offers of other schools and trying to maximize the number of top students they can attract with a given financial aid budget. This is known as enrollment management. An entire cottage industry of advisors has grown up to assist families in the wheeling and dealing.

Despite this imperfect ending, MIT is still regarded with respect for having stood on principle. We resisted unwarranted government intrusion into the business of private universities. Our stance strengthened our institution. And I earned my MIT spurs.

Optimism

I have learned the value of optimism.

Indeed, it is hard to live and work within the environment of discovery and accomplishment on the campus, and to observe the impact of our graduates on the world, without being optimistic about the future. But optimism is challenged from time to time.

Every fall for fourteen years, I have had the opportunity to speak to our first-year students at convocation during their first week on campus. This is the first time that they are together in one place. The air is electric with excitement, enthusiasm, and apprehension. It brings to me a wonderful sense of renewal, and an opportunity to say some things that I think are important about the adventure on which they are embarking—whether or not they care or remember a word of it!

A few years ago, notably before such shattering events as the attacks on September 11, 2001, the bursting of the dot-com bubble, or US engagement in war, one of the freshmen wrote an editorial in the campus newspaper. He took me to task for being so optimistic in my convocation message. That puzzled and troubled me.

MIT admits students on the basis of their merit and we distribute financial aid on the basis of their need.

Here was an absolutely stellar group of young men and women about to begin their studies at one of the world's greatest universities. They had a common bond of dedication to, and superb capabilities in, science, mathematics, and engineering. They were in the right place at the right time. The field of opportunity before them was unparalleled. It was arguably the most exciting period in human history for science—the human genome was being sequenced, life science was reinvigorating engineering, the information-technology revolution was playing itself out, instruments of unprecedented accuracy and resolution were giving us new insights into the human brain and the nature of the universe, it was a

golden age of mathematics, new interactions among social science, engineering, and management were beginning to blossom, and the power of computers to analyze and simulate complex phenomena was about to enter a whole new level.

Furthermore, the world ahead would need bright workers and leaders grounded in these disciplines in order to cleanse our environment, provide us energy, improve human health and security, and enable other nations to climb the ladder of well-being. The young people who would follow them would need to be educated. It was the dawn of the knowledge age, and they had come to learn from, and contribute to, one of the world's great knowledge resources.

How could MIT freshmen not be optimistic?

The reason, of course, is that they knew about poverty, disease, war, and human failings. One can always find reasons to be pessimistic, but it is no way to launch a college experience or a life of learning.

When I was young, I sat in our comfortable home in front of a black-and-white television and watched an interview with Dr. Tom Dooley, an American medical doctor serving people in Asia in the midst of unfathomable poverty and dire living conditions. Dr. Dooley held up in front of the camera a tiny, ill, starving child with a distended belly. Now, in the 1950s, such sights were never seen on television, or in magazines. It was shocking, and I recoiled emotionally. But then he calmly said, in essence, "When you look at this child you see something horrifying, but I look at this child and know that I have the knowledge and skill to make him well."

In the end, I believe that knowledge and skill trump ignorance, and that optimism trumps pessimism.

I have never forgotten that simple statement. It symbolizes for me, an important part of what a great university, especially one with the focus of MIT, can do. Through its own work, and especially through the lives and works of its graduates, a university can strive to make the world well. On our campus we can, through the arts, humanities, and fundamental science, advance the human condition at the most sophisticated level. And beyond our campus, we and our graduates have unbounded opportunities to improve life for the many. The knowledge we generate, the things we come to understand, and the devices we build can improve health, economies, security, and the quality of life.

In the end, I believe that knowledge and skill trump ignorance, and that optimism trumps pessimism. If we believe that and act accordingly, our personal happiness will benefit, and our talents will be well used.

MIT, too, must continue to be optimistic in its vision of why we are here and what we can do. For then our students will be inspired to take on the great challenges of the world, with excellence, perseverance, and boldness.

Justin Allyrdice Knight

Charles M. Vest
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