

Testimony for the Record
Submitted to the United States Senate Committee on Appropriations
Hearing on “Driving Innovation through Federal Investments”
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by
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My name is Wallace Loh and I am President of the University of Maryland. We are a land-grant university with a long and distinguished history of excellence in research, education and innovation, as evidenced by our high standing in the 2013 Academic Ranking of World Universities (#13 among U.S. public institutions; #38 globally).

I am very grateful to Chairwoman Mikulski, Vice Chairman Shelby and the entire committee for this opportunity. Senator Mikulski has long championed academic research as a vital component of our national and economic security. The incisive focus of this hearing, “Driving Innovation through Federal Investments,” reflects her strong leadership and that of the committee.

I would like to offer a ground-level view of the steps taken by the University of Maryland to maximize the productivity of its research. The antidote to an innovation deficit involves, in part, a more collaborative style of research that teams federal and state investments, universities and the private sector, along with targeted efforts to build a strong culture of innovation and entrepreneurship. These steps make us more competitive and efficient. But there is no substitute for a robust federal investment in our nation’s future.

The Challenge

We should begin with an appreciation for the difficulty of innovation. It is a long, hard and precarious path from idea to fulfillment. Good concepts often perish before they get a fair test, a tragic waste. Nurturing creative technological success takes about as long as it does to raise a child. Both require continuing support and involvement to achieve a good result.

From the end of World War II, the federal government ensured American technological superiority and economic prosperity through its support of research universities. During this period, the private sector has grown increasingly reliant on universities for basic research.

The University of Maryland now partners with businesses far more closely than in the past and on a regular basis. We collaborate with federal researchers and with other academic institutions. We work intensely to instill a stronger culture of innovation and entrepreneurship in our students and faculty.

But the federal role remains irreplaceable, funding the difficult years of basic research and demonstration of concept. Even with our growing list of partners—Lockheed Martin, Northrop Grumman, Siemens, foundations, angel investors and our own internal funds - the federal government currently accounts for about three-fourths of the University of Maryland’s research.

Strong federal support of university research and education helped America prevail in the Cold War and develop an unbeatable technological superiority. Now, this competitive edge is narrowing, as shown by congressional and scientific reports, such as the National Academies' *The Gathering Storm*. During the recent sequestration interlude, when the U.S. government eased up on the funding accelerator, many U.S. scientists grew very uneasy.

Talk of a brain drain of American university researchers has become more serious. I can tell you from many conversations that young and mid-career scientists are beginning to question whether they can succeed in the United States. They fear the roller coaster of funding, and worry about their future.

I have traveled to universities throughout Asia, and can testify to the rapid strides they are making, mainly through heavy government investment. In India, China, Taiwan and South Korea, government, business and universities all work closely together to support research and expand educational opportunities. Their impressive technology research parks thrive and produce innovations.

Just recently, South Korean researchers announced a possible breakthrough in therapeutic stem-cell research. Whatever you may think of this controversial work, it demonstrates the impact of the billions of dollars the Korean government has put into this effort.

India plans to build thousands of new campuses and expand higher education widely. With educational opportunities improving at home, the number of foreign students at U.S. institutions is beginning to taper off. Meanwhile, U.S.-educated foreign researchers who want to stay here often struggle to get U.S. visas. If we valued our investments in their work, we would attach a green card to their diplomas.

All these developments point to a narrowing U.S. competitive edge. Sooner or later it could reach a tipping point. If our international competitors increase funding for research and higher education, the United States cannot afford cuts or flat support without serious risk.

From Classroom to Lab

To answer Senator Mikulski's pertinent question directly: Long experience shows that the federal government drives innovation the furthest with full-throttle support. Its involvement is crucial, and not solely through its research grants.

Innovation begins in the classroom. Federal support that keeps higher education accessible also can promote innovation. Some examples:

- Senior honors students at the University of Maryland design and develop experimental medical devices. We encourage these students to pursue development once they graduate.
- Not long ago, entrepreneurial University of Maryland students seized on a chance comment by a professor and developed a patent-pending indoor waterfall that helps de-humidify summer air. The students were competing in the U.S. Department of Energy's Solar Decathlon.

- Several University of Maryland Physics Ph.D.'s started a company several years ago after graduation. We provided incubator space and support as they developed their nanotechnology processes. Now their company, Pixelligent, is thriving in Baltimore, producing customized additives for international firms. Their workforce has grown dramatically and they anticipate that their business will create 100 new jobs in coming years. This is the promise of advanced manufacturing.

Collaborative Research

The University of Maryland has evolved a far more collaborative style of research. It is more efficient and productive. Federal agencies encourage this.

Many major grants involve multiple institutions to assemble the most talented teams. Grants that pair academic and corporate researchers are preferred by federal agencies because the work is more likely to result in commercial development. Similarly we are deeply engaged with federal research facilities near the university. We are primed to make the most of federal research grants and investments.

- Just last week, the University of Maryland cut the ribbon on its new, advanced Physical Sciences Complex, built with state and federal support. One of the main occupants will be the Joint Quantum Institute, a partnership between the university and the National Institutes of Standards and Technology (NIST). They are working, among other things, to develop the Holy Grail of modern Physics quantum computing. It promises dramatically greater power, speed and security. The investment in this facility is intensifying the NIST partnership, attracting corporate partners to begin development of applied hardware and software, and has attracted top researchers and students. Here too, federal and state investment proves itself a powerful stimulus for innovation.
- When the U.S. National Weather and Climate Prediction Center opened in College Park, the university's researchers, plus those from other nearby federal research labs, created the world's most concentrated cluster of earth science and climate expertise in the world. This is how you build a dream team.

Fanning Innovation

The University of Maryland has an extensive innovation support system. With a recent National Science Foundation I-Corps grant, we are helping train federal scientists to think and act more entrepreneurially and bring their innovations to market.

On our own campus, we are helping our faculty recognize the potential of their research. Innovation now counts towards tenure. We have colleagues looking for the most promising work, and helping secure seed grants to demonstrate that promise. For students, we are increasing access to entrepreneurship education and competitions. Eventually, all 37,000 of our students will get this training. We are attuning our campus to the culture of entrepreneurship. This is an important way to maximize the impact of federal education and research support.

Successes

This fine-tuned collaborative model and our emphasis on a culture of collaboration have enabled the university to turn federal investments into highly promising new technologies able to attract private support. Some examples include revolutionary fuel cells with remarkable efficiency; a way to detect Lou Gehrig's disease before symptoms appear; software that dramatically improves the clarity of cellphone communications; and a novel, affordable way to overcome interference in wideband data transmissions.

Many more game-changing technologies are in the pipeline. Federal research funding is making these advances possible. The University of Maryland fully appreciates this federal commitment.

We continue to tap all possible funding sources, but ultimately, federal appropriations for education and research are irreplaceable as drivers of the nation's innovation. Without continuing significant federal support, the innovation engine may sputter and run down, while other nations surge ahead.

Thank you.