

Testimony of University of California President Janet Napolitano

United States Senate Committee on Appropriations Hearing on “Driving Innovation through Federal Investments” April 29, 2014

United States Senate Committee on Appropriations Chairwoman Mikulski, Ranking Member Shelby and Members of the committee, on behalf of the University of California (UC) I am pleased to submit testimony for this important hearing on “Driving Innovation through Federal Investments.”

As a former governor and Cabinet secretary, and now president of the University of California, I recognize the critical role that our nation’s public research universities play in driving innovation. As a Land-grant university, UC was created with a mission to deploy its research capabilities to support the national growth in the mid-19th century. In the 21st century, this mandate continues, but with a broader scope. We now deploy talents and technologies across all areas of science and technology to catalyze economic development.

Through a strong partnership with the federal government, UC is educating the next generation workforce, advancing scientific breakthroughs in research, providing world-class medical training and generating economic growth through new jobs, start-up companies and spinoff industries. It is critical that our nation maintain its investments in education, scientific research and health-care to ensure our nation’s economic prosperity continues to grow.

Recent budget challenges, including sequestration and the absence of timely budget and appropriations bills, have forced promising science to be delayed or abandoned. Labs were forced to lay off highly trained staff. And, perhaps most troubling, even now young researchers question whether to pursue research careers because vital fellowships are threatened and it is taking longer and longer for them to obtain their first independent research grants.

It is critical that the federal government maintain a strong investment in our nation’s research enterprise to ensure that the United States remains competitive and at the forefront of innovation and scientific and technological advancements. Federal investment in public research universities is also critical to our nation’s economic growth, driving innovation and helping create jobs across the country.

UC, with its ten campuses, five medical centers, three affiliated national labs, over 34,000 faculty, researchers, and academics, and nearly 240,000 undergraduate and graduate students, is the largest public research university in the world. UC investigators successfully competed for and were awarded \$4.2 billion in research funding last year from federal, state, and private sources to expand the boundaries of knowledge in all disciplines.

UC is the single largest university recipient of federal research funding. Of the \$4.2 billion in research awards received by UC investigators in the 2013 federal fiscal year, \$2.5 billion was from federal support. National Institutes of Health (NIH) provided 64 percent of all research funding from federal agencies to UC, or \$1.6 billion; National Science Foundation contributed 16 percent, or \$409 million, representing approximately 10 percent of all NSF funds; Department of Defense (DOD) provided \$198 million; and the Department of Energy (DOE) provided \$85 million. These DOE research funds are in addition to the funds that UC receives for its role in managing three national laboratories: Los Alamos, Lawrence Livermore, and Lawrence Berkeley, on behalf of the nation.

This federal investment drives innovation in numerous ways including training new researchers, producing intellectual property leading to new inventions and creating startup companies and jobs. Below are some examples of how UC leverages the federal investment.

- UC is the leading U.S. university system in training new researchers with advanced degrees, with 8,883 graduate academic degrees and 7,592 professional degrees awarded last year. UC awards about 3,600 Ph.D.s a year, or about seven percent of the nation's Ph.D.s. Among students who traditionally are underrepresented in higher education (African Americans, Latinos, Native Americans, and Pacific Islanders), UC awards about eight percent of the nation's Ph.D.s. In addition, UC annually hosts over 6,000 post-doctoral researchers.
- Last year, UC researchers disclosed more than 1,700 new inventions: an average of nearly five a day. Of these new inventions, 33 percent were supported by federal funding. Within the critical life-science sector, funding from the NIH is linked to 20 percent of all new UC inventions disclosed last year. UC's portfolio of U.S. patents derived from these disclosures exceeds 4,200; currently UC has more than 1,350 active licenses to industry that deploys private capital to create value-adding products and services that generate public benefit and fuel our local, regional and national economies.
- UC research helped launch 71 startup companies in 2013. Two-thirds of all UC startups are in medical technology and therapeutics. To date, approximately 719 startup companies have been formed based on UC patented technologies—among these are biotechnology multinationals Genentech and Chiron, and wireless technology leaders Qualcomm and Broadcom. Many of these are based directly on the work of UC graduate students, much of which was supported by federal funding.
- Since 2005, more than \$5 billion in venture capital has been invested in 181 UC startups and \$189 million in federal Small Business Innovation Research (SBIR) grants have been awarded to 132 UC startups. In turn, 414 UC startups

generated \$17 billion in annual revenue¹; employed 17,319 people¹; and 139 UC startups successfully moved at least one product to the market.

One of my first initiatives as president of UC was to further leverage the research investment by challenging the University to identify how we can be more effective at commercializing technologies created with federal and other funding sources. To succeed, we need to identify where, in our campus-centric innovation ecosystems, increased investment in technologies and people will create the greatest value given the limited resources we have to deploy. The University is now evaluating how to create greater “fuel” for the innovation engine; how we should invest in the critical elements of the innovation ecosystem—basic research, the basis of all innovation; the scientists and engineers who can translate such research into new applications; and the interlocutors who help bridge the gap between the research university and the business world.

These are tangible benefits derived from federal funding, but let us not be distracted by these commercial successes and initiatives from the more important outcome of federal research support: the advances in knowledge of the physical and biological world and the ways we interact with ourselves and that world. It is from such basic knowledge that most tangible benefits arise, created by layering new discoveries on the foundations of basic research until a clear picture arises of how to answer the technological or societal challenges that are before us.

Basic research in biomedicine funded by the NIH helped create the biotechnology revolution and UC is proud that our researchers played a seminal role in creating an industry in which the U.S. leads the world. While this research has led to the understanding of fundamental biological systems and processes, and resulted in innovative approaches to prevent and cure human disease, we should not lose sight of the value of basic research in other disciplines. In the physical sciences, research into the basic properties of materials spawned the nanotechnology industry and has driven innovation in the semiconductor industry, which has led to new products in a broad range of industries; from life sciences to energy. The federal government must continue to fund research in all areas, as no one has the ability to foresee the field where the next break-through discovery will arise.

Despite all that has been achieved, our nation now faces a crucial decision of whether the innovation ecosystem, which has served us so well since the mid-20th century, will continue to thrive as we have known it. In the 1960s, the United States spent nearly 17 percent of discretionary spending on research and development, reaping decades of economic growth from this sustained investment. Today, this figure is closer to 9 percent, and it occurs at a time when other nations in Asia and Europe have made significant gains in their own technological achievements, educational investments and research capabilities. To compete successfully in an increasingly innovative world economy, the U.S. will have to choose to lead in key technology sectors, and to do a better job of training an American workforce that will tackle the technical challenges

¹ Estimate by Dun & Bradstreet. Most recent data is 2011.

ahead of us and be capable of operating in a more technology-driven workplace. This will require an increased federal commitment to investment in research and innovation.

Indisputably, the federal government's investment in basic research has been the key to our nation's preeminence in scientific and technological innovation. Without continued federal funding, the pace and scale of the nation's research enterprise will be dramatically reduced. In the global economy, strategically, the U.S. cannot afford to decrease our support for basic research that drives the innovation economy. For our country to remain at the forefront of innovation and the world leader in scientific and technological advances, the federal government must recommit to investing in our research enterprise. This is not the time to turn away from critical investments that will move our economy forward.