



**THE RESEARCH UNIVERSITY AS  
COMPREHENSIVE KNOWLEDGE ENTERPRISE:  
THE RECONCEPTUALIZATION OF ARIZONA STATE UNIVERSITY  
AS A PROTOTYPE FOR A NEW AMERICAN UNIVERSITY**

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While the Glion Colloquia have brought together university leaders from throughout the world to share their perspectives on a comprehensive array of critical issues confronting higher education, perhaps none is more imperative to consider than the role of the research university in an innovation-driven society. Research universities both in the United States and around the world are the primary source of totally new knowledge and innovation that drives the global economy and provides those of us in advanced nations with the standard of living that we have come to take for granted. The impetus to advance innovation distinguishes the research university from other institutional forms in higher education in the twenty-first century. Indeed the research university may be defined as a comprehensive knowledge enterprise committed to discovery, creativity, and innovation. If we do not embrace the imperative for what has been termed “perpetual innovation” – and by this I mean innovation in both products and process as well as the organizational design of institutions themselves – not only the outcomes of academic research but also our collective standard of living will decline, our ways of life will be threatened, and opportunities for the success of future generations will be diminished.

Despite the critical niche that research universities occupy in the global knowledge economy, I would contend that institutions committed thus primarily to innovation exhibit inherent limitations unless they deliberately choose to embrace a broader societal role. Innovation alone can flourish in the analytical isolation of laboratories and amidst the commercial priorities of the firm or corporation. If, however, research universities

are to respond to the challenges that confront humanity – ensuring, for example, that our institutions create knowledge that is as socially useful as it is scientifically meritorious, in areas as broad and complex as social justice, poverty alleviation, access to clean water, sustainable land use, and technological innovation – they must integrate the imperative to advance discovery, creativity, and innovation with an explicit imperative to assume responsibility for the societies they serve.

Our research universities must not only produce fundamental or “pure” research, they must also steer “pure” research toward socially useful outcomes. In general we act as if the intellectual goals of our institutions, especially in terms of scientific and technological research, are automatically and inevitably aligned with our most important goals as a society. They most assuredly are not. The challenge in this context is therefore about institutional design – about designing knowledge-producing enterprises that attempt to understand and respond to their constituents and advance broader social and economic outcomes. Among other societal obligations, our institutions must commit to the production in sufficient numbers of scientists and engineers and artists and philosophers and economists and doctors and lawyers – in short, the production of the human capital from which we draw our future leaders in every sector. Our institutions must commit to ambitious and multifaceted societal outreach and engagement programs dedicated to societal advancement and regional economic development.

With my formulation of the research university as a “comprehensive knowledge enterprise,” I further underscore the concept of “enterprise,” generally wholly lacking in discussions about higher education. In the usage I advocate, “academic enterprise” engenders an entrepreneurial academic culture that inspires creativity and innovation – the intellectual capital that is the primary asset of every college and university. Generally associated with the private sector, the spirit of enterprise is critical to the advancement of innovation. My focus on enterprise is deliberate because since becoming the president of Arizona State University in July 2002, I have been leading an effort to reconceptualize a large public university as a competitive academic enterprise dedicated to leading the vanguard of innovation while addressing the grand challenges of our era. We have undertaken the task of pioneering the foundational model for what we term the “New American University” – an egalitarian institution committed to the topmost echelons of academic excellence, inclusiveness to a broad demographic, and maximum societal impact. It is the inherent and fraught complexity of these various conceptualizations of the role of the research university as well as their interaction and interplay that I hope to consider in our discussions.

There are many ways to parse the concept of the New American University, but, in brief, its objectives are inherent in the following “design aspirations” that, reduced to their essential terms, enjoin academic communities to (1) embrace the cultural, socioeconomic, and physical setting of their institutions; (2) become a force for societal transformation; (3) pursue a culture of academic enterprise and knowledge entrepreneurship; (4) conduct use-inspired research; (5) focus on the individual in a milieu of intellectual and cultural diversity; (6) transcend disciplinary limitations in pursuit of intellectual fusion; (7) socially embed the university, thereby advancing social enterprise development through direct engagement; and (8) advance global engagement. Taken together, these comprise a new paradigm for academic institutions, both public and private, that I advocate without reservation.

### **Diminishing returns on investment**

Unfortunately the proliferation of increasingly specialized knowledge that universities produce brings diminishing returns on investment as its impact on the world is measured in smaller and smaller ratios. But there is no reason why universities must confine themselves solely to the analysis of increasingly specialized knowledge. In our valorization of basic research, motivated solely by curiosity rather than with any higher purpose in mind, we lose sight of the potential for application when research is use-inspired. This is not to posit a dichotomy between basic and applied research—both are crucial, and in many cases the boundary between them is so permeable as to be meaningless. In our accustomed effort to produce abstract knowledge, however, many research universities have lost sight of the fact that they have the capacity to create useful products and processes and ideas that also have entrepreneurial potential. Through some strange elitist logic the concepts of enterprise and entrepreneurship have very nearly been eradicated from institutions of higher education. Our universities must recover an entrepreneurial edge if they are to be relevant and useful on a global scale. I would argue that we have always remained excessively attached to the outmoded institutional paradigms that we derive from our lineage from the academies of ancient Greece and the medieval European universities. We must instead design and build institutions that seek solutions to real-world problems and while addressing the challenges that confront global society allow us to remain competitive in the global knowledge economy.

The ancient Greek academies fostered within us the capacity to understand nature and society in complex terms, but they were tiny in scale and exclusively “conservative,” in the sense of perceiving their role as primarily to conserve knowledge. The ancient academies had little impetus to disseminate knowledge beyond their small elite circles and certainly no conception of the notion of risk and reward. The medieval European

universities were slightly larger in scale and only slightly more focused on the dissemination of knowledge. These institutions had only the most limited concept of risk and reward. The German universities that arose in the eighteenth century focused on specialized scientific research and were thus the immediate predecessors of the American research university, but with few exceptions entrepreneurship was still little in evidence. It was not until the establishment of the land-grant universities in the United States with their connection to large-scale agricultural research that the concept of an entrepreneurial university first emerged. Such an institution had the capacity to create products and processes and other forms of capital that could be sold and used by consumers outside the university system, and thus entrepreneurship came to the forefront. Following the example of these pioneering institutions, universities like Stanford and MIT committed themselves to entrepreneurial risk-taking and prospered.

The industrialized nations peaked some time ago in their capacity to continue to enhance capital creation, both in terms of raw numbers and access to the process of capital creation by all segments of society. From 1945 through the late 1990s, the United States was the world's dominant economic force. But now each nation looks toward the future as one of many major economic powers, each interrelated and cooperating with others but at the same time competitive in completely new ways. Continued worldwide economic growth must remain an overarching objective because if the world stops growing economically the social outcomes will be dire. The scale and speed of knowledge transfer is unprecedented, but speaking here primarily from the perspective of the president of an American research university, I perceive little initiative to invest in new universities or designs that will teach students how to thrive in this new environment.

To anyone who has looked at the role of innovation as a driver of economic development during the past half-century, the most obvious mechanism to enhance the long-term economic competitiveness of any nation is to invest in research universities. Yet where is the investment in building great new universities that will prepare the next generation for the disruptive effects of this new global economic reality? Over the past ten years I have had the opportunity to witness an unprecedented effort now underway in China to build from scratch a number of research universities modeled on, and intended to compete with, institutions of the caliber of the University of California, Berkeley, and the University of Michigan, Ann Arbor, two of our leading public research universities and world-class by any standard. In addition, during this period the Ministry of Education in China has planned to launch hundreds of other institutions.

## **A new model for the American research university**

In the rapidly changing and highly competitive global knowledge economy, the importance of a university education has never been greater. Education is the means by which a skilled workforce is produced and the source of new knowledge capital and thus economic growth and advances in society, for the benefit of both the individual and the collective. The global economy requires skilled workers, and the wage gap between those with education and skills and those without continues to widen. More and more knowledge inputs are increasingly required to perform almost any job in the new global knowledge economy. The economic success of individuals contributes to the success of a society – in fact, it is the main driver.

Arizona State University is advancing a new model for the American research university that responds to the imperative need for change in the existing paradigm. We reject the notion that excellence and access cannot be achieved in a single institution, and are thus advancing the foundational model for the “New American University.” At once the youngest and largest of the roughly one hundred major research institutions in the United States, both public and private, Arizona State University alone has sought to redefine the notion of egalitarian admissions standards by offering access to as many students as are qualified to attend. We champion diversity and seek to accommodate the many gifted and creative students who do not conform to a standard academic profile, as well as those who demonstrate the potential to succeed but lack the financial means to pursue a quality four-year undergraduate education.

Situated in the heart of an emerging megapolitan area that stretches from the Prescott region south to the border with Mexico, ASU is the sole comprehensive university in a metropolitan region that has already reached four million and is projected to increase to eight million – a metropolitan region the size of Chicago. Demographic projections suggest that this megapolitan – the so-called Sun Corridor – will emerge as one of perhaps twenty significant economic, technological, and cultural centers in the United States. As the president of the only comprehensive research university in metropolitan Phoenix, I take it for granted that our institution plays a leading role in shaping its future. If we hope to advance metropolitan Phoenix as entrepreneurial, creative, and adaptive, it is the responsibility of the university to envision and guide that outcome. Otherwise we face the prospect of the sort of outcomes that we have seen in declining cities like Cleveland and Detroit. Both are in decline because they were not able to adapt and change and evolve rapidly enough. The university models of the past are similarly just as stagnant and irrelevant as the most dated and discarded concepts of urban planning. If our universities remain hidebound and regard change and evolution as

recourses of last resort, then we can write off the adaptive capability of this important mechanism of capital creation and societal advancement.

Even while striving to improve their “product,” most institutions continue to exclude a high proportion of the population from reaching their full potential by excessive and sometimes arbitrary “culling.” It is generally taken for granted that there are two types of universities: those that aspire to academic excellence and discovery, and those that offer access, often providing little more than a base level of higher education.

Institutions that focus on academic excellence generally admit only the finest students, many of whom come from privileged socioeconomic backgrounds and have enjoyed undeniable advantages. In terms of societal outcomes, this implicit calculation is not only shortsighted but may in the long run prove to be a fatal error. There is growing social and economic stratification between those with access to a quality higher education and those without. More and more students who would most benefit from access to this most obvious avenue of upward mobility – those whom we might categorize as “disadvantaged” or “underrepresented” – are denied access for lack of means or choose not to pursue for lack of understanding a high-quality university education.

Consistent with our objective of creating differentiated learning environments that address the needs of individual students, we have designated one of our campuses, for example, to emerge as one of the nation’s leading polytechnics, with programs that provide both a theoretical and practical learning experience, preparing graduates for direct entry into the workforce. We are advancing two differentiated schools of engineering, one focused on research and the theoretical aspects of technology, and the other on practical application. Similarly, we have established three schools of education and three schools of management or business, each of which is built on a different learning platform. Some are focused on research, some on cultivating leadership skills, and some on practical application through learning-by-doing. We are overlapping and merging these programs to achieve maximum leverage.

The reconceptualized “school-centric” organization has produced a federation of twenty-three unique interdisciplinary colleges and schools that together with departments and research institutes and centers comprise close-knit but diverse academic communities that are international in scope. Consistent with this school-centric model we have conceptualized and launched sixteen new interdisciplinary schools, including the School of Human Evolution and Social Change, the School of Materials, and the School of Earth and Space Exploration. Although we are first and foremost committed to educating the students of Arizona, we are equally a cutting-edge discovery organization, focused on contributing to regional economic development

through enhanced research and academic programs, including major interdisciplinary research initiatives such as the Biodesign Institute, focused on innovation in healthcare, energy and the environment, and national security; the Global Institute of Sustainability (GIOS), incorporating the world's first School of Sustainability; and the Center for the Study of Religion and Conflict. In the process we have eliminated a number of traditional academic departments, including biology, sociology, anthropology, and geology. We consider them arbitrary constructs that may once have served certain social or administrative purposes but are no longer useful as we prepare to tackle global challenges.

### **Advancing a culture of academic enterprise and innovation**

As I said at the outset, academia most effectively responds to the demands of the global knowledge economy through the production of both "knowledge capital" and "human capital." Both concepts are closely interrelated because knowledge capital actually produces human capital, leading directly to broad economic development. "Enterprise" has been defined as a "purposeful or industrious undertaking, especially one that requires effort or boldness." Another definition terms it both a "mindset and a skill-set" that identifies opportunities in order to transform ideas into reality. Certainly both of these formulations are consistent with the manner in which I believe we are advancing both our mission and the institutional culture of our university. By acting as an "enterprise" and not merely another agency of state government, we at ASU are charting our own course rather than relying on others to set it for us.

Similarly, our use of the term "entrepreneurial" within the context of an academic enterprise means the self-directed and creative expression of intellectual capital as a new driver of knowledge-centric change. At ASU we consider entrepreneurship the process of innovation and spirit of creative risk-taking through which the knowledge and ideas within the university are brought to scale to spur social development and economic competitiveness. ASU is committed to embedding the paradigm of entrepreneurship into the fabric of our institutional culture through a supportive infrastructure of resources to inspire students, faculty, and staff, and provide them with the necessary skills to turn their ideas into reality.

Perhaps the most obvious dimension of academic enterprise is taking innovation from the research laboratory to the marketplace. To advance our institutional culture of academic enterprise and innovation we have reconceptualized a number of policies and core processes that make it easier to move ideas into action. Beginning with the establishment of Arizona Technology Enterprises (AzTE) in 2003 as our exclusive intellectual property management and technology transfer organization, we have

boosted innovative output with new approaches to technology evaluation, product development, technology marketing, capital formation, operations and management, IP protection, industry relationships, and licensing and commercialization. To simplify the licensing process, for example, we have introduced the use of licensing templates and master sponsored research agreements, which can reduce the need to negotiate over terms and conditions. In terms of strategic objectives, we are managing our IP for deal flow density rather than for revenue – in other words, to maximize the number of inventions and discoveries actually moved into use, instead of trying to maximize near-term income from fewer and bigger deals. We are also experimenting with faculty entrepreneurship incentives, allocating the income so as to give faculty inventors a greater incentive for starting companies.

But our conception of academic enterprise transcends the commercialization of university research. To maximize the societal impact of our culture of academic enterprise, we are advancing a concept we call “systems innovation.” Our objective is to exert impact on major social systems through innovation in multiple yet interrelated ways, beginning with P-20 education – with the “P” standing for pre-kindergarten and the “20” standing for the last year of formal instruction in graduate school. To transform public schools in the metropolitan region, we are building our institutional capacity to improve each stage of the educational process. Through a recent academic reorganization, for example, ASU has established the Mary Lou Fulton Institute and Graduate School of Education to conduct multidisciplinary research on the most critical education challenges of our time while preparing the next generation of leaders and scholars in the field. We are consolidating all teacher education programs university-wide into ASU’s College of Teacher Education and Leadership (CTEL), strengthening opportunities for students wishing to become teachers. At the same time, we are building collaborative partnerships with entities ranging from independent, nonprofit groups concerned with education to public school districts in Arizona, some of which, you will be saddened to hear, send only two children out of one hundred to the university. We are working with public policy makers in state government and with national organizations.

Among a number of related strategic initiatives is a nonprofit enterprise called University Public Schools, Inc., through which we operate our own schools to implement new ideas in education. We launched our first prototype elementary school in August 2008. Students from all backgrounds are welcome, including low-income families and immigrant households where the primary language is not English. We believe that when education does not produce optimal results, the main obstacle is not resource constraint but rather idea constraint. So we are working across multiple dimensions – from redesigning the structure of our own university to starting new



schools in the field – in order to create an entire system of innovation for transforming this social system. If you are familiar with the recent report on high school graduation rates in the fifty largest cities in the United States, you will recognize the urgency of the problem: according to the study, seventeen of the nation’s fifty largest cities had graduation rates lower than 50 percent. In terms of human capital, this is a loss of incalculable significance.

The same “systems innovation” approach that we considered in terms of our P-20 education initiatives is reflected in our institution-wide campaign called “University as Entrepreneur.” The overarching objective of this initiative is perpetual institutional innovation. Because enterprise means the self-directed and creative expression of intellectual capital as a new driver of knowledge-centric change, in practice we actually generate new enterprises – whether new ideas for products or processes or innovative new ventures in research or new for-profit startup companies. Unlike most universities, we have not limited our entrepreneurial education exclusively to business and engineering programs, but extended it across our campuses and throughout the disciplines and our new interdisciplinary schools and centers. We want to engage all disciplinary and interdisciplinary areas, from the arts and humanities and social sciences to the natural sciences and engineering and the professional schools. Instead of just teaching courses in entrepreneurship, we have decided to embed dynamic mechanisms for entrepreneurial innovation throughout our schools and departments. As a consequence, our College of Nursing and Healthcare Innovation, for example, now boasts an innovation and entrepreneurship center, and the Walter Cronkite School of Journalism has a major industry-funded center for innovation in news media.

Another program that harnesses the entrepreneurial potential of our students is the Edson Student Entrepreneur Initiative. An endowment provides a total of \$200,000 annually in seed funding. Each year, ten to fifteen teams are granted \$5,000 to \$20,000 to help subsidize expenses for developing new ventures. Money granted provides funding, office space, and training for students to explore their innovative ideas for business products and services in partnership with faculty, researchers, and successful entrepreneurs from both the academic and private sectors. Funding could be used for market research, building a prototype, or legal fees. The program will help students succeed in any enterprise, large or small, for-profit or not-for-profit, domestic or global. The students own the companies and the university expects no return other than seeing the companies take off. This is an idea we picked up from Tec de Monterrey, in Mexico, and we are incubating as many as eighty student-led companies right now.

Another systems innovation initiative with societal impact is ASU Technopolis, which brings together entrepreneurs, venture capitalists, and creative thinkers in the Phoenix

region. ASU Technopolis encourages innovation and economic development by providing fledgling technology and life sciences entrepreneurs with skills and strategies necessary to convert ideas into commercially viable businesses. Guidance is available for product development, business infrastructure development, proof-of-concept capital formation, revenue development, and access to funding. Technopolis stimulates economic development by offering a series of rigorous programs that educate, coach, and network local entrepreneurs. Through this program approximately five hundred early-stage companies have received coaching and mentoring, and they have raised about \$75 million in private investment capital.

It is not uncommon for universities to establish research parks, which begin as entrepreneurial ventures but often turn out to be more about real estate. To position metropolitan Phoenix and the state of Arizona as competitive in the global knowledge economy, we decided to reconceptualize the standard-issue academic research park and design a hub for knowledge-driven industries, technology innovation, and commercial activity. In collaboration with the City of Scottsdale and the ASU Foundation, ASU conceptualized and designed SkySong, named for an iconic shade structure that is the signature architectural element of the complex. Instead of just providing space for locally grown companies, we decided also to recruit large global and foreign-based companies that could engage in beneficial exchange with the university and its start-ups. SkySong is a \$500 million world-class assembly point for knowledge and technology research and commerce. With 1.5 million square feet of densely packed and creative educational, research, cultural, retail, and residential space, SkySong will be the nucleus for an entire open-ended community of entrepreneurs dedicated to innovation and learning.

An entrepreneurial university is highly networked. It has contacts and working alliances with entrepreneurs and industries, and with all sorts of individuals and groups concerned with innovation and growth. In some cases, new initiatives have been launched on an entrepreneurial basis – that is to say, they receive initial seed funding but beyond that they must raise or generate their own funds. But we have found that this model for an entrepreneurial university attracts investment from others. It is a model that invites wide-ranging participation and promises and delivers wide-ranging benefits. If an institution can put forth an entrepreneurial model of this type, individuals and corporations and foundations and governments will validate it by investing in the vision.

During the past six years we have raised and spent \$2 billion to advance the New American University design at ASU. During this period ASU has more than doubled its research expenditures, surpassing the \$300 million level for the first time in FY 2009.

During FY 2006 that figure first surpassed the \$200 million level. ASU is one of only a handful of major research universities without both an agricultural and medical school to have attained this distinction. Peer institutions in this category include Caltech, MIT, and Princeton. According to the National Science Foundation, ASU is now ranked among the top 20 leading research universities in the nation without a medical school, and for the third year ASU has been ranked as one of the top 100 universities globally in the international assessment of the Institute of Higher Education, Shanghai Jiao Tong University, placing 93rd in their 2008 “Academic Ranking of World Universities.”

The ecosystem of networked connectivity that we have produced, including seventeen different investment sources, creates many pathways for people to move ideas from conception to reality. Significant investment has come from individuals, corporations, and foundations that are inspired by our vision. Since 2002, for example, ASU has announced the eight largest gifts in institutional history. To advance entrepreneurship the Kauffman Foundation has given us a \$5 million grant, which we leveraged to attract another \$25 million in matching funds. Entities of regional government, with whom we had no prior financial relationships, have provided significant funding: \$233 million from the City of Phoenix for the establishment of our new downtown campus, and \$100 million from the city of Scottsdale for the establishment of SkySong. Investors from the private sector and venture capitalists have invested hundreds of millions of dollars to create endowments for venture funds or other initiatives or for particular schools and colleges. Altogether, in advancing this model, we have been able to generate about \$1.2 billion per year of new resources for the institution during the past six years. When all of the elements are working together one perceives a well-rounded “innovation infrastructure,” and the highly differentiated university becomes part of a larger “ecology of innovation.”

### **The ossification and failure of the standard model**

Just as various American industries have become ossified through their failure to adapt and innovate, it is all too commonplace for academic institutions to ossify. Industries become self-satisfied and complacent, oblivious to competition and other underlying and interrelated forces, and universities for the most part similarly rest on their laurels. With the population of the United States exceeding 303 million and projected to grow to 400 or 450 million within the present planning horizon, it is legitimate to ask where are the new universities being conceptualized and built to meet enrollment demand? What institutions have undertaken significant expansion? The answer is they are few and far between and certainly inadequate. With regard to intellectual adaptation and variation, we have developed the obsessive fixation that every institution must follow the same path and strive to become Harvard or Berkeley.

Relative to the scale of the United States the entire cadre of elite institutions like Harvard and Berkeley operate on a limited bandwidth of engagement. Their lack of impact derives in part from their lack of capacity to adapt in response to the needs of society at scale, and this is largely a question of access. This is to ask, then, where are all the engineers our nation requires going to come from, or the scientists or doctors or teachers? Inevitably they are going to come from the rank and file of American citizenry across all classes, yet where will so many students attend school in the numbers this nation urgently requires? The average public university in the United States has a negatively sloped graduation rate, yet no one seems to consider this alarming trend remarkable. As a consequence of lack of investment in “access” campuses we see insufficient innovation and an insufficiently diverse faculty and student body. Self-satisfaction leads to complacency and ossification, which leads to failure.

In contrast to the egalitarian model we are advancing that integrates academic excellence with access to a broad demographic, public policy throughout the nation perpetuates a tiered system that determines the lives of students according to arbitrary admissions criteria like class rankings and standardized test scores. While UCLA is one of the nation’s leading research universities, it limits admission to the upper 4 percent of graduating high school classes. In the 2006 freshman class of more than 4,800, UCLA admitted only 249 African American applicants, of whom only about one hundred enrolled. While the university has since made efforts to boost minority enrollment, given the ethnic and racial diversity of California and especially Los Angeles, such admissions practices represent a complete distortion. No more than eight miles from UCLA is Cal State Los Angeles. A few months ago I visited the two schools on the same day to juxtapose how it was that public policy could create one institution that was predominantly minority in one part of town while in another an institution that is largely Asian and white. I sought to contrast how policy could determine that one school would be heavily funded while another had labs teaching engineering that were outdated to say the least.

### **Toward more differentiated and responsible institutions**

With the global population projected to increase to 8.5 billion before mid-century, we face challenges of unimaginable complexity in terms of our collective standard of living, quality of life, and even success as a species. And of those 6.5 billion people living today, less than one in one hundred – less than one percent – has the equivalent of a college degree. In the world in which we live, with its dynamics and stresses and conflicts, I would argue that we are far from where we should be in terms of developing

even the most rudimentary infrastructure for education that is requisite if we are to address the challenges that will confront global society.

As we see look ahead to the next few decades, we must recognize that the institutional models we inherited from the nineteenth century will not instill in our graduates the drive and innovation required to meet the challenges of tomorrow. We must instead shape our universities to respond to the reality of the world and not according to some outmoded and irrelevant obeisance to tradition. If we are to maximize the immense potential of the human capital we produce, we must do all we can to ensure that our graduates are competitive. We need to make more of an effort to understand how to educate greater numbers of individuals successfully, but we must also educate students to be successful. Despite conventional wisdom or outright denial, this economic dimension to higher education is intrinsic to the societal mission of colleges and universities. Individuals deprived of higher education through the incapacity of society to assume responsibility for educating its citizens represent not only personal opportunity lost, but also the loss of societal economic prosperity. A lack of higher education is not only a personal loss; it is a loss for nations and the global economic system.

Conventional thinkers often tell me that our objectives cannot be accomplished because greatness is defined by the elite standards of the past. In other words, there is no alternative but to follow the pattern established by institutions such as Princeton and Berkeley and choose between excellence and access. Princeton and Berkeley are undeniably great institutions, but they epitomize the traditional model of excellence of another era and seemingly cannot respond to what our society needs going forward. If we persist with such traditional models how are we going to educate the tens of thousands of teachers and scientists and engineers that a megapolitan region of 8 million such as Phoenix will require? We must realize that we are no longer accommodating the societal requirements of colonial New England. We are confronting the scale and complexities of the twenty-first century in an emerging megapolitan in a nation beset by challenges and a world fraught with uncertainty.

Speaking here primarily from the perspective of the United States, we need new institutions, new designs, new structures, and new mechanisms for higher education. Research-grade universities are but one of a number of institutional types. They educate students in a milieu that advances discovery and innovation while contributing to the development of a highly skilled workforce and the diversification of the economy. While developing nations worldwide are investing strategically to educate their citizens for the new global knowledge economy, America's educational infrastructure remains dangerously underbuilt and undifferentiated. Little changed from the mid-twentieth

century and unable to accommodate projected enrollment demands at scale, America's colleges and universities require greater and not less diversification. While our nation urgently needs more research-intensive and research-active institutions, both public and private, it also needs more liberal arts colleges, four-year regional colleges, community colleges, technical institutes, and there is even a niche for for-profit institutions. Unique to comprehensive research-grade institutions like Arizona State University, however, is operation in a modality of immersive learning across all dimensions of human knowledge. Only in research-grade institutions is each and every faculty member in each discipline and emerging interdisciplinary arena responsible for discovery and the advancement of new knowledge. According to the tenets of the New American University, that new knowledge is destined to bring insight to the complex challenges associated with improving the human condition. The challenge, as I have said, is therefore about institutional design, about designing knowledge-producing enterprises that understand and respond to their constituents as well as the needs of global humanity.