ARIZONA STATE UNIVERSITY

INNOVATIVE WAYS THE U.S. CAN MAXIMIZE RETURNS ON FULL GLOBAL ENGAGEMENT: THE PERSPECTIVE OF AMERICAN RESEARCH UNIVERSITIES

Michael M. Crow
President, Arizona State University

National Academies Government-University-Industry Research Roundtable (GUIRR):
"Maximizing U.S. Returns on Shared Knowledge: Innovative Frameworks for Technology Transfer and Full Global Engagement"
National Academies
Washington, DC
June 3, 2009

Arizona State University is frequently characterized as a "case study" because we are a new university—at once the nation's youngest and largest major research institution—competing in an arena dominated by some of the most well-established and influential institutions in the world. Moreover, we are situated in the heart of an emerging metropolitan region undergoing explosive population growth and unprecedented demographic stresses. Some institutions might perceive case study status as problematic, but in our case the designation is not only appropriate but entirely welcome because through our reconceptualization we have deliberately positioned ourselves as an experiment in higher education at scale. We have assumed the task of pioneering the foundational model for what we term the "New American University"—an egalitarian institution committed to academic excellence, inclusiveness to a broad demographic, and maximum societal impact.

With a population that already exceeds four million, metropolitan Phoenix is currently half the size of metropolitan Chicago. But within the planning horizon of the next several decades, the population of the metropolitan region will exceed eight million according to some estimates, at which point it will have become slightly larger than metropolitan Chicago. And while Maricopa County has the same population as the entire state of Colorado, for example, it is home to only one comprehensive public baccalaureate-granting institution. There is no Stanford or Case Western in Arizona. Nobody came along to build a great private institution, so as the sole comprehensive research university in metropolitan Phoenix we have had to assume a very broad mission.

While we are committed to what we term "social embeddedness" and encourage teaching and research that addresses solutions to local and regional problems, an

equally important aspect of our mission is global engagement. From the case study perspective, our basic approach has two principal dimensions. Like most major institutions, we attempt to foster an environment conducive to maximum free collaboration between our faculty and researchers throughout the world who happen to be working on the same topic, and this takes place in the midst of all the complexity associated with trade laws and national security issues. Within that context we strive to facilitate that scholarly and scientific exchange at its fullest possible level under the assumption that it benefits science, technology development, and the relationships the United States conducts with other countries. We have set certain targets and had a 35 percent increase in international students last year. Once the logjam was broken up, as the Bush administration improved its policies, we observed an enormous influx of international students, and in terms of institutions with students from abroad we are now in the top five among universities for students from China, top two for students from India, top three for students from Korea, top two for students from Mexico, and the rest of the list follows accordingly.

In addition to promoting scholarly and scientific exchange we advance global engagement through what we loosely term mutual or reciprocal learning opportunities. Our approach is to seek collaboration and exchange throughout the nation and abroad that produces reciprocal knowledge and mutual benefits to multiple institutions. Unlike other universities that establish outreach programs in such areas as agriculture or even launch medical schools or business schools abroad—Cornell, for example, has set up a medical school in Qatar and the University of Chicago a business school in Singapore—we have taken a different approach.

Through mutual learning our objective is to identify problems that participating institutions can address together. We do not approach global engagement from the perspective of something to sell. We do not market our programs for international placement or international investment, nor do we seek funding from foreign governments to establish ASU centers abroad. We do not seek alliances intended to generate cash for the mothership institutions. We approach global engagement from the perspective of mutual problems and the opportunity to address these problems collaboratively.

ASU is advancing a number of productive relationships with the Mexican government and various municipalities such as the city of Monterrey in the state of Nuevo Leon. We have evolved an elaborate relationship with Tec de Monterrey, a major private institution with multiple campuses in the northern states of Mexico. In the case of our relationship with the city of Monterrey, we have launched initiatives that can be mutually beneficial to the United States, Mexico, and Latin America. One of those initiatives involves a spin-off company in construction technology and management that offers expertise, educational content, and course materials. Because we confront problems and issues with governments on both sides of the border, whenever possible

we advance our initiatives directly through the entities themselves.

In China we are advancing a joint institute on bio-energy in Inner Mongolia. Through the team we have put on the ground and with the millions of dollars in funding we have received from the Chinese government, we are tackling an interrelated cluster of problems in which we share an intense mutual interest. Derivative of agricultural overuse, which is in part a cultural issue, Inner Mongolia has a grassland management problem. Derivative of particulate matter distribution consistent with dustbowl formation, Inner Mongolia has an air pollution problem. At the same time the region is negotiating the challenges associated with the development of renewable energy. All of these problems are of immense interest to some of our faculty and our engagement is at once joint field project and joint technology development. Our engagement differs from the green revolution projects of past decades in which American technology and know-how would have been brought to bear on some isolated agricultural issue. Because we do not have a school of agriculture or a school of medicine, we are advancing this project through faculty teams affiliated with one or more of our unique and differentiated schools and research centers, including scholars from the life sciences, engineering, social sciences, anthropology, and other areas, matched person for person with Chinese counterparts all working as a unified team. In China we are confronted with a host of complexities originating from the regional government, the local Communist party officials who do not always share the same view as the funding source, which in this case was primarily the Chinese National Science Foundation as well as some corporate investors.

Meanwhile in Turkey we have undertaken an initiative to train 200,000 teachers. Turkey has advanced its literacy rate remarkably, from below 30 percent in 1970 to a present rate of 90 percent. While elevating the general ability of the population, the nation now confronts the serious problem of having only roughly 1 percent of the population able to go on to college. So they have serious difficulties in secondary education and serious issues in terms of how to approach teacher training. In Arizona we are also struggling with declining high school graduation rates, K-12 performance problems, and the development of technology platforms. Turkey has private sector companies trying to accomplish these same things, as well as some public sector funding and potential investment from the World Bank. So in this case what we have is a mutual problem. How do you develop a multicultural, multilingual, teacher training capability that can deal with large numbers of people rapidly? In their case they need 200,000 additional teachers, and then 20,000 more per year thereafter. So with investment from private sector companies and the Turkish government we have entered into a joint teacher education curriculum development project. We have a team of people in Ankara and two of these Turkish companies have set up offices in SkySong, our global innovation center in Scottsdale. In this case global engagement has brought an American university together with American and Turkish companies and a Turkish ministry to produce a specified outcome.

Our W. P. Carey School of Business is a top-25 business school with an enrollment of ten thousand students but we also operate a business school in Shanghai, designed in cooperation with the Ministry of Finance, in Beijing. The Ministry of Finance determined several years ago that mid-level executives in the government required higher levels of educational attainment, so working in coordination with the Shanghai National Accounting Institute we developed and deployed an MBA-granting business school which produces roughly seventy-five graduating executives each year. The school offers a full-time curriculum taught in Chinese and draws faculty from American universities, principally from ASU and Stanford, as well as a number of Chinese institutions.

In Australia we are working with Monash University, their largest university and one that faces problems similar to ASU. Some American universities, like ASU and the University of Maryland, for example, remain egalitarian in their admissions requirements, and by that I mean that if a student is qualified to do college-level work we find a way for him or her to be admitted. You may recall that President Obama has called for all Americans to graduate from high school and for our nation to claim the highest percentage of college graduates in the world by 2020. The college-going rate for qualified students in America, however, is far off that mark and this is the case in Australia as well, both among the indigenous and non-indigenous populations. As a function of their decreasing college-going rate, their national competitiveness is in decline. In response ASU and Monash University are addressing the question of how to enhance college attendance among students with high academic ability from the less advantaged sectors of society—largely the lower middle and middle classes. Many of you may not know that according to recent research the chance of a person of high academic ability from the lowest income levels graduating from college in the United States is the same as a person of the lowest academic ability from a high income family—only about 15 percent. It is an unbelievable tragedy and Monash, working with the Australian government, has entered into reciprocal engagement with ASU. We are working together to develop a program that will be simultaneously deployed, first in Australia, then in the United States, and afterward in other parts of the world wherever the platform would be beneficial.

The United Arab Emirates, specifically Dubai and Abu Dhabi, are located in climatic regions similar to Arizona, and through the decades, owing no doubt in part to similarities in our respective climates, we have educated thousands of UAE citizens. While in this context we thus enjoy an automatic entrée to the region, we are not taking a standard approach to our engagement. When we were asked to consider building a campus in the Emirates, an approach taken by a number of American universities, we determined that it would be more productive to collaborate in an effort to solve important problems of mutual concern. On our Tempe campus we had developed a facility termed the Decision Theater for the presentation of immersive, three-

dimensional scientific visualizations of complex multivariate relationships based on actual environmental data and modeling results. Because the Gulf region is negotiating so many political, military, and environmental complexities and stresses, visiting researchers from the Emirates immediately seized on the potential for modeling the consequences of various policy approaches to such concerns as water. We considered the potential of leveraging research from two such interconnected facilities aligned to explore a broad spectrum of planning, from the environmental to the military. We signed an agreement to advance the second center, which we are calling the Regional Decision Center for the Gulf States. The new center represents yet another example of the reciprocity that characterizes our global engagement.

One of the projects advanced by the Decision Theater and funded four years ago by the National Science Foundation is called the Decision Center for a Desert City (DCDC). Of mutual concern for both Arizona and the Emirates is use of the facility to optimize decision-making relative to water. With the population of Arizona projected to increase from the current 6.7 million to ten or eleven or twelve million, it would be disastrous to base allocation models on politics. We have found ways to integrate scientific modeling, political decision-making, and uncertainty about factors like climate change into interactive simulations. The eighteen water authorities that participate in the project concur in the opinion that through the use of the Decision Theater, the potential exists to arrive at more informed decisions at every level. We offer fifty-eight physical science models of climate for the Colorado River basin, models for underground water retention in Arizona, and two-dozen scenarios for social, economic, and political impacts. It is possible to model for more agriculture, less agriculture, more conservation, less conservation, more climate change, less climate change—and such enhanced decision-making makes possible rational decisions about whether or not capacity limits should be put into place, for example, or whether or not to install what is called triple plumbing, where all water is reused.

For the past twenty-five to thirty years, the economy of Arizona has been predicated on the potential for housing to replace agriculture, yet agriculture uses five times more water per acre than do occupants of housing developments. As a consequence, with population growth in metropolitan Phoenix water consumption has declined since 1980. Our net water consumption is 15 percent less now than it was then because agriculture has been replaced by housing. But as the built environment increasingly encroaches into virgin desert, we see a very different scenario. We are trying to provide informed decision-making derived from interaction between physical scientists and social scientists who in turn talk to decision-makers in the political sphere.

Our global engagement efforts sometimes yield unintended consequences, as was the case when outreach efforts in China related to space exploration may have come under some funding agency scrutiny. Consistent with our stature in planetary science and space exploration, ASU has contributed instrumentation on all of the solar system

exploration craft and on-the-ground devices deployed in recent years and we are one of ten institutions most heavily funded by NASA. At a point when we had just won management of the mission to Europa and established our new School of Earth and Space Exploration (SESE), we sought to share our expertise and bring an international dimension to the school in a series of exhibits at the national science and technology fair in Beijing. The event was attended by more than 750,000 and we found ourselves on the front page of every newspaper in China, but immediately afterward began to encounter roadblocks from NASA regarding continued funding of proposals. To this day we are not quite sure whether in seeking to be buddies across borders we had overstepped some implicit understanding. Our principal investigators followed up, and we look back on this episode as a cautionary tale regarding the need for clarification.

For us the primary issue is focusing on and searching for initiatives that offer the potential for reciprocity and mutual learning. That is the basis by which we determine whether or not to advance on an initiative. Advancing global engagement has required us to stay disciplined, and during the past few years we have devoted substantially increased resources to the process. We have scouts out and about looking for these problems but we do not control faculty members who are free to advance within the rules on their own. It is likely that our next problem of some scale, for example, will involve national responses to the failure of climate change forecasting. We are expecting an invitation to work with the government of the Republic of Viet Nam not on climate forecasting, because we already know climates are going to change, and not on whether or not CO_2 is going to drive climate change, because we just assume it will. Instead we are being asked to explore the problem of what to do when forecasts are not successful and climates change and sea levels shift and rainfall amounts vary. In this case the mutual knowledge we seek is a framework for mitigation and adaptation to dramatic climate change.

We are confronted by an extraordinary array of global challenges, from endemic regional conflicts to international terrorism and from worldwide health crises to the depletion of natural resources. Research universities have historically played a leading role in facilitating mutually productive international exchange and the formation of strategic alliances between academia, business, industry, and governments. Scholarship, scientific research, technological innovation, and creative endeavor all implicitly address a global audience and thus global engagement must be an explicit dimension to the American research university. While ASU is committed to teaching and research that improve the quality of life and quality of place in Arizona, we assume that the development of innovative approaches to local and regional problems will find application elsewhere in the world. It is with this in mind that we promote scholarly and scientific exchange and approach global engagement as an opportunity to identify and advance teaching and research that produces reciprocal knowledge and mutual benefits to multiple institutions.