CHAPTER 2

Reinventing the Research University: An American Perspective

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INTRODUCTION

Frank Rhodes is right to remind us that our most pressing task may not be imagining how to reinvent the research university. Over the span of a thousand years universities have largely resisted being reinvented and have instead adapted and evolved in profound ways to serve a modernizing world. Perhaps what is really being asked of universities today is a reformation of processes that have become detached and hence unwieldy, on the one hand, and, on the other, a refocusing on mission and strategy such that universities more effectively invest their resources.

It may also be the case that "reinventing" is the wrong verb simply because the pace of university change is being driven by social, economic and technological forces largely external to the academy. Today universities, as institutions, are much more likely to respond to rather than initiate change – and in that sense, universities are being remade rather than reinvented.

Among those forces perhaps the most dramatic, though to the public not always the most visible, is a knowledge base that is expanding exponentially while, at best, resources are growing linearly. It is the point Donald Kennedy, then president of Stanford University, made when he asked: "How can we look so rich and feel so poor?" (Kennedy, 1997). His answer was that universities were much better at getting new things started than at finding the necessary funds to sustain them. To this dilemma has been added the challenge of massification and the very real question of who is to pay for

making higher education both broadly available and broadly affordable. The lesson learned more than two decades ago by public universities in the United States – that no government has sufficient tax receipts to provide a higher education to all who seek it at little or no cost to the seeker – is now being absorbed by universities across Europe and Asia. Universities everywhere are "going to market" to raise the kind of revenues that are required to sustain quality and insure stability – even as they protest at what they see as the erosion of public support.

This push to market is having a host of consequences, not the least of which is the commercialization of much of what universities produce. Students have become "customers" demanding that they get their money's worth. The higher the tuition bill, the louder the cries that a university education needs to be "relevant", culminating in the kind of job that a graduate needs to recoup the costs of enrolment. At the same time, the agencies that provide external funding for research – government bureaus, foundations, and, increasingly, for-profit corporations – now see themselves as the universities' customers as well. What they want back are the "deliverables" they contracted for, somehow leaving to others the cost of the kind of basic research that has little or no immediate applicability. Universities have added their own momentum toward commercialization as they have sought to capture and exploit the value of the intellectual property produced through their research – ironically behaving much as they have for decades in exploiting the commercial entertainment value of college sports.

Then there are the changing educational needs of knowledge-driven economies that are becoming increasingly interdependent as globalization recasts the nature of commerce and the meaning of culture. Technologies, largely invented at universities, are redefining the boundaries of individual disciplines while simultaneously creating research communities that are global, that easily include researchers outside the academy, and that, as a consequence, often come to see universities and their constraints from academic values and government accountability more as hurdles to be overcome than as institutions that add more than funds to the research process.

THE FORCES REMAKING THE RESEARCH UNIVERSITY

How, when and where these forces interact to reshape individual universities largely reflect national circumstances and proclivities.

Diminishing Public Appropriations

In the United States today the most pressing concern is funding. Most public universities are facing devastating cuts in their appropriations from tax dollars – a function of the crushing budget deficits confronting most states.

Private universities and the best endowed public universities face a parallel erosion of private support from gifts and endowment income – a function of a weakened economy and a sense on the part of many traditional donors that higher education no longer needs or merits the same level of philanthropy as before.

The optimists among us will want to argue that today's troubles are just part of the ebb and flow of an economic cycle that gives as well as takes. In bad times, state governments and donors cut back support, and then restore their largesse once good times return. Now some are not so sure. 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" (Selengo, 2003).

Today, the priorities of both the electorate and the makers of public policy are heath care, prisons, homeland security and reduced tax burdens for the near term rather than investment in the education of the next generation and in the future. This situation is being exacerbated by the circumstances of those needs that, on the state level, compete directly with higher education for taxpayer support – public schools, prisons, highways and medical care for an ageing population no longer able to bear the full cost of health care. The problem is that public primary and secondary schools cannot charge tuition; prisons cannot charge rent; highways in the United States seldom charge tolls; and the nation's politically active elders have made clear they do not want to be charged for anything. But universities can and do charge tuitions; each time there is a downturn in the economy and a reduction in tax revenues, most universities make up for the loss in public funds by increasing the prices they charge their students. The result is that most public and all private universities in the United States are creatures of an increasingly competitive market for student enrolments as well as for research grants and private donations.

It is the market that calls the tune in the United States, and it is a market that is becoming increasingly segmented with those at the top the top of the pyramid – the nation's medallion and name-brand universities – getting stronger, while those in the middle and bottom continue to lose ground. It is not hard to imagine higher education in the United States, a decade from now, being dominated by 20 or so super – as well as super-rich universities, while the balance struggle to maintain programmes and preserve quality.

Changing Student Demands

At the same time universities are being asked to do more – becoming in the process more open, more flexible, and above all more responsive to student concerns about their employability after graduation. Today, a college degree

has become a necessity for most careers, and graduate education desirable for an increasing number. The fact that the population as a whole is growing will yield at a minimum growth rates in the 10-15 % range over the next decade for that portion of American higher education that serves traditional college-age students. In some states, particularly those in the American southwest such as California, Arizona and Texas, the rate of growth will be considerably greater. Expanding demands for adult education at the collegiate level will further strain higher education's capacity to serve those seeking jobs in high-performance workplaces. It is now estimated that by 2010 over 50 % of all university students will be working adults over the age of 25 (Almanac Issue, Chronicle of Higher Education, 2003).

Accompanying this increase in demand will be a marked shift in the kind of learning experiences most students have come to expect. What the digital- and media-savvy young as well as their adult counterparts and adult learners will increasingly demand are interactive, collaborative learning experiences, provided when and where the student needs the knowledge and skills. The continued blurring of the various stages of learning throughout one's lifetime – primary, secondary, undergraduate, graduate, professional, job training, career shifting, lifelong enrichment – will require a far greater coordination and perhaps even a merger of various elements of the nation's educational infrastructure – with the result being an infrastructure that sees its students as active learners in search of consumer-friendly educational services.

It is a utilitarian view of higher education that is having a marked – some would say, a profound – impact on American public policy. The National Governors Association notes that: "The driving force behind the 21st-entury economy is knowledge, and developing human capital is the best way to ensure prosperity." (National Governors Association, 2001) The telltales of the knowledge economy are everywhere. 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 labour. Instead it is intellectual and human know-how.

The Politics of Diversity

Education is also 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 the United States. But there is an important difference here. The space race galvanized public concern and

concentrated national attention on educating "the best and brightest", the nation's elite of tomorrow. The skills race of the 21st century will value instead the skills and knowledge of the entire workforce as a key to economic prosperity, national security and social well-being.

In this regard, the increasing diversity of the American population with respect to race, ethnicity, gender and nationality is both one of the United States' greatest strengths and most serious challenges. Far from evolving toward one America, the United States remains hindered by the segregation and non-assimilation of minority cultures. Nor is it clear that the consensus forged in the 1960s as part of the civil rights' movement still holds the political high ground. Instead a variety of groups, often centred in some of the nation's most advantaged communities, are effectively challenging long-accepted programmes of affirmative action and equal opportunity put in place to expand access to higher education to under-represented communities.

In this struggle American universities have become a major battleground as affirmative action's opponents have sought to limit, if not actually eliminate their ability to consider race as a factor in deciding which applicants to admit. As a reflection of that society, the nation's universities have a unique as well as a special responsibility to be effective multicultural communities. They also need to make affirmative action work, yielding new levels of understanding, tolerance and mutual fulfilment for peoples of diverse racial and cultural backgrounds. They need to move beyond simple questions of access to the tougher challenge of making more certain that those admitted through programmes of affirmative action achieve the same educational advantages that majority students achieve.

It is a struggle that has become all the more difficult as the nation's leading universities have become the target of a sophisticated political and legal campaign to limit programmes of affirmative action. What the future holds is more of the same – more court cases, more voting initiatives designed to curtail the universities' political autonomy and more internal debates as to the appropriateness of making the defence of affirmative action a major institutional priority. As the largely successful battle the University of Michigan waged in defence of its race-sensitive admissions policies demonstrated, universities can be successful in this struggle, preserving their ability to insure ethnically diverse student bodies. The salient and troubling question then becomes, at what cost in terms of dollars spent, energy invested and political capital expended?

The Push-Pull of Technology

Today's world is being transformed by a digital technology (computers, networks, wireless devices) that is evolving at an exponential pace. Capacity per

unit price – whether measured in terms of computing speed, memory, or network transmissions – is increasing by a factor of 100 to 1000 every decade. A recent National Academy of Sciences study group concluded that the extraordinary evolutionary pace of information technology is not only likely to continue for the foreseeable future, but it could well accelerate on a super-exponential slope. For American universities, the best planning assumption holds that by the end of the decade both scholars and students will have available infinite bandwidth and infinite processing power (at least compared to current capabilities). The world 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 as they proceed from e-commerce, e-government and e-learning to e-everything. The impact of these technologies on the university will be profound, rapid and discontinuous – just as it has been and will continue to be for the economy as a whole and the full range of institutions that comprise a nation's civil society.

It for this reason that Clayton Christensen writes about the digital revolution as the initiator of a disruptive technology (Christensen, 1997), one that will ultimately redefine the core activities of most universities (their teaching and research), their form of organization (academic structure, faculty culture, financing and management) and their links to the broader community (their outreach to the communities that host them, the governments that support them, and the corporations that hire their graduates and provide a critical portion of their research funding). It is a world that will require universities to anticipate as well as to react, in the process developing effective strategies and making focused investments in an increasingly uncertain future (Duderstadt, Atkins & Van Houweling, 2002).

Some of the world's leading universities are also learning what happens when the promise of these digital technologies is misjudged, leading to risky investments that fail to deliver the expected dividends. A decade ago, the promise of e-learning seemed irresistible – faculty would teach differently, students would learn at their own pace and in their own way, electronic learning would make a university education available to everyone by offering electronic instruction any-time-any-where. Respected agencies predicted the rapid expansion of the market for e-learning to embrace millions of students and billions of dollars. Universities would be able to replenish their coffers from the profits their new e-learning enterprises earned. And, to be sure, efforts such as the Sloan Foundation's Asynchronous Learning Network project and Carnegie Mellon University's cognitive tutor software demonstrated that such technology could create effective learning environments.

With that level of market anticipation at hand, a uniquely American stampede toward exploiting the commercial potential of instructional tech-

nology was ensured. Columbia University launched Fathom; New York University nearly matched those efforts with NYU.online. Cardean University became the model of a for-profit/not-for-profit collaboration in which some of this country's and Europe's best-known universities partnered with Unext to launch a high cost-high prestige programme of international business education. Individual states made similar investments, choosing to focus instead on providing low-cost, but ready access to the educational assets already available on publicly funded university campuses. California's brief fling with its own electronic university and the better known Western Governors University were probably the two best-known examples, though efforts in Massachusetts, Maryland, and Michigan in the end demonstrated more staying power.

Not surprisingly, perhaps, the reality never matched the promise. There has been no pedagogical revolution – most faculty who use the new technologies have not changed how or what they teach. Most of the commercial e-learning enterprises founded by major universities have closed. There has been no real burgeoning of distance education – the limited number of successes owe more to their past market triumphs – as in the case of both University of Maryland's University College and the University of Phoenix – than to the effectiveness of the new technologies.

Through it all, the new educational technologies have retained a core of true believers who argue, still forcefully and at times persuasively, that a revolution is at hand – that the computer will do for learning today what printing did for scholarship in the 15th century. Don't be fooled by the failures and false steps, they proclaim, the best is yet to come. More quiet and also more numerous are the pragmatists in the middle. They point out that e-learning is alive and well and has in fact spurred a host of important educational changes probably best symbolized by the widespread adoption of course management tools like Black Board and WebCT. Money is being spent, smart classrooms are being built everywhere, and university faculty are successfully integrating electronically mediated learning into literally thousands of courses focusing on both traditional and non-traditional subjects.

What is clear is that the story is still unfolding. The underlying information technologies on which e-learning depends are themselves too ubiquitous and the people attracted to having them serve as learning platforms are too smart for universities not to take seriously the prospect that major changes will flow from their efforts. The best guess is that the decade ahead will be one of continued experimentation as universities and their faculties get better at anticipating how the new technologies will impact their basic operations, both within and without the classroom. The danger is that universities will be inclined to delay, deciding to wait and see how e-learning involves before making further investments.

The Changing Nature of Research

Although the changing needs and nature of society have been important factors in the making of the university, so too has been the changing nature of research and scholarship. Intellectual transformations will in the future, just as they have in the past, play a major role in defining the nature of the university. One way to track those changes is to note the continuing modification of the disciplines that collectively define the structure of scholarship for any given age. What are too often regarded as entrenched and fixed are in fact constantly changing, combining and splitting in a continuous process of constant discovery and invention. Just as a century ago, Einstein's theory of relativity and the introduction of quantum mechanics revolutionized physical concepts, today speculation about dark matter and quantum entanglement suggests that yet another revolution in the physical sciences may be at hand. The articulation of the molecular foundations of life is having the same transformative impact on the biomedical sciences. What most scholars now understand is that 21st-century science will be marked by increasing complexities that will overwhelm the reductionist approach on which disciplinary definitions and boundaries have traditionally depended.

At the same time 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 at a variety of universities. This push to collaboration is in part a function of the enormous expense of major experimental facilities, and in part driven by the complexity of contemporary research topics. To study issues ranging from protein functions to global change to the harnessing of the new nano-technologies requires evolving teams of scholars drawn from a wide variety of disciplines.

In science and engineering education a new age is dawning, 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 cyber-infrastructure 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 holds that a rapidly expanding cyber-infrastructure (Atkins, 2003) will yield more ubiquitous as well as comprehensive digital environments that become interactive and functionally complete for research communities drawing together people, data, information, tools and instruments, all operating at unprecedented levels of computational speed, storage and data-transfer capacities.

The Dominance of Markets

The nation's research universities are similarly being changed by strong economic forces triggered by increasing competition and the government's reliance on market mechanisms to distribute public subsidies. One result could be the same kind of massive restructuring experienced by other sectors of the economy – for example, health care, transportation, communications and energy, to name just four. More generally, what the modern university may be experiencing are the early stages of a process whose logical outcome is the emergence 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 (Peterson & Dill, 1997).

One of the principal drivers of this process is the worldwide movement toward revenue-driven, market-responsive systems of higher education. In large part, this emphasis on raising revenues (as opposed to controlling costs) is the recognition that taxed-based revenues cannot support the massification of higher education required by knowledge-driven economies, on the one hand, and, on the other, the demands of an ever-increasing proportion of the population for a university degree. Among many of higher education's key supporters and funders there is also a growing recognition that the conventional model of public funding for universities, with its emphasis on high public subsidies coupled with low student tuitions, is in itself highly regressive, amounting to a subsidy of education for the rich by the tax dollars paid by the poor.

Some might argue that this emphasis on the pursuit of market revenues in lieu of public appropriations need only be temporary. A decade or two down the road a new generation of citizens will restore a more appropriate balance between the consumption needs of an ageing population and the educational needs of the young. The problem is that, while it is relatively easy to start markets, it is very hard to stop them. The world of higher education is at a point where resistance to market forces no longer yields resilience – instead the discipline of the market virtually guarantees a Darwinian process in which only the financially fit will survive.

WARNING SIGNS

The sum of these forces – the dominance of the market, the changing nature of research, the push-pull of the new electronic technologies, the politics of diversity, and the changing nature of student demands – suggest that what way may be at hand is a fundamental remaking of universities, not just in the United States but world-wide. The danger is that universities will want to believe they remain largely immutable. The university, after all, is one of but

a handful of social institutions to survive in recognizable form for a thousand years and more. Who is to say it would not endure in much its present form for another millennium?

We are not so sure. From our perspective, the ideal of a research-intensive university is now at a tipping point. Once the forces of change carry universities beyond that point, they will have entered a different era. More than that, they will become fundamentally different institutions no longer in control of their own destinies. The warning signs are clear and present – to ignore them will likely lead to universities that are no longer all that they should be.

Warning Sign 1: Darwinian Competition

The often corrosive effects of often unbridled competition are increasingly being reflected in the market focus of a growing number of universities. It is an arms race that escalates yearly, as institutions of every stripe compete ever more aggressively for better students, better faculty, government grants, private gifts, prestige, winning athletic programmes, and commercial market dominance. This competition for the resources necessary to achieve a competitive advantage is being aggravated by the vast wealth being accumulated by a handful of elite private universities that allows them to buy "the best and brightest" students through generous programmes of student financial aid (including a growing number that award aid based on merit rather than need). At the same time the growing gap between faculty salaries characterizing private and public research universities is creating 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 programmes by luring away their top faculty with offers they are unable to match.

Warning Sign 2: Commercialization of the Academy

A second warning sign is reflected in the efforts of universities and faculty members to capture and exploit the soaring commercial value of the intellectual property created by their research and instructional activities. As in the dot-com-inspired investments in e-learning enterprises, research universities are focusing increasingly on for-profit ventures intended to provide the sponsoring institution with robust and stable sources of revenue. This pursuit of profits is proving both infectious and diverting. To be competitive in this changing environment requires major investments in technology transfer staff, the placing of limits on the open sharing of research results and, not least, the hiring of teams of lawyers to defend an institution's ownership of the intellectual property derived from its research and instruction. In the near term, universities and their faculty members are likely to find them-

selves setting aside fundamental values 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 (Press & Washburn, 2000).

Warning Sign 3: From Public Good to Private Benefit

There is a deeper issue here. The American research 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 the broad support of all of society, rather just the patronage of those who benefited individually from its instruction. And public finance made certain that these institutions, both public and private, received direct appropriations and were the beneficiaries of a host of tax-subsidies, both direct and indirect, thus allowing them to discharge their public obligations.

The irony is that today, even as the needs of society for post-secondary education intensifies, there has been a visible erosion in the notion that universities provide a public good deserving of strong societal support (Zemsky, 1997). State and federal programmes have shifted from investment in the higher-education enterprise (largely in the form of appropriations to institutions for the benefit of students) to investment in the marketplace for higher-education services (most often through direct grants, access to capital and indirect 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 one that can best be described as an individual benefit has yet 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. Reputations earned using public funds become the key to winning a fair share of the revenues the market is now expected to provide: student tuitions and government grants along with the philanthropic largesse of foundations, corporations and individuals of substantial wealth. The consequence is the rise in the number of public "flagship" universities that now seek to become privately financed all at the expense of their once dominant public characters.

Warning Sign 4: The Loss of Public Purpose

In this process of responding to the marketplace by privatizing public higher education, the nation is in the process of diminishing the importance of the university as a place of public purpose. History demonstrates that markets are inexorable; it is both fruitless and dangerous to pretend they are not. At best, markets can be shaped by informed consumers and guided by government regulation meant to constrain the most egregious effects of unchecked competition. At the moment higher education in the United States has few informed consumers – what most students and their families seek is a competitive edge for themselves and their children, an outcome that can best be secured by focusing on institutional prestige rather than educational quality. Nor have governments demonstrated either the skill or inclination to enter the arena as regulators – in part because most public officials have been persuaded that universities are complex enterprises that, for the most part, can only be understood by those steeped in the traditions of the academy; and in part because these same public officials now have a vested interest in having public institutions succeed as market enterprises.

What is at stake are those core values and traditions that have afforded the research university its historic standing. Will the university retain its special role and responsibilities, its privileged position in society? Will it continue to prepare young students for roles as responsible citizens? Will it provide social mobility through access to education? Will its scholarship in pursuit of truth and openness continue to challenge society? Or will the university become, both in perception and reality, just another interest group defined largely by market forces?

A FINAL OBSERVATION

For American universities there is at least one more warning sign: the unforeseen and too often unrecognized rise of the European university as an

important competitor. The events that created the American research university of today largely occurred in years following the Second World War, spurred by Vannevar Bush's *Science, The Endless Frontier* which called on the federal government to make a massive and sustaining investment in basic scientific research (1990). The agency of that research, Bush argued, should be the American research university, in part because of the role it had played in the war effort, but mostly because only a university and its research faculty were capable of achieving what the nation required. Most of what Bush recommended, including the chartering of a National Science Foundation, became federal policy, making the federal government the principal funder of a scientific revolution that gave science and science departments an often dominant voice in the ordering of their universities.

Today European universities are on the edge of a parallel breakthrough. The European Union has laid out an ambitious plan of scientific investment that has at its core a pledge to create annual investment funds equal 3.5 % of the E.U.'s gross domestic product (GDP). The Bologna Process and the newly established European Research Council hold out the promise of a re-invigorated set of universities with greater flexibility, more attention to market forces and more willingness to invest in the entrepreneurial instincts of their faculty. The only remaining stumbling block is the resistance by many to the concentration of resources in 50 or so research-intensive universities. But that too is likely to change under the pressure of budget constraints and market competition.

Three possibilities describe the likely future of research universities on either side of the Atlantic. The least attractive is an era of unbridled competition, spurred in part by Europe's search for greater independence and the United States' pursuit of continued hegemony. The least likely future is an era of cooperation in which is there is a pooling of expertise and ambition made possible by a conscious political as well as academic decision to forgo the pursuit of competitive advantage. The middle path is one of competition mediated by cooperation. It is a path that would allow universities to shape, but not control, their own futures. But it is also a path that begins with a frank recognition of the current centrality of market forces and then moves with forthrightness to address the questions of the changing nature of research, the push-pull of technology, the politics of diversity and the shifting nature of student demands. Done right, it is a future that promises universities that are being remade in their own image.

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