



## AMERICAN RESEARCH UNIVERSITIES DURING THE LONG TWILIGHT OF THE STONE AGE

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AMERICAN UNIVERSITIES ARE THE PREEMINENT teaching and discovery organizations in the world. These institutions play a key role in ensuring that as a nation we will continue to lead the world in innovation, maintain our competitive advantage, and weave the fabric of our economic prosperity. They perform functions essential to our collective survival as a species. But although our universities have been transformational catalysts for societal advancement, academic culture has remained fundamentally unaltered since the nineteenth century. Given the inability of our institutions to address the escalating complexity of our relationship with the planet, one could make the case that our universities are actually mired in the Stone Age. And if you extrapolate further and stop to consider the lack of vision and planning and inherent limitations in our national science and technology policy, I would conclude that as a species we seem to be still living in the final decades of the Stone Age.

During this long twilight of the Stone Age we continue to conduct our Stone Age practices with perfect complacency. We continue to extract dark substances in both liquid and solid forms from the remains of prehistoric plants and animals that we dig up from holes in the ground, and we deliver these treasures to primitive machines for combustion to maintain the energy system

on which we base our entire civilization. We secure these resources only to burn them and, when necessary, we send soldiers across the globe to ensure our ability to continue to secure these resources. Our Stone Age institutions conduct research to discover new ways to extract energy from these resources or to create new chemicals to replace them.

Since the middle of the nineteenth century, these Stone Age universities have led scientific advance and technological innovation that has put over seventy thousand new synthetic chemicals into our ecosystem, and allowed 20 percent of the planet's bird species to be driven into extinction and 50 percent of all freshwater runoff to be consumed. On their watch, the sediment load of rivers has increased fivefold, and more than two-thirds of the major marine fisheries on the planet have been fully exploited or depleted. It is a crude system of immense complexity that is placing our entire planet under heavy stress.

Our universities are not doing anything fundamentally different than what human societies have been doing for the past ten thousand years. Like the human societies that they reflect, universities have typically perpetuated rigid social constructs that make them argumentative, selfish, and egotistical, manifesting hubris on a grand scale. Our

universities remain highly static, resistant to change, unwilling to evolve in pace with real time, focusing on their advancement of Stone Age technologies. In some institutions or within certain disciplines, the tools for change do not even exist, and the value of an investment whose benefits will be manifest a century down the road is discounted to nothing, skewing decision-making.

But, of course, to be fair, our institutions reflect our human limitations. And despite our best intentions, our actions are consistent with a global economy predicated on the expectation of continued growth and development derived from ever-increasing resource exploitation. Thus, for example, when we drive to campus we do not intend to exacerbate the trade deficit and pump greenhouse gases into the atmosphere.

With a global population of 6.5 billion projected to increase to 8.5 billion by mid-century, we face challenges of unimaginable complexity, both as a species, and, more narrowly, in terms of our standard of living and quality of life as a nation. But in our national policymaking and planning, and in our daily lives, we strive to deny complexity. And in our educational enterprises, rather than learning to understand and manage complexity, we continue to restrict our focus with ever-greater specialization and the narrowing of disciplines. The organizational frameworks we call universities have not been designed to accommodate change on the scale we are witnessing, or the attendant accelerating increases in complexity.

Sustainability is a term so easily applied to so many things that we constantly risk diluting its power as a concept, but I would argue that it represents nothing less than a reconceptualization of our relationship with both the planet and the collective of society. The task for scholars and administrators in our nation's colleges and universities is to register the significance of sustainability, and to consider how best to refigure their institutions to accommodate and advance the new transdisciplinary teaching and research so critical to our collective well-being.

In order for our universities to lead us out of the Stone Age, sustainability must become a new organizing principle, both organizationally and conceptually. Some institutions, like the University of Colorado at Boulder, are beacons of light because their administration and faculty and students recognize the importance of innovation and adaptation. The example set by institutions like CU-Boulder demonstrates that change is

possible. So I would argue that now is the right moment for all of our institutions to seriously rethink their design. American research universities need not remain the static monolithic behemoths they have always been, unwilling or unable to advance their own institutional evolution or to catalyze positive societal transformation.

AT ARIZONA STATE UNIVERSITY WE HAVE ALSO made an institutional commitment to sustainability, and further embraced the objective of rethinking the American research university. We call this new paradigm the "New American University," and it is predicated on a set of eight "design aspirations." Reduced to their essential terms, these enjoin the university community to (1) embrace the cultural, socioeconomic, and physical setting of the institution; (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 setting of intellectual and cultural diversity; (6) transcend disciplinary limitations in pursuit of an ideal of intellectual fusion; (7) socially embed the university, thereby advancing social enterprise development through direct engagement; and (8) advance the global engagement of the university. Taken together, these design principles comprise a paradigm for academic institutions, both public and private, that might yet allow us to move beyond the Stone Age.

The design aspirations call for fundamental change in our academic culture. The Stone Age university has generated scientific knowledge without asking what purpose that knowledge will serve, and it has allowed policy and decision makers to use that knowledge unchecked. We have traditionally believed that knowledge is best when it is driven by curiosity and serves no higher purpose, when we should have been fostering use-inspired scholarship and addressing the challenges that confront humanity. We must encourage intellectual fusion and create transdisciplinary knowledge that solves real-world problems, and not simply isolate ourselves to produce knowledge for the sake of knowledge itself. And we must no longer allow our universities to remain aloof from their communities. Our academic culture has an obligation to facilitate social transformation—to serve as responsible knowledge entrepreneurs.

At ASU these design principles undergird our institutional commitment to sustainability. And we have restructured our academic organization towards that end as well. We have established the Global Institute of Sustainability (GIOS), a university-wide network organization with over

five hundred faculty members involved in different aspects of education and research. We have launched the School of Sustainability, which currently offers masters' and Ph.D. degrees in sustainability, and which will soon be offering undergraduate degrees as well. We are committed to institutionalizing sustainable practices and building only energy efficient LEED-certified buildings.

The Biodesign Institute at Arizona State University, one of many new cutting-edge interdisciplinary schools and institutes working at the frontiers of knowledge, is explicitly committed to sustainability. Biodesign is biologically inspired design, or bio-inspired engineering, and seeks to mimic and harness the wonderful elegance of natural processes to confront specific challenges, with a focus on preventing and curing disease, overcoming the pain and limitations of injury, renewing and sustaining our environment, and securing a safer world. In a perfect exemplar of intellectual fusion, to accelerate the pace of discovery the institute merges formerly distinct fields of research, including biology, chemistry, physics, medicine, agriculture, environmental science, electronics, materials, and computing.

Sprawling across the fragile semi-arid Sonoran desert in a region where the natural ecosystem cannot sustain its continued growth, metropolitan Phoenix seems like a poster child for unsustainable urbanization. But Phoenix is by no means the only human settlement that lacks sustainability. The boroughs of New York City crowd on islands that have limited local sources of fresh water. New Orleans, with its probability for flooding and high costs associated with attempting to protect it, provides another example. We have met the enemy and he is us. But rather than issue recriminations for our lack of foresight in allowing modest settlements to become sprawling urban agglomerations, ASU has taken on the task of advancing urban sustainability with such initiatives as the Decision Theater and the Decision Center for a Desert City.

The concept of sustainability is sometimes mistakenly equated with an exclusive focus on the environment. But sustainability also means adaptation to competition in our new global knowledge economy. Universities are the primary source of the knowledge and innovation that has driven our economy and provided us with the standard of living that we have come to take for granted. If as a nation we are to prosper and continue to lead the world in innovation, thereby maintaining our quality of life, our universities must produce skilled workers. The wage gap between those with education and skills and those without continues to widen. Education is the means by which a skilled workforce is produced and the source of

economic growth and advances in society, for the benefit of both the individual and the collective.

For too long our great universities, both public and private, have been exclusive—that is to say, defining their excellence based on exclusion. At present they engage relatively small numbers of individuals in a very structured learning process. But universities must stop focusing on their own needs, and the compulsion to advance knowledge for the sake of knowledge, and start thinking about what everyone else needs. We must start thinking about what outcomes the institution can support by meeting those needs. The role of the university must be broader than the generation of scientific knowledge. Policy decisions require more than just science. Universities must lead the way in discerning linkages between science and decision-making. We must bring stakeholders to the table to discuss our collective survival.

The Stone Age University has fostered the assumption that science for the sake of science is sufficient. But science without purpose is an immoral act. Science without purpose disadvantages those who should benefit most—those who do not themselves have the means to generate knowledge. We must no longer ask students to seek scientific knowledge for the sake of knowledge itself. We must recognize our responsibility to use the knowledge we advance for the good of society. We must ensure that scientific and technological change in the coming decades lead to equitable societal benefit and contribute to global economic, environmental, and civic sustainability.

**U**NLESS WE RETHINK OUR INSTITUTIONS AND embrace sustainability as a new organizing principle, our universities will be as removed from the frontlines of change as the most remote monasteries. It is time for universities to recognize their moral responsibilities, both for the knowledge they produce and to the communities in which they exist. It is time for our institutions to come out of the Stone Age.