The Future of the Public Research University

James J. Duderstadt

President Emeritus and
University Professor of Science and Engineering
The University of Michigan

Pennsylvannia State University
National Issues Forum

October 7, 1996

As I arrived in State College late yesterday afternoon, I felt almost as if I was still in Ann Arbor. The hustle and bustle of the fall term, the leaves just beginning to turn, and the flags flying at half-mast after last Saturday's football losses.

Despite this familiarity, I should confess some trepidation toward my visit. For you see, the last time John Brighton invited me to speak at Penn State, I remember well a brief conversation we had with former President Bryce Jordan in a luncheon at the Nittany Lion Inn. I mentioned that the Big Ten Conference was beginning to think about possible expansion, and that while I knew how successful Penn State had been as an independent, conference affiliation was something you might want to explore. Well, we all know the outcome of that discussion. Penn State joined the Big Ten Conference--and Michigan hasn't made it back to Pasadena since (and, after last weekend's upset by Northwestern, we are unlikely to head west again this year).

My second concern arises because, exactly one year ago, I was serving as keynote speaker for a very similar forum we had arranged for our faculty senate at the University of Michigan. We had given the series the informal name of the "Big Bad Wolf" seminars, since we wanted our faculty to see and understand the perspectives of those folks who were particularly critical of higher education. Perhaps I became too much of a believer as I discussed the many challenges facing higher education, because the next week I announced my decision to step down after eight years as Michigan president and return to the faculty!

But perhaps this decision to become a faculty member once again is a good thing. Certainly Penn State's joining the Big Ten Conference was a good thing--for the Conference and for both of our institutions. So I'll just take a more optimistic outlook as I approach this lecture.

Introduction

As one of civilization's most enduring institutions, the university has been extraordinary in its capacity to change and adapt to serve society. The university has changed considerably over time and continues to evolve. A simple glance at the remarkable diversity of institutions comprising higher education in America demonstrates this evolution of the species.

Your university and mine represent one of the most important and vital classes of institutions, the public research university. These two words, *public* and *research*, denote perhaps the two most signficant 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 State College, 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 explosion in both the size and the number of major universities. The direct involvment 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. In the midwest, the founding words of the Northwest Ordinance proclaim: "Religion, morality, and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged."

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 deserving of 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 American public 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 50 years ago. This report echoed the spirit of the Northwest Ordinance by stating: "Since health, well-being, and security are proper concerns of government, scientific progress is, and must be, of vital interest to government." The central theme of the 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 obligate to ensure basic scientific progress and the production of trained personnel in the nation 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 progess 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.

Erosion of the Public Principle

Despite the great impact of the public research university on our nation, both of the fundamental principles upon which these institutions are based are now eroding.

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 institutions as governments struggle to meet short-term demands at the expense of long-term investments. The new mantra of the day in Washington has become "Balance the budget within seven years." While the particular Tao, the path to deliverance, is still uncertain...whether via the Contract with America or Reinventing Government...the endpoint is clear. Discretionary domestic spending, research and education programs, and federal support of the research university, are all at great risk. Some leaders have even suggested that the very viability of the

research university paradigm may be at significant risk during the next several years.

The states are also in serious trouble. Cost shifting from the federal government through unfunded mandates such as Medicare, Medicaid, ADA, and OSHA has destabilized many state budgets. The commitment many states have made to funding K-12 education through earmarks off-the-top and massive investments in corrections have undermined their capacity to support higher education. In fact, in many states today, the appropriations for prisons have now surpassed the funding for higher education and shows no signs of slowing. A case in point: a decade ago, when I began my presidency, Michigan had 15 public universities and eight prisons. Today, we still have 15 universities, but 35 prisons. More to the point, this year our state will spend $1.4 billion for the education of 250,000 students in its public universities and over $1.4 billion for the incarceration of 40,000 inmates–at an annual cost per inmate of $35,000, somewhat more than the cost of a Harvard education!

Perhaps of even greater concern is a trend in recent decades among most elected public officials to shift the costs of public higher education from general tax revenues to the tuitions charged to students and their parents. In a sense, our public leaders have abandoned a consensus that for the past century has governed the public support of higher education--that those who benefit and those who pay for higher education are part of the same collective "we' for public purposes. Whether deliberate or simply a response to the tightening constraints and changing priorities for public funds, the new message is that education has become a "private good", and hence that it should be paid for by the individuals who benefit most directly, the students.

Erosion of the Research Partnership

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. The evolution of the research university, the national laboratories, the interstate highway system, our telecommunications systems, airports, and the space program, all were stimulated by concerns about the arms race and competing with the Communist Bloc. So, too, much of the technology that we take for granted, from semiconductors to jet aircraft, from computers to composite materials, were all spin-offs of the defense industry.

Yet, in the wake of the extraordinary events of the last five years–the disintegration of the Soviet Union and Eastern Europe, the reunification of Germany, and the major steps toward peace in the Middle East–the driving force of national security has disappeared and, along with it, much of the motivation for major public investment. Far from a "peace dividend" providing new resources in a post-Cold War world for investment in key areas such as education and research, instead, 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.

Further, much of the existing intellectual infrastructure, developed to underpin national defense, is now at risk. The national laboratories are facing massive downsizing and necessarily searching for new missions. The burdens of the massive debts incurred in the buyout-merger mania of the late 1980s have forced corporate America to downsize research and development activities, including the shift of many of America's leading corporate research laboratories, such as the Bell Laboratories and the IBM Research Laboratories, from long-term research to short-term product development.

Equally serious are signs that the nation is no longer willing to invest in research performed by universities, at least at the same level, and with a similar willingness to support understanding-driven basic research. Congress has made it clear that they will insist that universities focus increasingly on applied research, more directly related to national priorities (although many industrial leaders have tried in vain to explain that without "basic" research, there is nothing to "apply"). The federal government has yet to develop a successor to the government-university research partnership which served so well during the Cold War years.

Unfortunately, in recent years the basic principles of this extraordinarily productive research partnership have begun to unravel, so much so that today this relationship is rapidly changing from a partnership to a procurement process. The government is increasingly shifting from being a partner with the university–a patron of basic research–to becoming a procurer of research, just like other goods and services. In a similar fashion, the university is shifting to the status of a contractor, regarded no differently from other government contractors in the private sector. In a sense, today a grant has become viewed as a contract, subject to all of the regulation, oversight, and accountability of other federal contracts. This view has unleashed on the research university an army of government staff, accountants, and lawyers all claiming as their mission that of making certain that the university meets every detail of its agreements with the government.

To be sure, we must all be concerned about the proper expenditure of public funds. But, we also must be concerned about restoring the mutual trust and confidence of a partnership and move away from the adversarial contractor/procurer relationship that we find today.

Surely, the most ominous warning signs for academic research are the erosion, even breakdown, in the extraordinarily productive fifty-year partnership uniting government and universities. 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 initiative, innovation, and creativity. It is truly perverse that the partnership that has been in large measure responsible for our long-undisputed national prosperity and security should be threatened at very moment when it has become most critical for our future.

Other Challenges of Today

In addition to the erosion of the principle of public support for higher education and the research partnership between the federal government and the universities, there are other issues swirling about and challenging our institutions. Let me list some of the most significant of today's issues:

The One-Percent Problem

Harold Shapiro, president of Princeton University, identifies what he calls the "one-percent problem" facing those institutions that compete to be the very best in teaching and scholarship. The decade of the 1980s experienced a trend in which the costs of achieving excellence in higher education rose roughly one percent per year more rapidly than the available resource base. Most studies project that this trend is likely to continue throughout the 1990s, driven in part by the expanding knowledge base and by the cost structures of quality research and teaching. While a given institution may be able to accommodate such an imbalance between costs and revenues over a short period, it is clear that over the long term, the "one-percent problem" will require a significant restructuring of the mission and activities of the university.

Cost Shifting

The modern research university is complex and multidimensional. People perceive it in vastly different ways, depending on their vantage point, their needs, and their expectations. Students and parents want high-quality, but low-cost, education. Business and industry seek high-quality products: graduates, research, and services. Patients of our hospitals seek high-quality and compassionate care. Federal, state, and local governments have complex and varied demands that both sustain and constrain us. And the public itself sometimes seems to have a love-hate relationship with higher education. They take pride in our quality, revel in our athletic accomplishments, but they also harbor deep suspicions about our costs, our integrity, and even our intellectual aspirations and commitments.

Looking at the university from an economist's perspective, one would see as inputs: our people (students, faculty, and staff), our funding (tuition paid by students and families, gifts, and income on endowments), and taxpayer dollars from state and federal governments. Our outputs are the value added through the education of our students, the knowledge produced on our campuses, and through direct services to our society, such as through agricultural extension services or teaching hospitals.

The problem is simple: each stakeholder wants to minimize the input it provides and maximize the output it obtains from universities, but none of the funding contributors is looking at the university as a whole, with diverse missions. More

specifically, each party seems to want much more out than it is willing to put in, thereby leveraging other contributors.

Unfortunately, most people–and most components of state and federal government–can picture the university only in terms of the part they from which seek services, *e.g.*, research procurement, student financial aid, and political correctness. Few seem to see, understand, or appreciate the entirety of the university. This is particularly true in Washington, where each element of the federal government attempts to optimize the procurement of the particular products or services they seek from our research universities. There seems to be little recognition that shifting federal priorities, policies, or support aimed at one objective, will inevitably have an impact on other roles of our institutions.

Between a Rock and a Hard Place

Many university presidents portray their academic programs as fragile enterprises, delicately balanced between the disruptive forces of the Department of Athletics on one end of the campus, and the Medical Center on the other end. While this is perhaps not the best time to comment on intercollegiate athletics--particularly after a weekend in which both Penn State and Michigan lost--I do feel oblidged to note the seriousness of the challenges faced by our medical centers. The changing nature of health care delivery and financing has led to a shift in financial risk, from third-party providers such as insurance companies, HMOs, and government to the hospitals. This financial risk is now shifting again, this time from the hospitals to the physicians--that is, to our Medical Schools. The impact of this restructuring of the health care industry on both the finances and the faculty of those universities with large medical centers will be traumatic, indeed.

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 from what subjects can be taught, who is fit to teach, and who should be allowed to study. Too often, such interference is a short-sighted effort to exploit public fears and passions of the moment for immediate political gain. The long-term costs to citizens is high because politically motivated intrusions into academic policy lead, in the long run, to educational mediocrity.

Once again, harmful political forces are gathering strength to intervene in university affairs. This time they originate in California, where the Governor and his appointed regents, have ordered the University of California to dismantle its time-tested and effective affirmative action policies by next year. A ballot initiative, eliminating government affirmative action programs entirely, is slated for a vote in November. Inspired by California's example, more than a dozen states are now reported by the *Washington Post* to be considering similar legislative initiatives to end affirmative action in admissions, hiring, and financial aid decisions.

This intensifying political pressure on our nation's great public universities is a threat to their unique historic role of providing a world-class educational opportunity to all students who have the will and ability to succeed. And, if politics today influence university admissions policies, what will be targeted next? Curriculum? Faculty hiring? Research?

Further, the special interest politics characterizing our times sometimes focus on higher education. In the past, these institutions, so critical to our future, were buffered from such attack 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...

Sunshine Laws

Public universities face one particular political challenge spared private institutions, sunshine laws. Most states have passed laws requiring that the meetings of public bodies, such as governing boards, be open to the press and members of the public. Further, many also have freedom of information laws that require public disclosure of any documents or data not protected by personal privacy laws. The media are using these laws not simply to pry into the operations of public institutions, but to actually manipulate and control them.

Populism

Higher education is also no stranger to the forces of populism that rise from time to time to challenge many other aspects of our society–a widespread distrust of expertise, excellence, and privilege. Indeed, many universities, faculty, and university administrators have made themselves easy targets by their arrogance and elitism. But, today we see a particularly virulent form of populism, almost a post-modern, deconstructionist variety, that aims at not simply challenging but actually destroying our social institutions and commitments. This slash and burn approach offers little in the way of alternatives. It also has a decidedly anti-intellectual character.

The Deteriorating Power of the University Presidency

This fall, the Association of Governing Boards released the report of their National Commission on the Academic Presidency which concluded that the greatest danger to higher education is that colleges and universities were neither as nimble nor as adaptable as the times required. The reason was simple. The academic presidency has become weak. ("Anemic" was the term they used.) 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.

A Time of Change and Challenge

The profound nature of the challenges and changes facing higher education in the 1990s seems comparable in significance to two other periods of great change in the nature of the university in America: the period in the late nineteenth century when the comprehensive public university first appeared and the years following World War II when the research university evolved to serve the needs of postwar America.

We now face challenges and opportunities similar to those characterizing these two earlier periods of transformation. Many point to negative factors, such as the rapidly growing costs of quality education and research during a period of limited resources, the erosion of public trust and confidence in higher education, or the deterioration in the partnership characterizing the research university and the federal government. But our institutions will be affected even more profoundly by the powerful changes driving transformations in our society, such as the increasing ethnic and cultural diversity of our people; the growing interdependence of nations; and the degree to which knowledge itself has become the key driving force in determining economic prosperity, national security, and social well-being.

The Changing Paradigm of the Research University

There is an even more profound transformation occurring: that involving the paradigm of the research university itself.

One frequently hears the primary missions of the university referred to in terms 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. While 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 PhD 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, and virtual reality. They approach learning as a "plug-

and-play" experience, unaccustomed and unwilling to learn sequentially–to read the manual–and rather 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, 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.

Finally, it is also clear that societal needs will continue to dictate great changes in the applications of knowledge it excepts from universities. Over the past several decades, universities have been asked to play the lead in applying knowledge across a wide array of activities, from providing health care, to protecting the

environment, from rebuilding our cities to entertaining the public at large (although it is sometimes hard to understand how intercollegiate athletics represents knowledge application).

This abstract definition of the roles of the university have 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, hence, the challenge of change, of transformation, is, in part, a necessity simply to sustain our traditional roles in society.

The 21st Century University

Of course, these paradigm shifts are being driven by the extraordinary pace of change in our society. We are living in the most extraordinary of times: the collapse of Communism, 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.

A case in point: for the past half-century, the Bush paradigm of federal patronage of investigator-driven research has determined the nature of the research university. Only 125 of the 3,600 institutions of higher education are research universities, but these are just the institutions at most risk as the federal science and technology budget shrinks in the years ahead. Don Langenberg, Chancellor of the University of Maryland, goes even further: "It is probably about as safe to assume that the dominate higher education institutions of the 21st Century will stem from this small but powerful group of present-day institutions as it would have been to assume that today's dominate life form on Earth would stem from Tyrannosaurus Rex."

The Privately-Financed Public University

Of course, one obvious consequence of declining state support is that the leading public research universities will increasingly resemble private universities in the way they are financed. The University of Michigan has already moved far down this road to becoming a *privately-financed public university*. 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% of our academic budgets (non-auxiliary funds), and 10% of our total revenue base.

Further, it seems clear that if the present rate of deterioration continues, by the end of the decade, state support will amount to less than 7% of our total resources. In a sense, long ago we 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. Yet, despite the low level of state support, the University remains a public university, committed to serving the citizens of Michigan. Further, it is clearly governed by the state through its publicly-elected Board of Regents.

Hence, the University of Michigan has already become a privately-financed, public university, 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. While the University of Michigan was one of the first public universities to see its state appropriations drop to such a low fraction of its operating budget, it is now being joined by other major public universities facing a similar privately-financed future--including, of course, Penn State University.

Today one might even conclude that America's great experiment of building world class universities supported by public taxes has come 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

The anticipated decline in federal support of university-based R&D in the years ahead will inevitably cause a variety of responses on the part of both public and private research universities. Many university faculty will shift from the public to the private sector for support to accommodate the erosion in federal support. Beyond seeking corporate support for R&D, they will need to market educational services more aggressively and put in place more realistic price structures (*e.g.,* tuition and fees) that accurately reflect costs.

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 "student-centered" enterprises of land-grant institutions...that is, in the language of the business world, from "provider-centered" to "customer-market".

There is an even more profound yet 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. That is, 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 was 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. Rather, it seems interested in seeking short-term services from universities, of high quality, to be sure, 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.

As Frank Rhodes, President-emeritus of Cornell University, and other leaders of public universities have stressed, the land-grant paradigm of the 19th and 20th Centuries was focused on developing the vast natural resources of our nation. The agricultural and engineering experiment stations and the cooperative extension programs were enormously successful. Today, however, we have come to realize that our most important national asset for the future will be our people. Hence, a contemporary land-grant university might be focused on human resource development along with the infrastructure necessary to sustain a knowledge-driven society.

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. Yet, the reality is far different–and far more complex.

The reality is something quite different, as a brief analysis of our mission will indicate. While we generally all start from the classic triad of teaching, research, and service, the various forms these general missions branch into stretch on and on.

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.

That is, 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.

Concluding Remarks

The American university has always responded quite effectively to the perceived needs–or opportunities–of American society. In the 19th Century they developed professional schools, then 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 to develop an extraordinary capability in basic research and advanced training in response to the federal research policies.

Again, this is not at all surprising, considering the individualistic, entrepreneurial nature of the faculty, and the loosely coupled, dynamic organizational structure of universities. We can argue that these institutions take on far too many missions as a result, but we cannot deny that they do respond to the opportunities and challenges presented by society. Today, universities are evolving rapidly, responding once again to their faculties' perception of the marketplace. And the faculty are hearing loud and clear the message that America no longer values the importance of basic research and questions even the relevance of the research university.

While they may not like it, the faculty is remarkably sensitive to the criticisms voiced by critics of the academy...about too much emphasis on research over teaching...about too many PhDs and not enough jobs...about whether we should shift toward more applied activities. And they are responding, quite rapidly, to adapt to this brave, new world. Just survey any group of junior faculty.

The world and the structure of our society have changed greatly since the adoption of those policies leading to the evolution of the public research university. However, the major principles undergirding these policies advanced merit reaffirmation. Now, more than ever before, the national interest calls for an investment in human and intellectual capital. Both the principle of public support of higher education and the government-university research partnership remain as relevant today as they have in times past. They are aimed at nurturing and maintaining the human strengths of a great nation and sowing

the seeds that will ultimately bear fruit in new products and processes to fuel our economy and improve our quality of life.

Today our public research universities play an absolutely critical role in our lives. Yet, in a world driven increasingly by knowledge, by educated people and their ideas, they are destined to play an even more significant role in our future. As Erich Bloch, former Director of the National Science Foundation, stated it 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."

The American public, its government, and its universities should not surrender the long-term advantage of the policies undergirding the public research university because of a short-term loss of direction or confidence. At a time when many of society's other institutions do not seem to be working well, the public research university is a true success story. We simply must get that message across to the American public. We must re-articulate and revitalize the remarkably successful partnership that has existed between our government, our society, and our universities over the past century.

But at the same time we must recognize that the 1990s will represent a period of significant change on the part of our universities if we are to 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 rapidly 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.