# The Future of the Public Research University

James J. Duderstadt

President Emeritus and
University Professor of Science and Engineering

Iowa State University

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Last week one of my colleagues forwarded to our deans the following quote from an interview with Peter Drucker that appeared in this week's Forbes magazine:

> Thirty years from now the big university campuses will be relics. Universities won't survive. It's as large a change as when we first got the printed book. Do you realize that the cost of higher education has risen as fast as the cost of health care? And for the middle-class family, college education for their children is as much of a necessity as is medical care—without it the kids have no future. Such totally uncontrollable expenditures, without any visible improvement in either the content or the quality of education, means that the system is rapidly becoming untenable. Higher education is in deep crisis. Crisis means that things will get either much better or much worse. Things will get much different. It took more than 200 years (1440 to the late 1600s) for the printed book to create the modern school. It won't take nearly that long for this big change. Already we are beginning to deliver more lectures and classes off-campus via satellite or two-way video at a fraction of the cost. The college won't survive as a residential institution. Today's buildings are hopelessly unsuited and totally unneeded.
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> Peter Drucker, Forbes, 3/10/97

Needless to say, this quote stimulated a great deal of E-mail traffic among our deans. Some responded by blasting Drucker. Others were simply moot. A few noted that a former president of the University of Michigan would probably agree with Drucker . . . .

Several years ago, I conducted an informal survey of attitudes toward change in higher education. I asked several groups to quantify the degree of change they believed the university would undergo during the 1990s, using a scale of 0 to 10—with 0 representing no change, the *status quo*, and 10 representing radical change, a total reinvention of the university.

Most faculty tended to suggest relatively modest change, in the range of 3 to 4 on the 10-point scale. Most academic administrators—deans, provosts, and the like—believed there would be more radical change, on the order of 7 to 8 on the 10-point scale.

During one of our annual Association of American Universities (AAU) meetings, I asked a number of presidents of major research universities this same question. Most of them responded that, on a scale of 0 to 10, the magnitude of the changes would be about 20! Incidentally, that is also my own estimate of the amount of change the American university will experience in the decade ahead: 20, on a 10-point scale.

Actually, this should be neither alarming or surprising. As one of civilization's most enduring institutions, the university has been quite extraordinary in its capacity to change and adapt to serve society. Far from being immutable, the university has changed quite considerably over time, and continues to do so

today. Even in our nation, there is a remarkable diversity of institutions of higher education, ranging from small liberal arts colleges to gigantic university systems, from storefront proprietary colleges to global "cyberspace" universities, all demonstrating the evolution of the species.

## The Public Research University

Your university and mine represent one of the most important and vital classes of institutions, the public research university. These two words, *public* and *private*, denote perhaps the two most significant changes in American higher education.

A century ago the industrial revolution was transforming our nation from an agrarian society into the industrial giant that would dominate the 20th Century. In towns like Ann Arbor, Madison, and Ames, a new paradigm of higher education evolved to serve this new nation, the "public" university. In sharp contrast to the original colonial colleges, based on the elitist educational principles of Oxford and Cambridge, these new institutions were committed to broad educational access and service to society.

A similar period of rapid change in higher education occurred after World War II. The educational needs of the returning veterans, the role the universities had played in the war effort, and the booming post war economy resulted in an explosion in both the size and the number of major universities. The direct involvement of the federal government in the support of campus-based research led to the evolution of a new class of institutions, the research universities.

Both the public university and the research university paradigms trace back to important public policies.

## The Public Principle

Perhaps the unique characteristic of higher education in America is the strong bond between the university and society. Historically, our institutions have been shaped by, have drawn their agendas from, and have been responsible to the communities that founded them. Each generation has established a social contract between our leading universities and the society they serve.

We generally think of the public university arising from the sequence of land-grant acts, the Morrill Act of 1862 giving states federal lands to establish universities, the Hatch Act of 1877 creating the Agricultural Experiment Station, and the Smith-Lever Act of 1914 establishing the Cooperative Extension Service. In reality these institutions trace their history back to the founding of the nation, with Jefferson's concept of national universities.

The key social principle is the perception of education as a "public good." That is, the public university is established to benefit all of society and hence deserves

support by that society, rather than just by the individuals participating in its particular educational programs.

Because they added the activities of research and service to the traditional academic mission of teaching the young, these institutions created a continuing connection between theory and practice. The result has been a powerfully creative engine for progress uniting students and faculty in a collective discovery and transfer of useful knowledge and technology. The public research university, through on-campus scholarship and off-campus extension activities, was first key to the agricultural development of America and then to the transition to an industrial society.

## The Research Partnership

The basic structure of the academic research enterprise and the evolution of the research university traces back to the seminal report, *Science, the Endless Frontier*, produced by a post-war study group chaired by Vannevar Bush some fifty years ago. The central theme of this report was that the nation's health, economy, and military security required the continual deployment of new scientific knowledge, and that the federal government was obligated to ensure basic scientific progress and the production of trained personnel in the national interest. The American university was selected as the vehicle to achieve this objective.

Not only did the new policy stress that federal patronage was essential for the advancement of knowledge. It also stressed a corollary principle: that the government had to preserve "freedom of inquiry," to recognize that scientific porgies results from the "free play of free intellects, working on subjects of their own choice, in the manner dictated by their curiosity for the explanation of the unknown." Since the federal government recognized that it did not have the capacity to manage effectively either the research itself or the universities, the relationship was essentially a partnership, in which the government provided relatively unrestricted grants to support part of the research on campus, with the hope that "wonderful things would happen."

The resulting partnership between the federal government and the nation's universities has had an extraordinary impact. It has made America the world's leading source of fundamental scientific knowledge. It has also produced the well-trained scientists and engineers capable of applying this new knowledge. This academic research enterprise has played a critical role in the conduct of more applied, mission-focused research in a host of areas including health care, agriculture, national defense, and economic development.

## The Good News . . . and the Bad News

Largely, as a result of this partnership, America's research universities have become the strongest in the world at a time when the benefits from R&D investment have never been higher. A few years ago, a *New York Times* editorial referred to our nation's research universities as the "jewel in the crown" of our

national economy. It went on to assert that university research "is the best investment taxpayers can ever make in America's future."

Yet, many today fear the 1990s stand a good chance of being the worst decade for higher education since the 1930s. There is a frightening sense of crisis at many of our nation's most distinguished campuses.

Our universities are at serious risk on a number of fronts. The signs of stress are everywhere:

1. The breakdown of mutual trust has led to increasingly adversarial relationships between universities and government, including Congress, the administration, and federal agencies, as manifested in recent skirmishes over matters such as indirect cost reimbursement, scientific misconduct, and pressures to restrict the flow of technical information.

2. The skepticism—indeed, hostility—exhibited by the media and government has badly eroded public trust and confidence in the university, as revealed by the recent deluge of attacks on the academy, *e.g.,* those who suggest that "most scholarly activity is either the sterile product of requirements imposed by Philistine administrators or a form of private pleasure that selfish professors enjoy at the expense of their students."

3. Forces upon and within the universities, such as the rapidly escalating costs of research, are pushing toward a rebalancing of missions, away from research and more toward teaching and public service.

4. The morale of academic researchers has deteriorated significantly over the past decade, due in part to the pressures and time-consuming nature of the need to obtain and manage sponsored research funding and the disintegration of a "scholarly community" within the university.

What is going on here? Why, at a time when the public research university is playing an absolutely vital role in our nation, are we feeling so threatened?

## The Challenge of Change

Two weeks ago, I had the privilege of co-chairing with Governor Richard Celeste a national meeting hosted by the National Academy of Sciences and the National Science Board, concerned with the nature of the stresses on research and education in American higher education.

This effort was stimulated several years earlier by the observation of Roland Schmitt, then chair of the National Science Board, that despite the relatively generous federal funding of academic research during the 1980s, faculty morale on our campuses appeared to be at an all-time low. A series of informal workshops hosted by the NSB revealed the usual litany of concerns:

- Fears about the future funding of research
- The stresses of grantsmanship
- The loss of a sense of scholarly community with increasing specialization
- The imbalance between the rewards for research vs. teaching
- And a host of technical issues, such as indirect costs, facilities support, government reporting and accountability requirements, and so on

To explore this in more detail, we asked the NAS Government-University-Industry Research Roundtable to sponsor dozens of townhall meetings for faculty and academic administrators on university campuses across the nation. Representatives of each of these universities then were invited to our meeting last week in Washington to discuss their findings with representatives of the federal government, including the White House science advisor, the heads of a number of key federal agencies, and the leaders of the national academies.

From these meetings, it has become clear that the stresses were driven by an array of more fundamental forces, all of which could be captured in a single word: *change*. Rapid and profound change is occurring in our world, our society, and consequently in our social institutions. And our universities are feeling the stresses of these forces of change.

There are many ways to group the challenges of change in higher education. For our purposes today, let me suggest the following framework:

A political-economic crisis: All universities are suffering the consequences of the structural flaws of national and state economies, the growing imbalance between revenues and expenditures, that are undermining support for essential social institutions as governments struggle to meet short-term demands at the expense of long-term investment. Beyond this, there is a growing sense that the traditional public principle—that education is a public good that benefits all of society and hence should be supported by society-at-large—is shifting to a view of education as a private good that should be paid for by those benefiting most directly—the students.

Cost shifting among stakeholders: Each of the many stakeholders of the contemporary university—students and parents, state and federal government, business and industry, the public-at-large—wants to minimize the resources it provides to and maximize the services it receives from our institutions. Today few seem to be able to see the university and its diverse missions as a whole. More specifically, each constituency seems to want much more out than it is willing to put in, thereby leveraging other contributors.

A shift in national priorities—from guns to butter: For almost half a century, the driving force behind many of the major investments in our national infrastructure has been the concern for national security in the era

of the Cold War. As concerns about national security have ebbed in the wake of the geopolitical restructuring of recent years, the nation is drifting in search of new driving imperatives. While there are numerous societal concerns, such as economic competitiveness, national health care, crime, and K-12 education, none of these has yet assumed an urgency sufficient to set new priorities for public investments.

A change from partnership to procurement: In recent years the basic principles of the extraordinarily productive partnership between the federal government and America's universities in support of research and advanced training has begun to unravel, so much so that today this relationship is rapidly changing from a partnership to a procurement process. Scientists and universities are questioning whether they can depend on the stable and solid relationship they had come to trust and that has paid such enormous dividends in the scientific and technological strength of our nation.

A shift in attitudes toward teaching and research: In recent years, there has been a decided shift in public attitudes toward the purpose of a university, away from research and toward undergraduate education. A several decade-long public consensus that universities were expected to create as well as transmit knowledge, a consensus that supported strong investment in the scientific, technological, and scholarly preeminence of this nation, has begun to erode.

Politics: Most of America's colleges and universities have more than once suffered the consequences of ill-thought-out efforts by politicians to influence everything—what subjects can be taught, who is fit to teach, and who should be allowed to study or teach. The special interest politics of our times, with a decidedly slash-and-burn character, are increasingly focusing on higher education. In the past, our universities were buffered from politics both by their governing boards and the media. Today, however, these groups now serve to focus and magnify political attacks on our campuses, rather than shielding us from them.

Deteriorating ability to lead: A recent study by the Association of Governing Boards has concluded that one of our greatest challenges is the weakness of the contemporary university presidency. They found that the authority of university presidents had been undercut by all of their partners—trustees, faculty, and political leaders—and at times by the president's own lack of assertiveness and willingness to take risks for change.

Such challenges suggest that the status quo is no longer an option. But, of course, change is no stranger to the university. American higher education has always been characterized by a strong bond with society, a social contract. As society has changed, so too have our institutions changed to continue to serve.

## The 21st Century University

We are living in the most extraordinary of times: the end of the Cold War, the impact of technologies ranging from computers and telecommunication to biotechnology, a redefinition of the world economic order, and, of course, the human population pushing against the very limits of the planet. Many believe that we are going through a period of change in our civilization just as momentous as that which occurred in earlier times such as the Renaissance or the Industrial Revolution—except that while these earlier transformations took centuries to occur, the transformations characterizing our times will occur in a decade or less! I used to portray the 1990s as the countdown toward a new millennium, as we find ourselves swept toward a new century by these incredible forces of change. The events of the past several years suggest that the 21st Century is already upon us—a decade early!

This time of great change, of shifting paradigms, provides the context in which we must consider the changing nature of the academic research enterprise itself. We must take great care not simply to extrapolate the past and instead examine the full range of possibilities of the future.

Here, we face a particular dilemma. Both the pace and nature of the changes occurring in our world today have become so rapid and so significant that our present social structures—in government, education, and the private sector—are having increasing difficulty in even sensing the changes, although they certainly feel their consequences. They are simply incapable of understanding the profound changes characterizing our world, much less responding and adapting in an effective way.

Let me go further. It may well be that our present institutions, such as universities and government agencies, which have been the traditional structures for intellectual pursuits such as research, could be as obsolete and irrelevant to our future as is the American corporation of the 1950s. We need to explore new social structures capable of sensing and understanding change, as well as capable of engaging in the strategic processes necessary to adapt or control change.

How will we respond to the challenges of our times, the challenges of change? Let me suggest three near-term possibilities:

### The Entrepreneurial University

The nature of the contemporary university and the forces that drive its evolution are complex and frequently misunderstood. The public still thinks of us in very traditional ways, with images of students sitting in a large classroom listening to a faculty member lecture on subjects such as literature or history. Our faculty have more of an Oxbridge image, thinking of themselves as dons and of their students as serious scholars. The federal government thinks of us as just another R&D contractor or health provider, a supplicant for the public purse.

The reality is something quite different. In many ways, the university today has become the most complex institution in modern society—far more complex, for example, than corporations or governments. We are comprised of many activities, some nonprofit, some publicly regulated, and some operating in intensely competitive marketplaces. We teach students; we conduct research for various clients; we provide health care; we engage in economic development; we stimulate social change; and we provide mass entertainment ( . . . athletics . . . ). In systems terminology, the modern university is a loosely coupled, adaptive system, with a growing complexity as its various components respond to changes in its environment.

In a sense, the modern university has become a highly adaptable knowledge conglomerate because of the interests and efforts of our faculty. We have provided our faculty the freedom, the encouragement, and the incentives to move toward their personal goals in highly flexible ways. In a very real sense, the university of today is a holding company of faculty entrepreneurs, who drive the evolution of the university to fulfill their individual goals. We have developed a transactional culture in which everything is up for negotiation.

While the entrepreneurial university has been remarkably adaptive and resilient throughout the 20th Century, it also faces serious challenges. Many contend that we have diluted our core business of learning, particularly undergraduate education, with a host of entrepreneurial activities. We have become so complex that few, whether on or beyond our campuses, understand what we have become. We have great difficulty in allowing obsolete activities to disappear. Today, we face serious constraints on resources that no longer allow us to be all things to all people. We also have become sufficiently encumbered with processes, policies, procedures, and past practices that our best and most creative people no longer determine the direction of our institution.

## The Privately Financed Public University

Of course, one obvious consequence of declining public support is that the leading public research universities will increasingly resemble private universities in the way they are financed. The University of Michigan provides an excellent case study of one possible consequence.

Over the past two decades, the share of the University of Michigan's support provided by state appropriations has declined to the point today where it comprises only 18 percent of our academic budgets (non-auxiliary funds), and 10 percent of our total revenue base. In a sense, we long ago ceased to be a state-supported university. Indeed, today we are, by most measures, not even a strongly state-assisted university, since other shareholders—students and parents through tuition, the federal government through research grants, alumni, friends, and benefactors through gifts, and patients through health care fees—each provide more support to the University than does the State of Michigan.

Hence, the University of Michigan has already become the first of what I suspect will be an increasing number of *privately financed, public* universities, supported

by a broad array of constituencies at the national—indeed, international—level, albeit with a strong mission focused on state needs. Just as a private university, it must earn the majority of its support in the competitive marketplace, i.e., via tuition, research grants, gifts. Yet it still retains a public character, committed to serving the people whose ancestors created it two centuries earlier.

Today one might even conclude that America's great experiment of building world-class universities supported by public tax dollars is coming to an end. Put another way, it could well be that the concept of a world-class, comprehensive state university may not be viable over the longer term. It may not be possible to justify the level of public support necessary to sustain the quality of these institutions in the face of other public priorities such as health care, K-12 education, and public infrastructure needs—particularly during a time of slowing rising or stagnant economic activity.

There are important issues raised by the "privatizing" of the support base for public higher education. For example, how does one preserve the public character of a privately-financed institution? How does a "state-related" university adequately represent the interests of its majority shareholders—namely, parents, patients, federal agencies, and donors—in its governance? Can one sustain an institution of the size and breadth characterizing our leading public research universities on self-generated ("private") revenues alone?

Back to the Future

But there are more profound shifts that will likely occur in the character of institutions. Clearly, to thrive in the more competitive marketplaces of the 21st Century, universities must shift from the "faculty centered" cultures of research universities to the "learner-centered" enterprises of land-grant institutions, that is—in the language of the business world—from "provider-centered" to "customer-driven."

But, there is an even more subtle shift that I believe may occur. There could be a shift in public attitudes toward universities that will place less stress on values such as "excellence" and "elitism" and more emphasis on the provision of cost-competitive, high-quality services—from "prestige-driven" to "market-driven" philosophies.

Let me elaborate a bit on this third issue. For the past half-century, the paradigm characterizing the government-university research partnership has been one built upon the concept of relatively unconstrained patronage. The government would provide faculty with the resources to do the research they felt was important in the hopes that at some future point this research would benefit society. Since the quality of the faculty, the programs, and the institution were felt to be the best determinant of long-term impact, academic excellence and prestige were valued.

Yet today society seems reluctant to make such long-term investments. To be sure, it seems interested in seeking short-term services from universities of high

quality, but with cost as a consideration. In a sense, it seeks low-cost, quality services rather than prestige. The public is asking increasingly, "If a Ford will do, then why buy a Cadillac?"

Perhaps, rather than moving ahead to a new paradigm, we are in reality returning to the paradigm that dominated the early half of the 20th Century—the "land-grant university" model. In fact, perhaps what is needed is to create a contemporary land-grant university paradigm.

## The Changing Roles of the University

But there are more fundamental forces of change at work here: change in our roles, in our relationship with society, in the nature of our institutions, and in the higher education enterprise more broadly. Let me consider each of these in turn.

It is common to refer to the primary missions of the university in terms of the trinity of teaching, research, and service. But these roles can also be regarded as simply the 20th Century manifestations of the more fundamental roles of *creating, preserving, integrating, transmitting,* and *applying* knowledge. From this more abstract viewpoint, it is clear that while these fundamental roles of the university do not change over time, the particular realization of these roles do change—and change quite dramatically, in fact.

Consider, for example, the role of "teaching," that is, transmitting knowledge. We generally think of this role in terms of a professor teaching a class of students, who in turn respond by reading assigned texts, writing papers, solving problems or performing experiments, and taking examinations. We should also recognize that classroom instruction is a relatively recent form of pedagogy. Throughout the last millennium, the more common form of learning was through apprenticeship. Both the neophyte scholar and craftsman learned by working as apprentices to a master. While this type of one-on-one learning still occurs today in skilled professions such as medicine and in advanced education programs such as the Ph.D. dissertation, it is simply too labor-intensive for the mass educational needs of modern society.

The classroom itself may soon be replaced by more appropriate and efficient learning experiences. Indeed, such a paradigm shift may be forced upon the faculty by the students themselves. Today's students are members of the "digital" generation. They have spent their early lives surrounded by robust, visual, electronic media—Sesame Street, MTV, home computers, video games, cyberspace networks, MUDS, MOOs, and virtual reality. They approach learning as a "plug-and-play" experience, unaccustomed and unwilling to learn sequentially—to read the manual—and instead inclined to plunge in and learn through participation and experimentation. While this type of learning is far different from the sequential, pyramid approach of the traditional university curriculum, it may be far more effective for this generation, particularly when provided through a media-rich environment.

Hence, it could well be that faculty members of the 21st Century university will be asked to set aside their roles as teachers and instead become designers of learning experiences, processes, and environments. Further, tomorrow's faculty may have to discard the present style of solitary learning experiences in which students tend to learn primarily on their own through reading, writing, and problem solving. Instead, they may be asked to develop collective learning experiences in which students work together and learn together with the faculty member becoming more of a consultant or a coach than a teacher.

One can easily identify other similarly profound changes occurring in the other roles of the university. The process of creating new knowledge—of research and scholarship—is also evolving rapidly away from the solitary scholar to teams of scholars, perhaps spread over a number of disciplines. Indeed, is the concept of the disciplinary specialist really necessary—or even relevant—in a future in which the most interesting and significant problems will require "big think" rather than "small think"? Who needs such specialists when intelligent software agents will soon be available to roam far and wide through robust networks containing the knowledge of the world, instantly and effortlessly extracting whatever a person wishes to know?

So, too, there is increasing pressure to draw research topics more directly from worldly experience rather than predominantly from the curiosity of scholars. Even the nature of knowledge creation is shifting somewhat away from the *analysis of what has been* to the *creation of what has never been*—drawing more on the experience of the artist than upon analytical skills of the scientist.

The preservation of knowledge is one of the most rapidly changing functions of the university. The computer—or more precisely, the "digital convergence" of various media from print-to-graphics-to-sound-to-sensory experiences through virtual reality—has already moved beyond the printing press in its impact on knowledge. Throughout the centuries, the intellectual focal point of the university has been its library with its collection of written works preserving the knowledge of civilization. Yet today such knowledge exists in many forms—as text, graphics, sound, algorithms, and virtual reality simulations—and it exists almost literally in the ether, distributed in digital representations over worldwide networks, accessible by anyone, and certainly not the prerogative of the privileged few in academe.

This abstract definition of the roles of the university has existed throughout the long history of the university and will certainly continue to exist as long as these remarkable social institutions survive. But, the particular realization of the fundamental roles of knowledge creation, preservation, integration, transmission, and application will continue to change in profound ways, as they have so often in the past. And the challenge of change—of transformation—is in part a necessity simply to sustain our traditional roles in society.

## Changes in the University's Relationship with Society

The modern university interacts with a diverse array of external constituencies—alumni and parents, local communities, state and federal government, business and industry, the media, and the public-at-large. All depend on the university in one way or another, just as we depend upon them. The management of the complex relationships between the university and its many constituencies is one of the most important challenges facing higher education.

America's universities touch the lives of a great many people in a great many different ways. Our society has assigned to the research university an increasing number of roles—broadening its research mission and increasing the participation of scholars as experts deeply engaged in public affairs and the world of commerce and industry. As a consequence, the contemporary university becomes ever more complex and multi-dimensional. Beyond the classical triad of teaching, research, and service, society has assigned to us an array of other roles: health care, economic development, entertainment (intercollegiate athletics), enabling social mobility and change, sustaining national security, even as we attempt to explore the far reaches of space or the depths of the ocean or the fundamental nature of matter or life itself. Also, today's society is asking us to assume additional roles such as revitalizing K-12 education, securing economic competitiveness, providing models for multicultural society, rebuilding our cities, and preparing the way for internationalization.

Yet, as important as universities are today in our everyday lives, it seems clear that in the future they will play an even more critical role, as they become the key players in providing the knowledge resources—knowledge itself and the educated citizens capable of applying it wisely—necessary for our prosperity, security, and social well-being. As Erich Bloch, former Director of the National Science Foundation, stated in Congressional testimony, "The solution of virtually all the problems with which government is concerned: health, education, environment, energy, urban development, international relationships, space, economic competitiveness, and defense and national security, all depend on creating new knowledge—and, hence, upon the health of America's research universities."

If ever there were ivied walls around universities, protecting us against the intrusions of politics or the economy, these walls have long since tumbled down. The environment beyond our campuses is very different today than it was even a decade ago. Today we are neither isolated nor protected. We are very much engaged and exposed in the world. If you doubt it, you have only to read the headlines. Hardly a day passes without some news story on higher education: state budget cuts; college closings; or some legislative committee out to regulate, legislate, or fact-find in areas that were once privileged academic territory.

It is paradoxical that the extraordinarily broad public attention and criticism of the academy comes at a time when the American university is more deeply engaged in society, when it has become a more critical actor affecting our economy, our culture, and our well-being than ever before. But, then again, perhaps it is not so paradoxical that just as the university is becoming a key

player in our society, it should come under much closer scrutiny and be subjected to greater accountability.

When you get right down to it, perhaps we are victims of our own success. We have entered an era in which educated people and the ideas they produce have truly become the wealth of nations, and universities are clearly identified as the prime producers of that wealth. This central role means that more people today have a stake in higher education. More people want to harness it to their own ends. We have become more visible and more vulnerable as institutions. We attract more constituents and support, but we also attract more opponents.

## Changes in the Nature of the University

The complex and heterogeneous nature of American society has given rise to a system of higher education of extraordinary diversity. From small colleges to big universities, from religious to secular institutions, from single-sex to coeducational colleges, from vocational schools to liberal arts colleges, from land-grant to urban to national research universities, there is a rich diversity both in the nature and the mission of America's roughly 3,600 accredited colleges of higher education. These factors not only lead to great diversity in the character of institutions appropriate for a highly diverse society—they also lead to a remarkable diversity in how institutions respond to a changing society.

Today, we see signs that this evolution of the species is continuing. "Open universities" based upon distance-learning paradigms have been common throughout the world for decades. The rapid evolution of information technology is making possible a new class of institution, the "virtual university," an institution without walls—and perhaps even without faculty—capable of providing education anytime, anyplace, at modest cost. As higher education breaks away from the constraints of space and time—and as the needs for advanced education in a knowledge-driven civilization become more intense—there are already signs that a new class of global universities is forming.

## Changes in the Higher Education Enterprise

Increasingly, the education and skills of a person are seen as the key to both their personal quality of life and the broader strengths of their society throughout the world. Hence, higher education is evolving rapidly to respond to this emerging importance the demand for its products and its services.

In the past, most colleges and universities served local or regional populations. While there was competition among institutions for students, faculty, and resources—at least in the United States—the extent to which institutions controlled the awarding of degrees, credentialing, led to a tightly controlled competitive market.

Today, universities are facing new competitive forces. As the need for advanced education becomes more intense, some institutions are moving far beyond their

traditional geographical areas to compete for students and resources. There are hundreds of colleges and universities that increasingly view themselves as competing in a national or even international marketplace. Even within regions such as local communities, colleges and universities that used to enjoy a geographical monopoly now find that other institutions are establishing beachheads through extension services, distance learning, or even branch campuses. Furthermore, with advances in communications, transportation, and global commerce, several universities, in the United States and abroad are increasingly viewing themselves as international institutions, competing in a global marketplace.

In a very real sense, higher education is evolving from a loosely federated system of colleges and universities serving traditional students from local communities to a *knowledge industry*. Since nations throughout the world recognize the importance of advanced education, this industry is global in extent. With the emergence of new competitive forces and the weakening influence of traditional regulations, it is evolving like other "deregulated" industries, e.g., communications or energy. It is strongly driven by changing technology. And as our society becomes ever more dependent upon new knowledge and educated people, upon "knowledge workers," the higher education business must be viewed clearly one of the most active "growth industries" of our times.

While many in the academy would undoubtedly view with derision or alarm the depiction of the higher education enterprise as an" industry," operating in a highly competitive, increasingly deregulated, global marketplace, this is nevertheless an important perspective that will require a new paradigm for how we think about post-secondary education. Furthermore, it is clear that no one, no government, is in control of the knowledge industry. Instead it responds to forces of the marketplace. Universities will have to learn to balance the competitive pressures for the millennium-old model against the new market forces compelling change.

Unbundling

The modern university has evolved into a monolithic institution controlling all aspects of learning. In a sense, the faculty has long been accustomed to dictating what it wishes to teach, how it will teach it, and where and when the learning will occur. Students must travel to the campus to learn. They must work their way through the bureaucracy of university admissions, counseling, scheduling, and residential living. If they complete the gauntlet of requirements, they are finally awarded a certificate to recognize their learning—a college degree.

Today comprehensive universities, at least as full-service organizations, are at considerable risk. These institutions have become highly vertically integrated. They provide courses at the undergraduate, graduate, and professional level; support residential colleges; professional schools; lifelong learning; athletics; libraries; museums; athletics; entertainment; and on, and on, and on . . . . Yet today we are already beginning to see the growth of differentiated competitors for many of these activities. Universities are under increasing pressure to spin

off or sell off or close down parts of their traditional operations in the face of this new competition.

The most significant impact of a deregulated higher education "industry" will be to break apart this monolith, much as other industries have been broken apart through deregulation. As universities are forced to evolve from "faculty-centered" to "learner-centered," they may well find it necessary to unbundle their many functions, ranging from admissions and counseling to instruction to certification.

An example might be useful here. Today there is much discussion concerning the concept of a "virtual university," a university without a campus or faculty that provides computer-mediated distance education. The virtual university might be viewed as the "Nike approach" to higher education. Nike, a major supplier of athletic shoes in the United States and worldwide, does not manufacture the shoes it markets. It has decided that its strength is in marketing, and that it would outsource shoe manufacturing to those who could do it better and cheaper. In a sense, the virtual university similarly stresses marketing and delivery. It works with the marketplace to understand needs, then it outsources courses, curriculum, and other educational services from established colleges and universities—or perhaps individual faculty—and delivers it through sophisticated information technology.

## From a Cottage Industry to Mass Production

Higher education is one of the few activities which has yet to evolve from the handicraft, one-of-a-kind mode of a cottage industry to the mass production enterprise of the industrial age. In a very real sense, the industrial age has largely passed the university by. Faculty continue to organize and teach their courses much as they have for decades—if not centuries. Each faculty member designs from scratch the courses they teach, whether they be for a dozen or several hundred students. They may use standard textbooks from time to time—although most do not—but their organization, their lectures, their assignments, their exams are developed for the particular course at the time it is taught. So too our social institutions for learning—schools, colleges, and universities—continue to favor programs and practices based more on past traditions than upon contemporary needs.

Universities—more correctly, faculty—are skilled at creating the content for educational programs. Indeed, we might identify this as their core competency. But they have not traditionally been particularly adept at "packaging" this content for mass audiences. To be sure, many faculty have written best-selling textbooks, but these have been produced and distributed by textbook publishers. In the future of multimedia and Net-distributed educational services, perhaps the university will have to outsource both production and distribution from those most experienced in reaching mass audiences—the entertainment industry.

## Restructuring

The perception of the higher education enterprise as a deregulated industry has several other implications. As we have noted, there are over 3,600 colleges and universities in the United States, characterized by a great diversity in size, mission, constituencies, and funding sources. Not only are we likely to see the appearance of new educational entities in the years ahead, but as in other deregulated industries, there could well be a period of fundamental restructuring of the enterprise itself. Some colleges and universities might disappear. Others could merge. Some might actually acquire other institutions.

A case in point: The Big Ten universities (actually there are twelve, including the University of Chicago and Penn State University) have already merged many of their activities, such as their libraries and their federal relations activities. They are exploring ways to allow students at one institution to take courses—or even degree programs—from another institution in the alliance in a transparent and convenient way. Could one imagine that the Big Ten universities becoming a university system "of the heartland of America"?

One might also imagine affiliations between comprehensive research universities and liberal arts colleges. This might allow the students enrolling at large research universities to enjoy the intense, highly personal experience of a liberal arts education at a small college while allowing the faculty members at these colleges to participate in the type of research activities only occurring on a large research campus.

Indeed, one might even imagine "hostile takeovers," in which a Darwinian process emerges such that some institutions devour their competitors. All such events have occurred in deregulated industries in the past, and all are possible in the future we envision for higher education.

Perhaps the most profound question of all concerns the survival of the university—at least as we know it—in the face of the changes, the emergence of new competitors, during our times. Could an institution such as the university, which has existed for a millennium, disappear in the face of such changes? As Bill Wulf reminds us, other long-standing social institutions such as the family farm have disappeared during our times.

## The Ubiquitous University

So what might we expect over the longer term for the future of the university. In this discussion I will not be so bold as to suggest a particular form for the university of the 21st Century. Indeed, the great and ever-increasing diversity characterizing higher education in America makes it clear that there will be many forms, many types of institutions serving our society. But let me suggest a number of themes that will likely characterize the higher education enterprise in the years ahead:

- *Lifelong Learning*, requiring both a willingness to continue to learn on the part of our citizens and a commitment to provide opportunities for this lifelong learning by our institutions
- *A Seamless Web*, in which all levels of education not only become interrelated, but blend together
- *Asynchronous* (anytime, anyplace) *Learning*, breaking the constraints of time and space to make learning opportunities more compatible with lifestyles and needs
- *Affordable*, within the resources of all citizens, whether through low cost or societal subsidy
- *Interactive and Collaborative*, appropriate for the digital age, the "plug and play" generation
- *Diversity*, sufficient to serve an increasingly diverse population with diverse needs and goals

There is one further modifier that may characterize the university of the future: *ubiquitous*. Let me explain:

In today's world, knowledge has become the coin of the realm, determining the wealth of nations. It has also become the key to one's personal standard of living, the quality of one's life. Hence, we might well make the case that today it has become the responsibility of democratic societies to provide their citizens with the education and training they need throughout their lives, whenever, wherever, and however they desire it, at high quality, and at a cost they can afford.

Of course, this has been one of the great themes of higher education in America. Each evolutionary wave of higher education has aimed at educating a broader segment of society—the public universities, the land-grant universities, the normal and technical colleges, the community colleges.

For the past half a century, national security was America's most compelling priority, driving major public investments in social institutions such as the research university. Today, however, in the wake of the Cold War and on the brink of the age of knowledge, one could well make the argument that education will replace national defense as the priority of the 21st Century. Perhaps this will become the new social contract that will determine the character of our educational institutions, just as the government-university research partnership did in the latter half of the 20th Century. We might even conjecture that a social contract, based on developing the abilities and talents of our people to their fullest extent, could well transform our schools, colleges, and universities into new forms that would rival the research university in importance.

Once again we need a new paradigm for delivering it to even broader segments of our society. Fortunately, today's technology is rapidly breaking the constraints of space and time. It has become clear that most people, in most areas, can learn and learn well using asynchronous learning, that is, "anytime, anyplace, anyone" education. Modern information technology has largely cut us free from the constraints of space and time, and has freed our educational system

from these constraints as well. The barriers are no longer cost or technology but rather perception and habit.

Perhaps lifetime education will soon become a reality, making learning available for anyone who wants to learn, at the time and place of their choice, without great personal effort or cost.

But this may not be enough. Instead of asynchronous learning, perhaps we should instead consider a future of "ubiquitous learning"—learning for everyone, every place, all the time. Indeed, in a world driven by an ever-expanding knowledge base, continuous learning, like continuous improvement, has become a necessity of life.

Rather than "an age of knowledge," could we instead aspire to a "culture of learning," in which people were continually surrounded by, immersed in, and absorbed in learning experiences. Information technology has now provided us with a means to create learning environments throughout one's life. These environments are able not only to transcend the constraints of space and time, but they, like us, are capable as well of learning and evolving to serve our changing educational needs.

## Concluding Remarks

Let me conclude with a favorite quote of university presidents these days:

> *There is no more delicate matter to take in hand, nor more dangerous to conduct, nor more doubtful of success, than to step up as a leader in the introduction of change. For he who innovates will have for his enemies all those who are well off under the existing order of things, and only lukewarm support in those who might be better off under the new.*
>
> Niccolo Machiavelli

The American university has responded quite effectively to the perceived needs—or opportunities—of American society. A century ago our universities developed professional schools and rapidly transformed themselves to stress applied fields, such as engineering, agriculture, and medicine, favored by the federal land-grant acts. In the post-World War II years, they responded again, expanding to absorb the returning veterans and later the postwar baby boom. They then developed an extraordinary capability in basic research and advanced training in response to the evolving government-university research partnership.

The 1990s represent another period of significant change on the part of our universities as we respond to the challenges, opportunities, and responsibilities before us. A key element will be efforts to provide universities with the capacity to transform themselves into entirely new paradigms that are better able to serve a changing society and a profoundly changed world.

We must seek to remove the constraints that prevent our institutions from responding to the needs of a rapidly changing society, to remove unnecessary processes and administrative structures; to question existing premises and arrangements; and to challenge, excite, and embolden the members of our university communities to embark on this great adventure. Our challenge is to work together to provide an environment in which such change is regarded not as threatening but rather as an exhilarating opportunity to engage in the primary activity of a university, *learning*, in all its many forms, to better serve our world.