Reviving our Economy: Supporting a 21st Century Workforce
US House of Representatives
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Written Testimony

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Chairman Kline, Ranking Member Miller, Representative Salmon, Member (s) of the Committee, thank you for inviting us here today. My name is Ann Weaver Hart and I am President of the University of Arizona, and I am honored to have the opportunity to speak with you about the role that the University of Arizona plays in helping Arizona and the United States address the needs of the 21st century global economy.

I also want to take the opportunity to thank the committee for the work that you are doing on the reauthorization of the Higher Education Act. This work is vital to the future of higher education and its role in workforce development in the United States and the UA wishes to provide input. As Congressman Salmon knows, the UA has created an internal taskforce that brings together elements of the University most interested and most impacted by the reauthorization. Congressman, I want to thank you for speaking with the taskforce late last year, and I very much look forward to continued partnership with you as this work continues.

To address how the UA fulfills its role in Arizona and the nation, I want to cover three main points:

1. The importance of STEM education and research fields and the need for a strong pipeline of student success and research innovation.
2. The University's 100% Engagement Initiative, which helps ensure that UA graduates are ready to tackle the challenges of the 21st century economy because they have worked with faculty and industry partners on cutting edge research with the most up-to-date methods and practices in a given field.
3. The partnerships that we have fostered with local, national, and international industry, which are at the heart of our success in the educating our students and innovating new knowledge and technologies.

STEM Research and Education

Within this broad goal of furthering workforce development and innovation, the UA places particular focus on being a world leader in STEM education fields.

This focus is in part because of the University of Arizona's mission as a land-grant university, founded to broaden access to what the first Morrill Act of 1862 called "liberal and practical education," which designates areas of learning and inquiry that are inherently engaged in the lives of the communities that we serve. Thus, the UA's mission is, in part, to improve the prospects and enrich the lives of the people of Arizona and the world.

This mission means that we are tasked with innovating new knowledge that can then be applied to the grand challenges of the contemporary world and also to the seemingly mundane problems of everyday life. While it does place focus on STEM fields, this focus is not at the expense of other disciplines (the liberal arts or fine art, for example), but rather enriches their efforts to understand and express truths about the human condition. Because the UA is a public land-grant research university, the core of our mission is high quality education and research that creates a pipeline of talent and discoveries in high-tech and high-wage fields. This research enterprise, currently at just over $600 million a year in research expenditures and going to $1.2 billion by 2023, drives the economic and civic well-being of Arizona and the region and contributes to the nation's competitiveness in the global economy.

As a land-grant university, the UA develops new knowledge, with a specific focus and tradition of excellence in agriculture, engineering, mining and other fields, and we provide ways to apply that knowledge in partnership with Arizona's diverse communities, businesses, and individuals. To ensure that the UA has a strong future serving Arizona, the southwest and the entire nation, we recently completed a comprehensive strategic planning process that sets out ambitious goals for the academic future of the University, and which integrates that academic vision with a specific business plan.

The resulting academic and business plan, Never Settle, targets areas of needed workforce development within the state. These areas also draw on our historic and emerging strengths as a university and our specific geographic location and cultural heritage so that the opportunities we pursue leverage what makes our learning community and our state unique. By positioning ourselves as a leader in these core areas of research and teaching, the UA will be able to compete internationally as these fields develop around the world while creating new knowledge and addressing the areas of greatest need for Arizona and the nation:

1. Medical and health professions – especially population health and health outcomes, healthcare disparities, precision health, neurosciences, and clinical trials.
2. Water and the arid environment
3. Space sciences
4. Defense and security

It is critical that these and other areas of inquiry also drive the education of our students so that the UA and Arizona's other educational institutions create a pipeline of talent to sustain the state and nation's workforce. This is one of the reasons that the University is embarking on a 100% Engagement initiative, which I will discuss in more depth in a moment.

We are, however, not positioned to conduct remedial education programs effectively – either in terms of quality or cost management. In the contemporary higher education ecosystem, our specialization as a public land-grant research university complements other institutions with different roles. This is why the UA's partnership with the other public universities in the Arizona higher education enterprise is so critical, as are our partnerships with community colleges and K-12 systems throughout the state.

We have specific transfer pathways and 2+2 transfer programs throughout Arizona with more being added continually. For instance, the UA Bridge program connects the University with Pima, Maricopa and Mohave Community College Districts. By summer 2014, all Arizona community colleges will have similar agreements with the UA, which will allow students to connect early and successfully with the UA. Our Office of Enrollment Management is also leading an Information Technology project that will expand the UA's existing SmartPlanner tool to allow prospective in-state transfer students to map out a degree plan and progress tracking prior to applying for admission.

Beyond Arizona, University policy opens the potential for transfer credits through the general education core curriculum programs in California's community college system, and we accept hundreds of courses from other community colleges across the U.S.

These agreements provide students with access to the UA's degree programs in high-demand fields like STEM at the time that they are ready for those programs.

100% Engagement

The University of Arizona's 100% Engagement initiative targets the needs for workforce development that I have described above by providing students with opportunities to take the knowledge they gain in the classroom and laboratory and apply it in real time in other settings.

By working with world-leading scientists and scholars, and with partners from industry and business, UA students learn how to apply their classroom and laboratory knowledge to problems and opportunities as they arise in real time. If the research conducted by the University of Arizona in partnership with scientists and industry leaders from around the world provides the knowledge for the state's future success, the application of that knowledge by our graduates is the fuel that powers Arizona's economic engine.

For example, on December 9, 2013 the UA began a 999-day countdown to the mission launch in 2016 of OSIRIS-REx. The billion-dollar mission, funded through NASA's New Frontiers program, will send a spacecraft to the near-earth asteroid 101955 Bennu, named by a North Carolina third-grader in a UA contest, and return with a sample of surface material for analysis. The project is driven by an international consortium of more than 60 institutions. These partners include other world-class universities, industry leaders like Lockheed Martin, government agencies, and research centers like NASA. On the UA campus, the OSIRIS-REx mission involves more than 50 undergraduate interns, who, when they graduate, will be ready to work in some of the most advanced areas of science, engineering, and management, among other fields.

In the UA Department of Mining and Geological Engineering, undergraduate students work in a fully operational mine south of Tucson, where they gain experience with cutting-edge technology and up-to-date industry best practices. Graduates from the department's undergraduate degree program have a 100% placement rate, often going on to work with top companies in the mining and rock products industry throughout Arizona and around the world.

Similarly, students in the College of Agriculture and Life Science's Department of Animal Sciences take classes and help run the Food Product and Safety Laboratory, which includes a retail operation that gives students experience in meat product safety and testing, harvesting, nutritional testing, and catering.

In every case, our ability to partner with industry leaders provides students with an education that deeply integrates knowledge and application, which ultimately fulfills our land-grant mission to support both liberal and practical education.

To promote this 100% Engagement initiative, we will hire leadership for the program, college engagement advisors to assist students, and staff to work directly with business and industry to expand internships and engagement opportunities. These positions will allow the University to implement a full Engagement program on campus with pre-qualified experiences, engagement success colloquia, and enhanced opportunities in partnership with local, regional and national employers.

To further emphasize the importance of this kind of learning experience, the UA is establishing a Graduation with Engagement designation for the UA transcript, which will position UA graduates as employment-ready with top businesses and graduate programs around the world. This step will further our current success, indicated recently by the third annual Global Employability Survey, which ranked the UA's graduates the 13th most employable among American public universities.

Partnerships with Local Industry

This significance and success of our 100% Engagement initiative depends in part on the expertise of UA faculty. Because of our robust research enterprise, students have the opportunity to work with world-leading scientists, scholars, and artists in a variety of fields. This synergy between research and teaching is one of the things that make the public research university such an important and distinct model within the higher education landscape in the United States.

To encourage faculty success in innovation and discovery, we have focused on developing partnerships with business and industry through the new Tech Launch Arizona (TLA), which centralizes UA tech transfer operations and streamlines vital processes like startup licensing and research compliance protocols.

For instance, TLA's Wheelhouse Arizona provides a unified resource for commercialization assessment and development, and is building a network of partners who have experience in a given field and are able to donate time and expertise to foster new technologies.

We have also implemented one of the key elements of the Never Settle plan by adjusting tenure and promotion guidelines so that faculty whose work integrates basic research with its application can be recognized for their innovative work in both areas.

Students benefit from this environment in two predominant ways:

First, because faculty are at the cutting edge of their fields, UA students learn the most up-to-date methods of research, the most current knowledge, and – importantly for our 100% Engagement initiative – the most advanced applications of that knowledge.

Secondly, because faculty members are working with industry and business partners in their basic and applied research, students develop working relationships with leaders in their respective fields, both in academia and in industry.

With these two outcomes, the UA is fortunate to have many foundational partnerships in Tucson and Southern Arizona. For instance:

- Raytheon and Honeywell are key partners in the new Defense and Security Research Institute that the UA recently launched.

- The Mining and Geological Engineering Department is partnering with the Laborers' International Union of North America on a cooperative health and safety training program for underground construction and tunneling.

- The Department of Teaching, Learning and Sociocultural Studies in the College of Education has created the Teach Arizona Master of Education Program, which includes a full year, half-day internship and student teaching experience. Teach Arizona works in partnership with local school districts to place students with mentor teachers while also partnering with designated Human Resources or Curriculum and Instruction professionals. UA students in this program participate in the internship for the entire year, as opposed to the single semester that is more common. They start their internship based on the school district's calendar, rather than the University calendar as in traditional internships, and so their phase-in process at the school where they intern takes place in the fall semester. This includes time observing their mentor teacher as they set up their physical classroom and class management rules, which student-teachers normally do not see. During this period they also work with small groups of students before working with the mentor teacher on lesson planning and team teaching and eventually teaching full lessons units. In the spring semester, the student-teachers have full responsibility for two classes. The result of this program's unique structure is that the UA students are seen and treated as regular teachers, giving them the experience necessary for their first year after graduation to be more like their second year as an instructor.

Conclusion: Synergy and the Application of UA Research

While I have described these three elements of the UA's efforts to support the 21st economy distinctly, it is important to note that they are, in fact, melded together in the UA's strategic plan and in the way that we work with students and partners. As we envision the University's future in the Never Settle academic and business plan, higher education is most effective when all parts of an institution work together for increased effectiveness, achievement and impact. Our goal, in other words, is to create a unity of purpose and a harmony of effort that allows our students, our faculty, and our partners to fulfill potential that would be otherwise unimaginable.

This component of the strategic plan, which we refer to as synergy, emphasizes interdisciplinarity – which you see in the promotion and tenure adaptations that I mentioned earlier – to foster a problem-based approach to research, teaching and partnership rather than a discipline based one. The UA's research centers achieve this same goal by fostering collaborative research across disciplines.

For example, the BIO5 Institute brings together researchers from the UA Colleges of Science, Agriculture, Engineering, Medicine, and Pharmacy to address problems in biology-based problems facing the contemporary world. Among the innovative programs housed at the BIO5 Institute is the iPlant Collaborative, a multi-institution and international project that is developing computing-based methods for plant science research. The project allows researchers from across the world to work together and to analyze massive sets of data to solve increasingly complex problems in agriculture, biofuels and biodiversity.

The Institute also has Dr. Carol Barnes as a member. Dr. Barnes is Regents' Professor in the UA's Departments of Psychology and Neurology, the Evelyn F. McKnight Endowed Chair for Learning and Memory in Aging, Associate Director of BIO5, and recent recipient of the Ralph W. Gerard Prize in Neuroscience – the highest recognition conferred by that society. She and other world-class scientists at the University are working together at the intersections of physics, nanotechnology, medicine, imaging, optical sciences, engineering, information technology, genomics, and other rapidly emerging fields. Together, their work is revolutionizing how we study the brain and respond to the scourge of diseases like Alzheimer's. We also continue to forge and strengthen partnerships with research consortiums like the Arizona Alzheimer's Consortium, state and federal governments, philanthropic organizations, and industry stakeholders to accelerate the discovery of prevention and treatments for the more than 100 million people suffering with 1,000 different brain diseases worldwide.

The Institute also has close ties to the UA Cancer Center, housing the Center's Shared Molecular Modeling facility in its Oro Valley site, and numerous faculty from the Cancer Center are members of the BIO5 Institute. Both organizations are models for the kind of innovative, collaborative, and ambitious research that will meet the health and wellness needs of Arizona and the nation's aging and expanding population.

Similarly, our newly formed Defense and Security Research Institute will create a forum of interaction in materials science, energy, environmental research, medical technologies and social sciences, among others. The Institute will enable researchers at the UA and in partner institutions from business, industry, and academia to pursue large scale projects and funding opportunities much as BIO5 has done in the biological sciences. Both centers allow the University to deepen regional roots while expanding global connections.

The University then applies the outcomes of this and other research through partnerships throughout the state, nation and world that advance knowledge and create high paying and high tech jobs. For instance, the UA-led Phoenix Mars Lander mission was an international collaboration that sent the first NASA's Mars Scout spacecraft, and we are continuing this work with the OSIRIS-REx mission that I mentioned earlier. Similarly, our Steward Observatory Mirror Lab (SOML) makes the world's largest telescope mirrors, including the pair in the Large

Binocular Telescope (LBT) on Mount Graham – the largest telescope in human history – and the Mirror Lab is at the heart of the Giant Magellan Telescope Organization, a worldwide consortium building a telescope that will gather more light and resolve images more clearly than any telescope now in existence. This advancement will allow researchers from the UA and around the world to solve some of the most complex and fundamental questions about the nature of our existence while maintaining the position of Arizona and the U.S. at the forefront of research in optics, astronomy, engineering and related fields. These projects also make far-reaching contributions to Arizona's economy. For example, over the next five years, SOML will finish casting the seven 8.4 meter (27.6 ft.) mirrors that will be used in the Giant Magellan Telescope. The mirrors have an estimated total contract value of $177 million over the course of the telescope's construction and allow SOML to employ 35 – 40 people annually.

The UA has numerous other partnerships throughout the state that directly benefit Arizona's residents while also making contributions to the advancement of human knowledge in biomedical and other vital fields. For example, the UA Cancer Center partners with the University of Arizona Health Network in Tucson to offer clinical care that applies the most cutting edge research available. The UA is expanding the reach of the Cancer Center, and broke ground on a new facility in Phoenix that will open in 2015 and will operate in partnership with Dignity Health Arizona, St. Joseph's.

Similarly, our telemedicine program, which has nearly 50 sites in Arizona, brings the benefits of UA biomedical research to patients in rural and other underserved communities. Similarly, our Cooperative Extension system has offices in 5 tribal reservations and in each of Arizona's 15 counties, and in 2013 had 585,110 participants in programs ranging from agriculture and food safety to 4-H Youth Development and natural resource management. Finally, Tech Launch Arizona has rapidly developed a network of community and business partnerships that are transforming Arizona's economy with new licensing and startup opportunities. All of these efforts promote an environment that will support high-tech and high-wage jobs throughout Arizona and the region, bring new innovations to the market, and educate the workforce who will continue to fuel progress well into the future.

As a public land-grant research university, the UA has much to offer the state of Arizona, the U.S. as a nation, and the entire human family. We face many challenges and it is hard to know what to attempt first, but the critical point for all three universities in the Arizona state system and for public universities across the country is to work together in partnership with each other to form a sustainable higher education system, and to work with business and government partners to ensure that our degree programs, research, and outreach efforts are suited to the needs of our communities.