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OP-ED:

THE IMPORTANCE OF SCIENCE ADVOCACY

BY

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U.S. leadership in global science and technology (S&T) stands as one of America's greatest traditions of the 20th century. In the past, most notably after World War II and the advent of the Cold War, leadership in the scientific world was often synonymous with a powerful global presence and a successful, progressive society. In recent years, shifting political priorities of policymakers and the American public have begun to eat away at federal funding opportunities for U.S. research and development (R&D). The continuing national debt crisis, coupled with the moral and ideological concerns surrounding several of the more prominent R&D issues (i.e., climate change, stem cells, energy policy), have pushed U.S. funding for S&T below a quickly rising global standard. In the face of a persistent decline and stagnation in R&D funding, scientists and engineers must devote more time and effort toward keeping the economic and societal value of science in the public eye and advocate for it to hold a higher standing in the federal budget.

The U.S. involvement in R&D has long been associated with preserving national security and the well-being of American citizens. The National Science Foundation (NSF) was created by Congress in 1950 after World War II to establish an independent governing body for basic and applied research (Neal, Smith, & McCormick, 2008). Throughout the 1960s and 1970s, following a strategic belief that an intelligent young populous would lead to a strong nation in the future, the federal government deepened their investment in public R&D by channeling money into the booming American university system. The plan worked. The following generation of Americans shaped the nation into the world leader in technological and scientific innovation.

In recent years, however, the U.S. has begun to lose its footing as the sole frontrunner of the global research community. Our nation's contribution to the total R&D worldwide expenditures has dropped from 38% to 31% over the last decade, while Asia's share (predominately China and South Korea) has surged from 24% to 35% (NSB, 2012). This marked shift in global R&D funding demographics is not surprising considering the recent trends in U.S. federal investment in S&T. Each of the top federal science agencies' appropriations, (i.e., NSF, NASA, NIH, the Department of Energy's Office of Science and the Department of Defense's basic and applied R&D divisions, which all together comprise over 80% of the total federal R&D budget), have remained mostly stagnant during the last decade. In FY2011 and FY2012, the total federal R&D budget declined by 3.5% and 1.4% FY2012, respectively, although several agencies, such as NSF, experienced minor increases (AAAS, 2012).

Our nation's science agencies are facing an even bleaker future. Historically, federal R&D spending is most closely linked with the non-discretionary budget, often landing at approximately 10%. The Budget Control Act of 2011 will require non-discretionary spending to be cut by 15% each year for the next 10 years, or a total reduction of \$917 billion. If the R&D funding continues with recent trending, the Budget Control Act will cause a dramatic decline in national investment in S&T (Gulledge, 2011). Several large-scale research projects are already at risk of being shut down due to lack of funding, including the Giant Magellan Telescope (Bhattacharjee, 2012) and the Brookhaven Relativistic Heavy Ion Collider, the last running collider in the U.S. (Cho, 2012). If this trend continues, basic science and innovation will

continue to migrate to other countries that dedicate a larger percentage of their federal budgets toward R&D.

Earlier this year, the White House Office of Management and Budget (OMB) directed the major R&D agencies in their FY2013 appropriations request, to ask for a minimum of 5% below their enacted discretionary budgets in FY2011 (AAAS, 2011). OMB's mandate comes in direct opposition to President Obama's previously stated goals for the future of American S&T.

Obama, at a speech to the National Academy of Sciences in 2009, stated:

At such a difficult moment, there are those who say we cannot afford to invest in science, that support for research is somehow a luxury at moments defined by necessities. I fundamentally disagree. Science is more essential for our prosperity, our security, our health, our environment, and our quality of life than it has ever been before.

President Obama followed this with numerous endorsements of basic and applied R&D in the United States, in particular, the release and renewal of his "Strategy for American Innovation" (EOP, 2009), passing and implementing the "American Recovery and Reinvestment Act", and in 2011, reauthorizing the 2007 "America COMPETES Act". The COMPETES Act, which aims "to invest in innovation through research and development, and to improve the competitiveness of the United States," was an encouraging effort from Congress to push American S&T forward through doubling the budgets of several science agencies including NSF and DOE's Office of Science, but excluding NIH (OSTP, 2011). Unfortunately, even as Obama continues to push for investment in innovation and S&T education initiatives, the COMPETES Act has been essentially ignored during the last several funding cycles. Again this year, Obama put forth an

ambitious budget for federal R&D spending, with a 5% increase in non-defense funding, in the face of a large federal deficit and conservative Congress (AAAS, 2012).

Science-related issues should remain objective and politically neutral when discussed in Congress. However, topics such have become highly politicized and progressively more contentious as the budget has tightened. For example, as U.S. Representative and physicist Rush Holt (2011) notes, “A clash is under way in Washington, D.C., between two starkly different visions for the U.S. government’s role in R&D. The outcome of this debate will shape the nation’s scientific landscape for years to come.” In order to influence this outcome, especially now as funding levels for federal R&D continue to decline, scientists and engineers must strengthen their lobbying efforts to keep science objective among policymakers. Further, the benefit of basic and applied research to our nation’s economy is often lost amongst other more pressing, or tangible, political agendas. By actively engaging the public through media outlets, educational outreach and working with politicians, scientists can push R&D back to a higher funding priority. Such was the case in 1999 with the overwhelmingly successful National Nanotechnology Initiative (NNI), pioneered by the late Richard Smalley, a Nobel Prize winning chemist, and Neal Lane, then top science advisor to President Clinton. Both appeared before Congress to speak on the potential of nanotechnology, and helped to enact an initiative which has now grossed over \$12 billion research dollars (Lok, 2010).

Scientists who do step into the public sphere, such as Holt, Smalley, and Lane are often referred to as “civic scientists”. According to Lane, a civic scientist “is someone who uses his or her knowledge, accomplishments and skills to help bridge the gap between science and society

(BIPP, 2010).” Without actively making science relevant, clear and unbiased to politicians and the American public, scientists will find that this gap only widens.

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