Navigating the American University through the Stormy Seas of a Changing World

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Last month I had the opportunity to co-chair a four-day workshop in Switzerland concerning the future of the university. In attendance were roughly two dozen leaders of the world's leading universities from both North America and Europe, with the provocative assignment of imaging they had just received a no-strings-attached gift of $20 billion, with instructions to design from scratch a university for the 21st Century. Midway through our workshop, the Supreme Court handed down its decision on the Michigan affirmative action cases, an event of rather considerable interest both to me (as a named defendant) and to the American university presidents (and particularly Nils Hasselmo of AAU and David Ward of ACE). I'll return to comment more on this decision in a moment. But first back to the university futures workshop.

We began with a discussion by Frank Rhodes, former president of Cornell, concerning the choice of an appropriate verb, whether the assignment was to "reinvent" the university, to simply "reform or refocus" it, or to just "relax" and enjoy life, noting that the university was one of the few social institutions to last over a thousand years, and was likely to endure in much its present form for decades to come. Yet change has always characterized the university, even as it has sought to preserve and propagate the intellectual achievements, the cultures, and the values of our civilizations. The university has endured as an important social institution for a millennium, perhaps because it has evolved in profound ways to serve a modernizing world. The 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, demonstrates the evolution of the species.

Since you folks are the planners for American higher education, I thought it might be interesting if I drew on my Swiss experience last month, along some perspectives shaped by several national study groups I have recently chaired, to speculate a bit about the trends that will likely reshape, redirect, reinvent, and possibly even replace the university as we know it in the years ahead. (As you will see, I don't believe "relaxation" is a safe and secure path toward institutional survival…)

Of course when ever any group of university presidents get together, they usually begin with all the usual topics: money, students, politics, and, for an unfortunate few, intercollegiate athletics. But I'm going to take a somewhat different approach, by climbing up to the 100,000 foot level, to look perhaps a decade or more ahead, with a view encompassing not simply higher education in the United States but throughout our increasingly interconnected world.

The Themes of Change in Higher Education

1. The Current Budget Crunch

Of course, foremost on the minds of most university leaders these days are the devastating cuts in appropriations as the states struggle to cope with crushing budget deficits or the erosion of private support from gifts and endowment income associated with a weak economy.. Alan Merton, president at George Mason University has called this the "triple whammy of increasing enrollments, declining state and philanthropic support, and rising expectations for higher education on the part of students and the broader public". Across the nation, the fiscal crises facing the states are resulting in deep cuts in appropriations for public higher education, ranging as high as 26% in Colorado (and 10% in Michigan and other Midwestern states) and averaging 5%. Even the wealthy private universities are facing hard times, as evidenced by Stanford's recent decision to forego a salary program this year in the face of a $25 million drop in endowment income.

Of course, the optimist might suggest that this is just part of the ebb and flow of economic cycles. In bad times, state governments and donors cut support, hoping to restore it once again in good times. But this time it may be different. As one state budget officer noted: "College leaders are fooling themselves if they think the end of this recession will be like all the others. What we're seeing is a systematic, careless withdrawal of concern and support for advanced education in this country at exactly the wrong time."

Why the doom and gloom? In Europe and Asia, the erosion of public support is seen as a consequence of massification of higher education, in which tax revenues once supporting only university education for the elite are now being stretched beyond capacity to fund higher education for an appreciable fraction of the population. In the United States, I would characterize our current dilemma somewhat differently as a transition from "guns" to "pills", as a nation, which once viewed education as critical to national security, seems today more concerned with sustaining the social benefits (and tax policies) demanded by an aging baby boomer population (and to hell with the kids). The priorities of those of us in this impacted wisdom group are clearly heath care, prisons, homeland security, and reduced tax burdens for the near term rather than in the education of the next generation and the future. This situation is unlikely to change until most of baby boomers in this room die off and allow our nation to re-establish an more

appropriate balance between consuming for our present desires and investing for our children's future.

2. The Changing Higher Education Needs of Society

Today, a college degree has become a necessity for most careers, and graduate education desirable for an increasing number. A growing population will necessitate some growth in higher education to accommodate the projected increases in the number of traditional college age students, roughly 15% across the U.S. in the next decade, and considerably more in states such as California. But even more growth and adaptation will be needed to respond to the educational needs of adults as they seek to adapt to the needs of the high performance workplace. In fact, it is estimated that by 2010 over 50% of college students will be working adults over the age of 25! Furthermore, such educational needs will be magnified many times on a global scale, posing both a significant opportunity and major responsibility to American higher education.[1]

Both young, digital-media savvy students and adult learners will likely demand a major shift in educational methods, away from passive classroom courses packaged into well-defined degree programs, and toward interactive, collaborative learning experiences, provided when and where the student needs the knowledge and skills. The increased blurring of the various stages of learning throughout one's lifetime–K-12, undergraduate, graduate, professional, job training, career shifting, lifelong enrichment–will require a far greater coordination and perhaps even a merger of various elements of our national educational infrastructure. We are shifting from "just-in-case" education, based on degree-based programs early in one's life, to "just-in-time" education, where knowledge and skills are obtained during a career, to "just-for-you" educational services, customized to the needs of the student.
The student is evolving into an active learner and eventually a demanding consumer of educational services.

This increasingly utilitarian view of higher education is reflected in public policy. Ask any governor about state priorities these days and you are likely to hear concerns expressed about education and workforce training. The National Governors Association notes that "The driving force behind the 21st Century economy is knowledge, and developing human capital is the best way to ensure prosperity." The signs of the knowledge economy are numerous. The pay gap between high school and college graduates continues to widen, doubling from a 50% premium in 1980 to 111% today. Not so well known is an even larger earnings gap between baccalaureate degree holders

and those with graduate degrees. In the knowledge economy, the key asset driving corporate value is no longer physical capital or unskilled labor. Instead it is intellectual and human capital.

Education is becoming a powerful political force. Just as the *space race* of the 1960s stimulated major investments in research and education, there are early signs that the *skills race* of the 21st Century may soon be recognized as the dominant domestic policy issue facing our nation. But there is an important different here. The space race galvanized public concern and concentrated national attention on educating "the best and brightest," the elite of our society. The skills race of the 21st Century will value instead the skills and knowledge of our entire workforce as a key to economic prosperity, national security, and social well-being.

The skills race is also driving major changes in the way governments views higher education and what they will demand from us. The National Governors' Association recent project on higher education was based on the following principles:

- Insisting that higher education contributes to a state's economic development, recognizing that competitive states in the 21st Century recognize that an educated workforce is critical to economic vitality.
- Confronting the challenging of educating a more diverse citizenry ("leaving no adult behind".)
- Promoting a customer orientation by focusing on learners, employers, and the public who supports educational opportunities.
- Holding high expectations for postsecondary education providers and expecting results in areas of access, quality, cost containment, civic engagement, public/private partnerships, and innovation.

Clearly such principles will demand very significant changes not only in the nature of our colleges and universities, but also in how we as stakeholders, patrons, and government bodies relate to them.

3. Diversity

The increasing diversity of the American population with respect to race, ethnicity, gender and nationality is both one of our greatest strengths and most serious challenges as a nation. A diverse population gives us great vitality. However the challenge of increasing diversity is complicated by social and economic factors. Far from

evolving toward one America, our society continues to be hindered by the segregation and non-assimilation of minority cultures. Our society is challenging in both the courts and through referendum long-accepted programs as affirmative action and equal opportunity aimed at expanding access to higher education to underrepresented communities and diversifying our campuses

Here, as many of you know, I speak with some personal involvement since I was a named defendant in two recent cases before the United States Supreme Court involving the University of Michigan's admissions. (I'm the *"et. al."* in the cases.). Although the Court split on these cases, the important feature of both opinions was the establishment that diversity in higher education is a compelling national interest, and that racial factors may play a role in efforts to achieve this objective.

At Michigan, we felt it was important that we "carry the water" for the rest of higher education to re-establish this important principle. Throughout our history, my university has been committed to providing, as one of our early presidents put it, "an uncommon education for the common man", being one of the first American universities to extend educational opportunities to the working class, to women, to racial and ethnic minorities, and to students from every state and nation.. We are absolutely convinced that there is a very strong linkage between academic excellence and campus diversity. Indeed, in an increasingly diverse world, it is hard to imagine how the contemporary university can provide both a high quality and relevant education, not to mention contribute original scholarship and research, without reflecting such diversity among its students, faculty, and staff.

As a leader of society at large and a reflection of that society, the university has a unique responsibility to develop effective models of multicultural, pluralistic communities for our nation and our world. We must strive to achieve new levels of understanding, tolerance, and mutual fulfillment for peoples of diverse racial and cultural backgrounds both on our campuses and beyond. We need to shift our attention from simply access to educational opportunity to success in achieving educational objectives. The recent Supreme Court decisions have now not only reaffirmed the importance of this fundamental commitment, but the Court has also clarified the path we may take to achieve diversity in higher education. But we will still have many battles yet to fight before this war is won.

4. Technology

Two years ago the presidents of our National Academies launched a project to understand better the implications of information technology for the future of the research university, which I was asked to chair. Let me mention three key conclusions from first phase of this study:

Point 1: The extraordinary evolutionary pace of information technology will not only continue for the foreseeable future, but it could well accelerate on a superexponential slope.

Digital technology is characterized by an exponential pace of evolution in which characteristics such computing speed, memory, and network transmission speeds for a given price increase by a factor of 100 to 1000 every decade. Over the next decade, we will evolve from "giga" technology (in terms of computer operations per second, storage, or data transmission rates) to "tera" and then to "peta" technology (one million-billion or 10^{15}). To illustrate with an extreme example, if information technology continues to evolve at its present rate, by the year 2020, the thousand-dollar notebook computer will have a data processing speed and memory capacity roughly comparable to the human brain.[2] Except it will be so tiny as to be almost invisible, and it will communicate with billions of other computers through wireless technology.

For planning purposes, we can assume that by the end of the decade we will have available infinite bandwidth and infinite processing power (at least compared to current capabilities). We will denominate the number of computer servers in the billions, digital sensors in the tens of billions, and software agents in the trillions. The number of people linked together by digital technology will grow from millions to billions. We will evolve from "e-commerce" and "e-government" and "e-learning" to "e-everything", since digital devices will increasingly become our primary interfaces not only with our environment but with other people, groups, and social institutions.

Point 2: The impact of information technology on the university will likely be *profound, rapid, and discontinuous*–just as it has been and will continue to be for the economy, our society, and our social institutions (e.g., corporations, governments, and learning institutions). It is a *disruptive* technology.

Information and communications technology will affect the activities of the university (teaching, research, outreach), its organization (academic structure, faculty

culture, financing and management), and the broader higher education enterprise. However, at least for the near term, meaning a decade or less, we believe the research university will continue to exist in much its present form, although meeting the challenge of emerging competitors in the marketplace will demand significant changes in how we teach, how we conduct scholarship, and how our institutions are financed.

Universities must anticipate these forces, develop appropriate strategies, and make adequate investments if they are to prosper during this period. Procrastination and inaction are the most dangerous courses for universities during a time of rapid technological change.

Point 3: It is our belief that universities should begin the development of their strategies for technology-driven change with a firm understanding of those key values, missions, and roles that should be protected and preserved during a time of transformation.

5. The Changing Nature of Research and Scholarship

Although the changing needs and nature of society have been important factors in shaping the evolution of the university over the centuries, so too has been the changing nature of research and scholarship. Intellectual transformations ranging from scholasticism to the scientific revolution have played a major role in defining the nature of the university in the past and are continuing to do so today. What changes in the nature of research and scholarship might we identify as significant factors in determining the nature of the university in the century ahead?

Here it is important to recognize the dynamic nature of the disciplinary character of scholarship. What we regard as entrenched disciplines today have changed considerably in the past and continue to do so. New ideas and concepts continue to explode forth at ever-increasing pace. We have ceased to accept that there is any coherent or unique form of wisdom that serves as the basis for new knowledge. We have simply seen too many instances in which a new concept has blown apart our traditional views of the field. Just as a century ago, Einstein's theory of relativity and the introduction of quantum mechanics totally revolutionized the way that we thought of the physical world, today's speculation about dark matter and quantum entanglement suggest that yet another revolution may be underway. The molecular foundations of life have done the same to the biomedical sciences. Twenty-first century science is marked

by increasing complexity that frequently overwhelms the reductionist approach of the disciplines.

As the speed of intellectual change continues to accelerate, it has become more evident that we need to make basic alterations in the discipline-focused culture and structure of the universities. As E. O. Wilson put it in his provocative book, *Consilience*, "Most of the issues that vex humanity daily cannot be solved without integrating knowledge from the natural sciences with that of the social sciences and humanities. Only fluency across the boundaries will provide a clear view of the world as it really is, not as seen through the lens of ideologies and religious dogmas or commanded by myopic response to immediate needs."[3]

Moreover the process of creating new knowledge is evolving rapidly away from the solitary scholar to teams of scholars, often spread over a number of disciplines. This is driven by many factors. The enormous expense of major experimental facilities such as high energy physics accelerators, astronomical observatories, and biochemical laboratories compel scientists to work in teams consisting not only of primary investigators but specialists such as systems engineers and software developers that may number in the hundreds. Similarly the complexity of contemporary research topics such as protein function or global change span many disciplines that require multidisciplinary teams.

New types of research organizations are appearing that are based on evolving information technology. An example is the "collaboratory," an advanced, distributed infrastructure that uses multimedia information technology to relax the constraints on distance, time, and even reality.[4] Scholars around the world can now join together to operate remote facilities such as telescopes on Mauna Kea or scientific equipment at the South Pole Station, collaborating in data collection, analysis, and interpretation. A vast array of human team activities in commerce, education, and the arts would be supported by variants of this concept. In fact, such network-enabled scholarly communities may become the basis for the world universities in the decades ahead.

The tools of research continue to evolve, increasing dramatically in power, scope, and, of course, cost. Research university leaders and funding agencies have long pointed to the staggering size and cost of the experimental facilities characterizing the physical sciences, e.g., the high energy physics accelerators such as the Large Hadron Collider or astronomical observatories such as the Keck telescopes or the Hubble Space Telescope. But today many research universities are making even larger investments in the biomedical sciences, building new “life sciences institutes” to achieve the critical mass of facilities and scientists to tap the massive funding flowing into molecular genetics,

proteomics, and biotechnology. Over the longer term, one might well question whether these research facilities will soon following the path of high-energy physics and astronomy, becoming too large and expensive for single institutions–and perhaps even nations–and instead requiring international consortia of institutions, sponsors, and scientists.

The rapid evolution of digital technology also poses both new opportunities and challenges. A new age has dawned in S&E research, pushed by continuing progress in computing, information, and communication technology, and pulled by the expanding complexity, scope, and scale of today's challenges. The capacity of this technology has crossed thresholds that now make possible a comprehensive cyberinfrastructure on which to build new types of knowledge environments and organizations and to pursue research in new ways and with increased efficiency. The emerging vision is to use cyberinfrastructure[5] to build more ubiquitous, comprehensive digital environments that become interactive and functionally complete for research communities in terms of people, data, information, tools, and instruments and that operate at unprecedented levels of computational, storage, and data transfer capacity.

For decades, the conventional wisdom in the United States has been that research and teaching were mutually reinforcing and should be conducted together, at the same institutions by the same people.[6] Higher education has long attempted to weave together research and education, particularly in making the case for public support of the research mission of the university. Yet, the relationship of research to teaching quality is far from obvious. For example, in most universities there is an ever-widening gap between the research activities of the faculty and the undergraduate curriculum.

There is a certain irony here. The university provides one of the most remarkable learning environments in our society—an extraordinary array of diverse people with diverse ideas supported by an exceptionally rich array of intellectual and cultural resources. Yet we tend to focus our educational efforts on traditional academic programs, on the classroom and the curriculum. In the process, we may have overlooked the most important learning experiences in the university. Increasingly, we realize that learning occurs not simply through study and contemplation but through the active discovery and application of knowledge. From John Dewey to Marie Montessori to Jean Piaget to Seymour Papert, we have ample evidence that most students learn best through inquiry-based of "constructionist" learning. As the ancient Chinese proverb suggests "I hear and I forget; I see and I remember; I do and I understand."

Perhaps it is time to integrate the educational mission of the university with the research and service activities of the faculty by ripping instruction out of the classroom–or at least the lecture hall–and placing it instead in the discovery environment of the laboratory or studio or the experiential environment of professional practice. This approach not only appeals directly to the research interests of the faculty, but it could involve the human resources represented by graduate research and teaching assistants not only to provide technical support but moreover leverage the faculty member's time. Utilizing graduate student assistants and software automation, we might be able to actually scale this approach to the size of the undergraduate programs of most research universities.

6. Markets

The growing and changing nature of higher education needs will trigger strong economic forces. The weakening influence of traditional regulations and the emergence of new competitive forces, driven by changing societal needs, economic realities, and technology, are likely to drive a massive restructuring of the higher education enterprise. From our experience with other restructured sectors of the economy such as health care, transportation, communications, and energy, we could expect to see a significant reorganization of higher education, complete with the mergers, acquisitions, new competitors, and new products and services that have characterized other economic transformations. More generally, we may well be seeing the early stages of the appearance of a global knowledge and learning industry, in which the activities of traditional academic institutions converge with other knowledge-intensive organizations such as telecommunications, entertainment, and information service companies.[7]

Throughout the world we are moving toward a revenue-driven, market-responsive higher education system for two key reasons:

1. There is no way that a tax system can support the massification of higher education required by knowledge-driven economies, in the face of other compelling social priorities (particularly the needs of the aging).
2. The growing realization of the highly regressive nature of the conventional model of public higher education, with strong tax support and low tuition.

This situation is likely to continue for at least several decades, at least until a new generation restores a more appropriate balance between the consumption of an aging population and meeting the educational needs of the young. But as Zemsky reminds us, while it is relatively easy to start markets, it is very hard to stop them. We are at a tipping point in which resistance to market forces not longer yields resilience–instead the market will determine survival of the fittest. The market forces currently driving the evolution of higher education in the United States are global in extent, and they will sweep aside institutions dependent only upon public support. But there are warning signs.

Warning Sign 1: Darwinian Competition: Evidence of this increasingly market driven character of higher education is provided by the competition among universities. The arms race is escalating, as institutions compete ever more aggressively for better students, better faculty, government grants, private gifts, prestige, winning athletic programs, and commercial market dominance. This is aggravated by vast wealth accumulated by several of the elite private universities that allows them to buy "the best and brightest" students through generous financial aid programs (including merit-based programs) and raid outstanding faculty from less well-endowed institutions. The growing gap between faculty salaries characterizing private and public research universities have created a Darwinian ecosystem in which wealthy elite universities have become predators feeding on the faculties of their less well-endowed prey, causing immense damage to the quality of the latter's programs by luring away their top faculty with offers they are unable to match.

Warning Sign 2: Commercialization of the Academy: Yet another warning sign concerns the efforts of universities and faculty members to capture and exploit the soaring commercial value of the intellectual property created by research and instructional activities. This has infected the research university with the profit objectives of a business, as both institutions and individual faculty members attempt to profit from the commercial value of the products of their research and instructional activities. Universities have adopted aggressive commercialization policies and invested heavily in technology transfer offices to encourage the development and ownership of intellectual property rather than its traditional open sharing with the broader scholarly community. They have hired teams of lawyers to defend their ownership of the intellectual property derived from their research and instruction. On occasions some institutions and faculty members have set aside the most fundamental values of the university, such as

openness, academic freedom, and a willingness to challenge the status quo, in order to accommodate this growing commercial role of the research university.[8]

Warning Sign 3: From Public Good to Private Benefit: There is a deeper issue here. The American university has been seen as an important social institution, created by, supported by, and accountable to society at large. The key social principle sustaining the university has been the perception of education as a *public good*--that is, the university was established to benefit all of society. Like other institutions such as parks and police, it was felt that individual choice alone would not sustain an institution serving the broad range of society's education needs. Hence public policy dictated that the university merited broad support by all of society, rather than just by the individuals benefiting from its particular educational programs, through direct tax subsidy or indirect tax policies (e.g., treatment of charitable giving or endowment earnings).

Yet, today, even as the needs of our society for postsecondary education intensifies, we also find an erosion in the perception of education as a public good deserving of strong societal support.[9] State and federal programs have shifted from investment in the higher education enterprise (appropriations to institutions or students) to investment in the marketplace for higher education services (tax benefits to students and parents). Whether a deliberate or involuntary response to the tightening constraints and changing priorities for public funds, the new message is that education has become a private good that should be paid for by the individuals who benefit most directly, the students. Government policies that not only enable but intensify the capacity of universities to capture and market the commercial value of the intellectual products of research and instruction represent additional steps down this slippery slope.

This shift from the perception of higher education as a public good to an individual benefit has another implication. To the degree that higher education was a public good, benefiting all (through sustaining democratic values, providing public services), one could justify its support through taxation of the entire population. But viewed as an individual benefit, public higher education is, in fact, a highly regressive social construct since, in essence, the poor subsidize the education of the rich, largely at the expense of their own opportunities.

The implications are that the marketplace coupled with a commitment to provide educational opportunities to all, regardless of economic ability, will increasingly drive many of the best public universities toward high-tuition, high financial aid policies in which state support becomes correctly viewed as a tax-supported discount of the price of education that should be more equitably distributed to those with true need. The

leading public universities may increasingly resemble private universities in the way they are financed and managed. They will use their reputation, developed and sustained during earlier times of more generous state support, to attract the resources they need from federal and private sources to replace declining state appropriations. Put another way, many will embrace a strategy to become increasingly privately financed, even as they strive to retain their public character. Not that those public universities with the political capacity to move to high tuition will suffer, since the marketplace teaches us that high quality is frequently far more competitive than low cost (the Lexus sells better than the Neon!).

Warning Sign #4: The Loss of Public Purpose: In this process of responding to the market place by privatizing public higher education we could lose something of immense importance: the public purpose of the university. As Bob Zemsky stresses, markets are inexorable, and it is both fruitless and dangerous to pretend they are not. Yet, if they are allowed to dominate and reshape the higher education enterprise without constrain, some of the most important values and traditions of the university will likely fall by the wayside. Will higher education retain its special role and responsibilities, its privileged position in our society? Will it continue to prepare young students for roles as responsible citizens? Will it provide social mobility through access to education? Will it challenge our society in the pursuit of truth and openness? Or will it become, both in perception and reality, just another interest group driven along by market forces? As we assess these market-driven emerging learning structures, we must bear in mind the importance of preserving the ability of the university to serve a broader public purpose.

Possible Futures of the University

A New Social Contract

Even more fundamentally, as we enter the new millennium, there is an increasing sense that the social contract between the university and American society may need to be reconsidered and perhaps even renegotiated once again.[10] Today we have entered an era in which educated people and the knowledge they produce and use have become the keys to the economic prosperity and social well-being. Moreover, education, knowledge, and skills have become primary determinants of one's personal standard of living. One might well argue that 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 an affordable cost.

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, at creating new educational forms to that—the public universities, the land-grant universities, the normal and technical colleges, the community colleges, and today's emerging generation of cyberspace universities. But we now will need new types of colleges and universities with new characteristics:

1. Just as with other social institutions, our universities must become more focused on those we serve. We must transform ourselves from faculty-centered to learner-centered institutions, becoming more responsive to what our students need to learn rather than simply what our faculties wish to teach.

2. Society will also demand that we become far more affordable, providing educational opportunities within the resources of all citizens. Whether this occurs through greater public subsidy or dramatic restructuring of the costs of higher education, it seems increasingly clear that our society—not to mention the world—will no longer tolerate the high-cost, low-productivity paradigm that characterizes much of higher education in America today.

3. In an age of knowledge, the need for advanced education and skills will require both a personal willingness to continue to learn throughout life and a commitment on the part of our institutions to provide opportunities for lifelong learning. The concept of student and alumnus will merge.

4. Our highly partitioned system of education will blend increasingly into a seamless web, in which primary and secondary education; undergraduate, graduate, and professional education; on-the-job training and continuing education; and lifelong enrichment become a continuum.

5. Already we see new forms of pedagogy: asynchronous (anytime, anyplace) learning that utilizes emerging information technology to break the constraints of time and space, making learning opportunities more compatible with lifestyles and career needs; and interactive and collaborative learning appropriate for the digital age, the

plug-and-play generation. In a society of learning, people would be continually surrounded by, immersed in, and absorbed in learning experiences, i.e. ubiquitous learning, everywhere, every time, for everyone.

6. The great diversity characterizing higher education in America will continue, as it must to serve an increasingly diverse population with diverse needs and goals. But it has also become increasingly clear that we must strive to achieve diversity within a new political context that will require new policies and practices.

It is clear that the access to advanced learning opportunities is not only becoming a more pervasive need, but it could well become a defining domestic policy issue for a knowledge-driven society. Higher education must define its relationship with these emerging possibilities in order to create a compelling vision for its future as it enters the new millennium

New Paradigms for the University

So what might we anticipate as possible future forms of the university? The monastic character of the ivory tower is certainly lost forever. Although there ar4e many important features of the campus environment that suggest that most universities will continue to exist as a place, at least for the near term, as digital technology makes it increasingly possible to emulate human interaction in all the sense with arbitrarily high fidelity, perhaps we should not bind teaching and scholarship too tightly to buildings and grounds. Certainly, both learning and scholarship will continue to depend heavily upon the existence of communities, since they are, after all, high social enterprises. Yet as these communities are increasingly global in extent, detached from the constraints of space and time, we should not assume that the scholarly communities of our times would necessarily dictate the future of our universities.

As illustrations, let me suggest several possible visions of the future, that progress ever more toward an unpredictable and unknowable future (and, as some might contend, toward the lunatic fringe…).

The Core-in-Cloud University: Many university communities are already evolving into so-called "core in cloud" organizations,[11] in which academic departments or schools conducting elite education and basic research, are surrounded by a constellation of quasi-university organizations--research institutes, think tanks, corporate R&D centers--

that draw intellectual strength from the core university and provide important financial, human, and physical resources in return. Such a structure reflects the blurring of basic and applied research, education and training, the university and broader society.

More specifically, while the academic units at the core retain the traditional university culture of faculty appointments, for example, tenure, and intellectual traditions, for example, disciplinary focus, those quasi-academic organizations evolving in the cloud can be far more flexible and adaptive. They can be multidisciplinary and project focused. They can be driven by entrepreneurial cultures and values. Unlike academic programs, they can come and go as the need and opportunity arise. And, although it is common to think of the cloud being situated quite close to the university core, in today's world of emerging electronic and virtual communities, there is no reason why the cloud might not be widely distributed, involving organizations located far from the campus. In fact, as virtual universities become more common, there is no reason that the core itself has to have a geographical focus.

New Civic Lifeforms: Today, as knowledge becomes an ever more significant factor in determining both personal and societal well being, and as rapidly emerging information technology provides the capacity to build new types of communities, we might well see the appearance of new social structures.[12] A century ago, stimulated by the philanthropy of Andrew Carnegie, the public library became the focal point for community learning. Today, however, technology allows us to link together public and private resources such as schools, libraries, museums, hospitals, parks, media, and cultural resources. Further, communities can easily be linked with the knowledge resources of the world through the Internet. . Perhaps a new "civic life form" will evolve to provide community education and knowledge networks that are open and available to all. These might evolve from existing institutions such as libraries or schools or universities. They might be a physically located hub or virtual in character. However, they also might appear as entirely new constructs, quite different than anything we have experienced to date. Perhaps it is time to consider a blank sheet approach to learning, by setting aside existing educational systems, policies, and practices, and instead first focusing on what knowledge, skills, and abilities a person will need to lead a productive and satisfying life in the century ahead. Then, by considering the diversity of ways in which people learn, and the rich array of knowledge resources emerging in our society, designing a new ecology of learning for the 21st Century.

The University a la Neuromancer[13]: Ray Kurzweil's *The Age of the Spiritual Machine* provides a provocative vision of possible futures for our society by projecting Moore's Law–the exponential evolution of digital technology–over the next several decades. He suggests that over the next decade intelligent courseware will emerge as a common means of learning, with schools and colleges relying increasingly on software approaches, leaving human teachers to attend primarily to issues of motivation, psychological well-being, and socialization.[14]

More specifically, Kurzweil speculates that by the end of this decade, although schools are still not on the cutting edge, the profound importance of the computer as a knowledge tool will be widely recognized. Many children will learn to read on their own using their personal computers before entering grade school. Within two decades, most learning will be accomplished using intelligent software-based simulated teachers. To the extent that teaching is done by human teachers, the human teachers are often not in the local vicinity of the student and will be viewed more as mentors and counselors than as sources of learning and knowledge.

Within three decades (2030), Kurzweil suggests that human learning will primarily accomplished using virtual teachers and enhanced by the widely available neural implants that improve memory and perception (although not yet able to download knowledge directly, thereby bypassing formal education entirely). Although enhanced through virtual experiences, intelligent interactive instruction, and neural implants, learning still requires time-consuming human experience and study. This activity comprises the primary focus of the human species, and education becomes the largest profession, as human and nonhuman intelligences are primarily focused on the creation of knowledge in its myriad forms. There is almost no human employment in traditional endeavors such as manufacturing, agriculture, and transportation.

Finally, a century hence, Kurweil speculates that learning will no longer the struggle it once was. Rather the struggle will be discovering new knowledge to learn.

While many would argue (indeed, many have argued) with Kurzweil's view of the future, it does illustrated just how profoundly different the future may be both for our society and our universities.

Some Lessons Learned

So, what are university planners to do, as their institutions are buffeted by such powerful forces of change, and in the face of unpredictable futures. Here, if I may, I would like to draw several lessons learned from the hard knocks of personal experience.

Values

It is important that any strategic effort always begin with the basics, by launching a careful reconsideration of the key roles and values that should be protected and preserved during a period of transformation. For example, how would an institution prioritize among roles such as educating the young (e.g., undergraduate education), preserving and transmitting our culture (e.g., libraries, visual and performing arts), basic research and scholarship, and serving as a responsible critic of society? Similarly, what are the most important values to protect? Clearly academic freedom, an openness to new ideas, a commitment to rigorous study, and an aspiration to the achievement of excellence would be on the list for most institutions. But what about values and practices such as shared governance and tenure? Should these be preserved? At what expense?

A Commitment to Excellence, but in an Increasingly Diverse Way

Of course, we all aspire to excellence, but just how do we set our goals? Frank Rhodes refers past several decades as the "Harvardization" of American higher education, in which the elite research universities became the gold standard, the model that other types of institutions, whether they be large public universities, private liberal arts colleges, or even regional and community colleges, attempted to emulate. But in the years ahead, Rhodes believes that we will see the de-Harvardization of higher education, as people begin to realize that an elite paradigm which simply focuses more and more resources on fewer and fewer does not serve the needs of American society.

Rather the premium will be on the development of unique missions for each of our institutions, missions that reflect not only their tradition and their unique roles in serving society, but as well their core competency. As industry has learned, in an increasingly competitive global marketplace, you have to focus on what you can do best, where you are truly world-class, and outsource other products and services. This will require not only that each of our colleges and universities develop a unique vision, but beyond that, that they be prepared to focus resources to achieve it. They must be prepared to shift resources when necessary, possibly reducing or even eliminating some programs and activities in order to improve or initiate others. In such decisions, it must keep in mind the important criteria of quality, centrality, and cost-effectiveness.

Alliances

Universities should place far greater emphasis on building alliances with other institutions that will allow them to focus on core competencies while relying on alliances to address the broader and diverse needs of society. For example, flagship research universities in some states will be under great pressure to expand enrollments to address the expanding populations of college age students, possibly at the expense of their research and service missions. It might be far more constructive for these institutions to form close alliances with regional universities and community colleges to meet these growing demands for educational opportunity. Another example would be alliances between research universities and liberal arts colleges that take mutual advantage of the learning-intensive environment of the latter and the vast intellectual resources of the former.

Here alliances should be considered not only among institutions of higher education (e.g., partnering research universities with liberal arts colleges and community colleges) but also between higher education and the private sector (e.g., information technology and entertainment companies). Differentiation among institutions should be encouraged, while relying upon market forces rather than regulations to discourage duplication.

Experimentation

We must recognize the profound nature of the rapidly changing world faced by higher education. Many of the forces driving change are disruptive in nation, leading to quite unpredictable futures. Planning in the face of such uncertainty requires a more experimental approach to university transformation.

A personal example is useful here. During the 1990s we led an effort at the University of Michigan to transform the institution, to re-invent it so that it better served a rapidly changing world. We created a campus culture in which both excellence and innovation were our highest priorities. We restructured our finances so that Michigan became, in effect, a privately supported public university. We dramatically increased the diversity of our campus community. We launched major efforts to build a modern environment for teaching and research using the powerful tools of information technology.

Yet with each transformation step we took, with every project we launched, with each objective we achieved, we became increasingly uneasy. The forces driving change in our society and its institution were far stronger and more profound that we had first thought. Change was occurring far more rapidly that we had anticipated. The future was becoming less certain as the range of possibilities expanded to include more radical options. We came to the conclusion that in a world of such rapid and profound change, as we faced a future of such uncertainty, the most realistic near-term approach was to explore possible futures of the university through experimentation and discovery. That is, rather than continue to contemplate possibilities for the future through abstract study and debate, it seemed a more productive course to build several prototypes of future learning institutions as working experiments. In this way we could actively explore possible paths to the future. For example,

- We explored the possible future of becoming a privately supported but publicly committed university by completely restructuring our financing, raising over $1.4 billion in a major campaign, increasing tuition levels, dramatically increasing sponsored research support to #1 in the nation, and increasing our endowment ten-fold. Ironically, the more state support declined as a component of our revenue base (dropping to less than 10% by the late 1990s), the higher our Wall Street credit rating, finally achieving the highest AAA rating (the first for a public university).

- Through a major strategic effort known as the Michigan Mandate, we altered very significantly the racial diversity of our students and faculty, doubling the population of underrepresented minority students and faculty over a decade, thereby providing a laboratory for exploring the themes of the "diverse university." (And ended up before the U.S. Supreme Court as a result.)

- We established campuses in Europe, Asia, and Latin America, linking them with robust information technology, to understand better the implications of becoming a "world university."

- We played leadership roles first in the building and management of the Internet and now Internet2 to explore the "cyberspace university" theme.

But, of course, not all of our experiments were successful. Some crashed in flames, in some cases spectacularly:

- We tried to spin off our academic health center, merging it with another large hospital system in Michigan to form an independent health care system. But our regents resisted this strongly, concerned that we would be giving away a valuable asset (even though we would have netted well over $1 billion in the transaction and avoided the $100 million annual operating losses we are now facing as managed care sweeps across Michigan.

- Although we were successful eventually in getting a Michigan Supreme Court ruling that provided relief from intrusive nature of the state's sunshine laws, we ran into a brick wall attempting to restructure how our governing board was selected and operated. (It remains one of the very few in the nation still determined by popular election and partisan politics.)

- And we attempted to confront our own version of Tyrannosaurus Rex by challenging our Department of Athletics to better align their athletic activities with academic priorities, e.g. recruiting real students, reshaping competitive schedules, throttling back commercialism…and even appointing a real educator, a former dean, as athletic director. Yet today we are posed to spend $20 million on skyboxes for Michigan Stadium after expanding stadium capacity three years ago to over 110,000.

Nevertheless, in most of these cases, at least we learned something (if only our own ineffectiveness in dealing with cosmic forces such as college sports). More specifically, all of these efforts were driven by the grass-roots interests, abilities, and enthusiasm of faculty and students. While such an exploratory approach was disconcerting to some and frustrating to others, fortunately there were many on our campus and beyond who viewed this phase as an exciting adventure. And all of these initiatives were important in understanding better the possible futures facing our university. All have had influence on the evolution of our university.

Our approach as leaders of the institution was to encourage strongly a "let every flower bloom" philosophy, to respond to faculty and student proposals with "Wow! That sounds great! Let's see if we can work together to make it happen! And don't

worry about the risk. If you don't fail from time to time, it is because you aren't aiming high enough!" We tried to ban the word "NO" from our administrators.

Turning Threats into Opportunities

It is important for university leaders to approach issues and decisions concerning transformation not as threats but rather as opportunities. True, the status quo is no longer an option. However, once we accept that change is inevitable, we can use it as a strategic opportunity to control our destiny, while preserving the most important of our values and our traditions.

Creative, visionary leaders can tap the energy created by threats such as the emerging for-profit marketplace and technology to engage their campuses and to lead their institutions in new directions that will reinforce and enhance their most important roles and values.

Concluding Remarks

In conclusion, it is clear that we have entered a period of significant change in higher education as our universities attempt to respond to the challenges, opportunities, and responsibilities before them.[15] To be sure, higher education will flourish in the decades ahead. In a knowledge-intensive society, the need for advanced education will become ever more pressing, both for individuals and society more broadly. Yet it is also likely that the university as we know it today—rather, the current constellation of diverse institutions comprising the higher education enterprise—will change in profound ways to serve a changing world.

Let me end with a brief story from history. My university, the University of Michigan, has long been known for the knack of re-inventing itself over the years. This actually began with our first president, Henry Philip Tappan, over 150 years ago, who arrived on our campus determined to build a university very different than those characterizing the colonial colleges of 19th century America. Tappan was a broadly educated philosopher strong influence by European leaders such as Humbolt who stressed the importance of combining specialized research and humanistic teaching to define the intellectual structure of the university. Tappan stressed a vision of the university as a capstone of civilization, a repository for the accumulated knowledge of mankind, and the home of scholars dedicated to the expansion of human understanding.

Among his many accomplishments at Michigan were an emphasis on graduate education and research, student autonomy and freedom, and active faculty governance.

Unfortunately, Tappan was also far ahead of his time. Undermined by several faculty members resistant to change, challenged by state newspapers opposed to using state funds for such a grandiose purpose, and undermined by several members of the first of our popularly elected governing boards (a burden we carry to this day), Tappan was eventually fired in 1863, after a decade of leadership during which he helped to shape the early character of the American research university. One of our later presidents characterized Henry Tappan as "the largest figure of a man that ever appeared on the Michigan campus. And he was stung to death by gnats!"

In a similar spirit, several years ago, during a meeting with my executive officers following my announcement of my decision to step down as president and return to the faculty, one of my vice-presidents slipped me a piece of paper with the well-known quote of Machiavelli:

> "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."

After almost a decade of attempting to lead a transformational change process at the University of Michigan, I could only respond with an emphatic "AMEN!" The resistance can be intense, and the political backlash threatening.

To be sure, it is sometimes difficult to act for the future when the demands of the present can be so powerful and the traditions of the past so difficult to change. Yet, perhaps this is the greatest challenge for our institutions, and the most important role of our leadership, in the years ahead as we navigate our institutions through the stormy seas of a changing world.

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