

CHAPTER 19

Preparing the American University for 2030

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Although the university has existed as a social institution for almost a millennium, with each historical epoch it has been transformed in very profound ways. The scholasticism of early medieval universities, first appearing in Bologna and Paris, slowly gave way to the humanism of the Renaissance. The graduate universities appearing in early 19th century Germany (von Humboldt's University of Berlin) were animated by the freedom of the Enlightenment and the rigour of the scientific method. The Industrial Revolution in 19th America stimulated the commitment to education of the working class and the public engagement of the land-grant universities. The impact of campus research on national security during WWII and the ensuing Cold War created the paradigm of the contemporary research university during the late 20th century.

Although the impact of these changes has been assimilated and they now seem natural, at the time they involved a profound reassessment of the mission and structure of the university as an institution. But the pace of change in our world is accelerating, with the impact of rapidly evolving technology and changing demographics, and the impact of humankind on our planet. These will pose great challenges to our universities in the next few decades.

CHALLENGES OF TODAY

Developing a vision for the future of the American university is a challenging exercise, both because of the unusual size, breadth and complexity of our institutions, and because of the important leadership role they are expected to play for our society. Today we are challenged to adapt the university to a

post-industrial, knowledge-based society as our economies are steadily shifting from material- and labour-intensive products and processes to knowledge-intensive products and services. In this knowledge economy, where the key assets driving prosperity are intellectual capital, education has become a power political force, both nationally and on a global scale. The key technologies enabling the global knowledge economy, e.g. information technology, biotechnology and nanotechnology, all evolve at an exponential pace, and are also reshaping the learning and scholarship on our campuses.

Our universities are also challenged by the rapidly changing nature of our population as our current population ages, similar to other developed nations in Europe and Asia. Yet here the United States stands apart because of a second and equally profound demographic trend: immigration. As it has been so many times in its past, America is once again becoming a highly diverse nation of immigrants, benefiting immensely from their energy, talents and hope. Yet, while of great value, this increasing diversity of our population is complicated by social and political factors such as prejudice and segregation.

Added to these broad changes in our world and nation are specific challenges currently faced by American higher education. Today much of the earlier commitment of public funds that built our great research universities in the 20th century has eroded. Over the past decade, state support of our public universities has dropped by roughly 35%. After a brief surge in federal support of research during the late 1990s, both federal and corporate support of basic and applied research has fallen significantly in recent years, while fields such as the social sciences have been savaged by conservative political forces. And, perhaps most telling of all, the inequities characterizing educational opportunity have become extraordinary. Today most of those responsible for public policy at both the federal level and among the states have ignored the public good character of higher education. Instead, and in sharp contrast to most of the rest of the world, most Americans view a college education primarily as a private benefit for individuals aimed at providing them with good jobs. Hence it is accepted that their education should be paid for through student fees, and increasingly funded through personal debt, rather than through public investment. (Holliday, 2012)

While most nations are facing — or at least coping with — the ongoing challenges of massification, academic competition and limited public resources, culture, tradition and local politics shape their particular approach. Because of our origin as a federation of independent colonies (and then states), the United States continues to rely on a highly decentralized, market-driven approach to higher education, with little strategic direction from the federal government. In fact, with the recent change in our federal government in 2017, education has not only dropped low on the list of nation priorities, but it has come under attack because of its efforts to sustain the important academic values such as truth, evidence and the scientific method that undergird its learning and scholarship.

THE WORLD OF 2030

Demographics

Demographers project that global population will continue to increase for several more decades, rising to 8.5 billion in 2030, then 9.7 billion in 2050 and 11 billion in 2100. Growth will be limited in developed nations in Europe, Asia and North America where aging populations and depressed fertility rates are likely to lead to declining populations (with the notable exception of the United States with its unusually high immigration rate).

In sharp contrast, developing nations in Asia, Latin America and particularly Africa (where population is likely to double) will be characterized by young and growing populations with exploding needs for education. Unless developed nations step forward and help address this crisis, billions of people in coming generations will be denied the education so necessary to compete and survive in the knowledge economy. The resulting despair and hopelessness among the young will feed the terrorism that so threatens our world today.

But there is another important demographic trend: the lengthening of human lifespan driven by the progress of biomedical science, particularly in developed nations. Those in today's Millennial generation (those born between 1980 and 1995) have an expected lifespan into their 90s, while today's young children have a 50% chance to live to 100 or longer (Gratton, 2016). While certainly encouraging from a public health perspective, the downside is the fact that even prosperous societies will simply be unable to afford supporting decades of retirement beyond the age of 70. Longer lives will require more years of work. Yet it is also clear that an education received in one's youth will likely not be sufficient to sustain employment 50 years later. Hence lifelong education and continually retraining will become essential, and this will pose new challenges to higher education. (*The Economist, Lifelong Education*, 2017)

Technology

The technologies of today — cyberinfrastructure, big data, artificial intelligence, clouds and soon quantum computing — have the disruptive feature that they continue to grow in power at exponential rates, increasing 100 to 1,000-fold each decade (Kelly, 2016). The rapid evolution of digital technology not only accelerates conventional economic activity, but it creates entirely new ventures such as social media, virtual and augmented reality, intelligent agents (Siri and Alexa) and sophisticated data management and access (*The Economist, Technology Quarterly*, 2017). Furthermore, as the technology continues to evolve, so too do the ambitions of those organizations that exploit it such as Google (to make available all the world's knowledge to

all people), Facebook (to connect all the people of the world) and Amazon (an everything, everywhere store).

While such technologies have had great positive impact on our lives, they also threaten our current activities. For example, increasing power of AI clouds, the Internet of Things and other automation technologies are transforming our economy (what Schwab calls the Fourth Industrial Revolution) (Schwab, 2016), eliminating more routine jobs in fields such as construction, manufacturing and services. More generally, there is a strong concentration of wealth driven by the new technologies, since the return on capital and technology is greater than for labour, leading to not only jobless economic growth but also increasing income disparities. In fact, some suggest that in a future that may have only 20% of today's jobs, the real challenge will become how to create meaningful lives in a world with rapidly increasing machine intelligence. (*The Economist, On Artificial Intelligence*, 2016) With our current education system, most citizens will not have the skills for the new jobs. Of course, we might argue that there will always likely be some jobs that can be performed better by humans than AI systems, particularly those involving empathy or social interaction. In fact, one might suggest that such "human traits" should be given a much higher priority in learning organizations such as universities.

Today, a rapidly changing world demands a new level of knowledge, skills and abilities on the part of our citizens. Just as in earlier critical moments in history when our prosperity and security were achieved through broadening and enhancing educational opportunity, it is time once again to seek a bold expansion of educational opportunity. But this time we should set as the goal providing all citizens with universal access to lifelong learning opportunities, thereby enabling participation in a world both illuminated and driven by knowledge and learning.

CREATIVITY, COMMUNICATION AND CONVERGENCE

The professions that have dominated the late 20th Century — and, to some degree, the contemporary university — have been those which manipulate and rearrange knowledge and wealth rather than create it, professions such as law, business, accounting and politics. Yet, it is becoming increasingly clear that the driving intellectual activity of the 21st Century will be the act of creation itself.

We now have the capacity to create new objects literally atom by atom. With new methods in molecular biology such as CRISPR/cas9 and gene drive, we can not only precisely modify the DNA code for a living organism, but we can actually cause it to propagate through a species to change future

generations (a frightening thought when human gene editing is considered) (Baltimore, 2015). The dramatic pace of evolution of information technology shows no sign of slowing, continuing to advance in power from 100 to 1000-fold a decade, enabling not only new forms of analysis such as augmenting the traditional tools of experiment and theory with the sophisticated tools of data analysis (big data). Indeed, the tools of artificial intelligence not only are rapidly progressing, but they have stimulated fears of eventual sentient behaviour of machines.

Already we are seeing the spontaneous emergence of new forms of creative activities, e.g., the “maker” fairs providing opportunities to showcase forms of artistic, recreational and commercial activity; the use of “additive manufacturing” to build new products and processes atomic layer by atomic layer; and the growing use of the “app” culture to empower an immense marketplace of small software development companies. In fact, some suggest that our civilization may experience a renaissance-like awakening of creative activities in the 21st century similar to that occurring in 16th century Europe.

The determining characteristic of the university of the 21st Century may be a shift in intellectual focus, from the preservation or transmission of knowledge, to the process of creativity itself. If so, then the vision for the university of 2030 should stress characteristics such as creativity, innovation, ingenuity and invention, and entrepreneurial zeal. But here lies a great challenge. While universities are experienced in teaching the skills of analysis, we have far less understanding of the intellectual activities associated with creativity. In fact, the current disciplinary culture of our campuses sometimes discriminates against those who are truly creative and do not fit well into our stereotypes of students and faculty.

Yet another feature of our information-rich society is our capacity for communication. The internet and related technologies such as smartphones and cloud computing make it cheap and easy not only to communicate but also to collect, store and analyse immense quantities of information. But, while facilitating communication and communities, such technology also has its downside. Always on, always used communication consumes the attention of individuals. Indeed, this attention is the valuable commodity needed by advertisers that actually funds these communications networks.

Finally, the very structure of knowledge is continuing to shift as fields such as biology, physics, mathematics and the social sciences are converging. (Sharp, 2014) Today physicists and engineers have as much impact on the evolution of biological science as biologists do on chemistry and computer technology (e.g. the deep learning algorithms derived from neural networks). The emergence of convergence (or consilience, as E. O. Wilson would term it) is challenging the disciplinary fragmentation of the University into departments, schools and colleges.

Any vision proposed for the university in 2030 must consider the extraordinary changes and uncertainties of a future driven by exponentially evolving information and communications technology. The extraordinary connectivity provided by the Internet already links together the majority of the world's population. To this, one can add the emerging capacity to capture and distribute the accumulated knowledge of our civilization in digital form and provide opportunities for learning through new paradigms such as MOOCs and AI cognitive tutors. This suggests the possible emergence of a new global society no longer constrained by space, time, monopoly or archaic laws and, instead, even more dependent upon the generation of new knowledge and the education of world citizens. In such an era of rapid change, it has become the responsibility of democratic societies to provide their citizens with the learning opportunities they need throughout their lives, at costs they can afford, as a right rather than a privilege (Germano, 2010).

SOCIAL AND POLITICAL CHANGE

Even as our world becomes increasingly dependent upon knowledge, the very technology that is key to creating, archiving and making available knowledge is ironically being used to attack and undermine it. In the Trump era, social media not only has become a powerful tool of American politics, but it provides the capacity to distort knowledge and truth, the “alt-truth” phenomenon that allows a tidal wave of anger built on the social media Twitter to not only win a presidential election, but to build a powerful, almost mythological force capable of challenging the evidence-based truth critical to a democracy (Brooks, 2017). While counterforces such as Wikipedia and digital libraries were thought of as power technologies capable of distributing facts and truth, the worry today is that the alt-truth deluge from social media may in fact be eroding American democracy (*The Economist, Technology and Politics*, 2016).

Xenophobic and racist energy creates a hostile electorate that is not only unwilling to accept truth established by evidence, but has largely abandoned the scientific method (with only 25% of Americans now expressing confidence in scientific discovery) (Miller, 2016). Both parents and young people are beginning to question the value of higher education. Indeed, one wealthy billionaire is even trying to bribe students not to go to college.

Policy-makers, determined to serve their “populist” constituencies, are erecting barriers to higher education based on race and class. Nearly two decades into our new century, there are unmistakable signs that America's fabled social mobility is in trouble — perhaps even in serious trouble. “We are faced with a challenge to liberalism by populists who are challenging the ideas of

freedom, equality, human rights, representative democracy and globalization with our current post-truth age in which expertise on matters such as climate change is rubbished and institutions are deemed untrustworthy.” (Gitlin, 2017)

Broader Challenges

Over the longer term there is compelling evidence that the growing population and invasive activities of humankind are now altering the fragile balance of our planet. The concerns are multiplying in number and intensifying in severity: the destruction of forests, wetlands and other natural habitats by human activity, the extinction of millions of species and the loss of biodiversity; the buildup of greenhouse gases and their impact on global climates; the pollution of our air, water and land. We must find new ways to provide for a human society that presently has outstripped the limits of global sustainability.

Of comparable concern are the widening gaps in prosperity, health and quality of life characterizing developed, developing and underdeveloped regions. To be sure, there are some signs of optimism: a slowing population growth that may stabilize during the 21st century, technological advances such as the “green revolution” that have fed much of the world, and the rapid growth of developing economies in Asia and Latin America. Yet it is estimated that one-sixth of the world’s population still live in extreme poverty, suffering from diseases such as malaria, tuberculosis, AIDS, diarrhoea and others that prey on bodies weakened by chronic hunger, claiming more than 20,000 lives daily. These global needs can only be addressed by the commitment of developed nations and the implementation of technology to alleviate poverty and disease.

There are other possibilities that might be considered for the longer-term future. Balancing population growth in some parts of the world might be new pandemics, such as AIDS or an avian flu virus, that appear out of nowhere to ravage our species. The growing divide between rich and poor, the developed nations and the third world, the North and South hemispheres, could drive even more serious social unrest and terrorism, perhaps armed with even more terrifying weapons.

Technology could present new challenges that seem almost taken from the pages of science fiction. Clearly if digital technology continues to evolve at its current pace for the next decade, creating machines a thousand, a million, a billion times more powerful than those which are so dominating our world today, then phenomena such as the emergence of machine consciousness and intelligence become very real possibilities during this century. In fact, some even suggest that we could encounter a “technological singularity”, a point at which technology begins to accelerate so rapidly (for example, as intelligent

machines develop even more intelligent machines) that we lose not only the ability to control but even to predict the future.

Clearly phenomena such as machine consciousness, contact by extraterrestrial intelligence, or cosmic extinction from a wandering asteroid are possibilities for our civilization, but just as clearly they should neither dominate our attention nor our near-term actions. More generally, it is clear that as the pace of change continues to accelerate, learning organizations and innovation systems will need to become highly adaptive if they are to survive. Here, we might best think of future learning and innovation environments as ecologies that not only adapt but also mutate and evolve to serve an ever-changing world.

We cannot predict these things...but we can make sure that our descendants are equipped with the education and skills to handle them!

HOW DO WE LEAD OUR UNIVERSITIES TO 2030?

As many leaders in higher education have come to realize, our changing environment requires a far more strategic approach to the evolution of our institutions at all levels. It is critical for higher education to give thoughtful attention to the design of institutional processes for planning, management, leadership and governance. The ability of universities to adapt successfully to the profound changes occurring in our society will depend a great deal on their collective ability to develop and execute appropriate strategies. Key is the recognition that in a rapidly changing environment, it is important to develop a planning process that is not only capable of adapting to changing conditions, but to some degree capable of modifying the environment in which the university will find itself in the decades ahead. We must seek a progressive, flexible and adaptive process, capable of responding to a dynamic environment and an uncertain — indeed, unknowable — future.

But, today, incremental change based on traditional, well-understood paradigms may be the most dangerous course of all, because those paradigms may simply not be adequate to adapt to a future of change. If the status quo is no longer an option, if the existing paradigms are no longer viable, then transformation becomes the wisest course. While universities have always successfully managed the balance between preserving and propagating the fundamental knowledge sustaining our cultures and civilizations and not only adapting to but actually creating the paradigm shifts that drive change, the time scales characterizing these roles are becoming ever shorter. The centuries it took for earlier forms of learning as scholasticism to humanism and enlightenment to evolve contracted to decades for the industrial revolution and globalization and now have been compressed to a generation or less for

the age of knowledge as the technologies of our times now evolve at an exponential pace. Put another way, during the transition from Generation X to the Millennials, info-, bio- and nano-technology have increased in power a million-fold and will do so yet again with Generation Z.

To succeed, we strive for a more flexible culture, one more accepting of occasional failure as the unavoidable corollary to any ambitious effort. We must learn to adapt quickly while retaining the values and goals that give us a sense of mission and community. Many view the current rigid and hierarchical structure of the university as obsolete. To advance, we must discover ways to draw upon the unique and vibrant creativity of every member of our community. Our challenge is to tap the great source of creativity and energy of outstanding faculty, students and staff, working at the grassroots level of the academic enterprise of the University in a way that preserves our fundamental missions, characteristics, and values.

The American University, Circa 2030...and Beyond

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

Imagine the linking together of billions of people with limitless access to knowledge and learning tools enabled by a rapidly evolving scaffolding of cyberinfrastructure, which increases in power one-hundred to one thousand-fold every decade. This hive-like culture will not only challenge existing social institutions such as corporations, universities, nation states, which have depended upon the constraints of space, time, laws and monopoly. But it will enable the spontaneous emergence of new social structures as yet unimagined — just think of the early denizens of the Internet such as Google, Facebook, Amazon...In fact, we may be on the threshold of the emergence of a new form of civilization, as billions of world citizens interact together, unconstrained by today's monopolies on knowledge or learning opportunities.

Perhaps this, then, is the most exciting vision for the future of knowledge and learning organizations such as the university, no longer constrained by space, time, monopoly or archaic laws, but rather responsive to the needs of a global, knowledge society and unleashed by technology to empower and serve all of humankind. And all of this is likely to happen during the lives of today's students. These possibilities must inform and shape the manner in which we view, support and lead higher education. Now is not the time to back into the future.

Yet we also might remember a quote from the 2009 Glion Declaration:

“For a thousand years the university has benefited our civilization as a learning community where both the young and the experienced could acquire not only knowledge and skills but also the values and discipline of the educated mind. It has defended and propagated our cultural and intellectual heritage, while challenging our norms and beliefs. The university of the twenty-first century may be as different from today’s institutions as the research university is from the colonial college. But its form and its continued evolution will be a consequence of transformations necessary to provide its ancient values and contributions to a changing world” (Rhodes, 2009).

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