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Conference Report

AAAS S&T Policy Forum, May 2011

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Abstract

The American Association for the Advancement of Science (AAAS) held the 36th Annual Forum on Science and Technology Policy in May 2011. The forum addressed the federal research and development budget, science and technology (S&T) spending, and national innovation strategy. This paper reviews the highlights of the Forum and summarizes the budget outlook for fiscal year 2012. Given the current political and economic climate, significant budget pressures can be expected. However, many of the conference speakers make a strong case for looking beyond the current crisis and sustaining government investment in S&T and innovation for long-term economic growth and continued US global leadership.

Key words: Science and technology, policy, innovation, federal budget, AAAS

Introduction

The American Association for the Advancement of Science (AAAS) held the 36th Annual Forum on Science and Technology Policy on 5-6 May 2011 in Washington, DC. Major issues addressed included the federal research and development budget, science and technology (S&T) spending, national innovation strategy, and the role of research universities. The conference featured presentations by John Holdren, Director of the White House Office of Science and Technology Policy (OSTP), Subra Suresh, Director of the National Science Foundation (NSF), Anthony Fauci, Director of the National Institute of Allergy and Infectious Diseases at the National Institutes of Health (NIH), and Gregory Jaczko, Chairman of the US Nuclear Regulatory Commission. The forum targeted both AAAS member scientists who are interested in policy as well as policymakers in science and technology. It also included an in-depth presentation from AAAS analyzing the budget for the coming year. The forum proceedings and presentations are posted online at: http://www.aaas.org/spp/rd/forum2011/.

The President's S&T priorities

Like past OSTP Directors, Dr. Holdren presented the President's priorities in S&T and discussed the President's budget request for fiscal year 2012 (FY12), emphasizing President Obama's commitment to science and technology as the drivers of innovation and the engines of the US economy. Holdren asserted that the President sees research and development (R&D) funding as an investment in the future, and as being especially important in the current economic climate. The President's priorities for S&T include:

- Reform/redirection of NASA and human spaceflight;
- Energy and climate change; and
- International cooperation, with S&T central to economic development and diplomacy.

Holdren reviewed the major investments in S&T under the Obama administration, such as $100 billion in the Recovery Act; tax and policy reforms in the American Innovation Strategy; $700 million in the Educate to Innovate initiative; and Startup America, a program to

support entrepreneurship. Policy reforms intended to facilitate American S&T include stem cell research guidelines, MANTIS visa procedure reforms, and streamlined reporting on federal grants.

One of the Presidents' broader initiatives for government has been increased transparency, and developing policy on scientific integrity within each agency. As defined in a December 2010 White House memo, scientific integrity refers to "…the minimum standards expected as departments and agencies craft scientific integrity rules appropriate for their particular missions and cultures, including a clear prohibition on political interference in scientific processes and expanded assurances of transparency."(1). OSTP had previously requested that the federal agencies report on their progress in developing guidance on scientific integrity. During his address at the AAAS Forum on Science and Technology Policy, Holdren announced a new deadline of 90 days for all agencies to submit their draft policies on this issue (2).

Budget analysis for 2011 and 2012

The annual in-depth budget analysis by AAAS spans all S&T spending across the federal government, and provides a highly valuable distillation of major trends and changes. The fiscal year 2011 (FY11) budget passed just weeks before this year's meeting, and thus final budgetary figures were not available when the printed version of the AAS Report was issued. In light of this, the published analysis compares 2012 to 2010 spending levels with a 2011 addendum. The report, AAAS Report XXXVI: Research and Development FY 2012, is available online at http://www.aaas.org/spp/rd/rdreport2012/

In the contentious FY11 budget battle, nearly all agencies sustained cuts to their respective budgets. The United States Department of Agriculture (USDA) and Department of Homeland Security (DHS) were most significantly affected, with each incurring nearly 20% cuts. Most of the agencies' budgets would rebound if the President's 2012 budget request would be passed as written, but that is uncertain given the current political and economic climate.

Patrick Clemins of AAAS presented the budget analysis, describing the priorities in the President's 2012 budget as: "…moving from rescue to rebuilding, putting the nation on a sustainable fiscal path, and competing and winning in the world economy." (3).

Highlights of the AAAS FY12 budget analysis include (3):

1. The 2012 budget request totals $3.7 trillion, and projects a $1.1 trillion deficit, down from $1.3 trillion in 2010. The Federal R&D budget of $149.1 billion in the 2012 request represents 4% of the overall budget, and 12% of the discretionary budget.
2. Discretionary spending would decrease by 5.4% overall and non-security discretionary spending would decline by 10.1% for FY12; the President has directed a five year freeze on this spending category.
3. Over the next decade, The President's Plan for Science and Innovation aims to double the budgets of agencies that invest in basic research. In this spirit, the 2012 budget for the NSF, the National Institute for Standards and Technology (NIST) laboratories, and the Department of Energy's (DOE) Office of Science all receive budget increases, thereby keeping them on track toward projected doubling (4).
4. The budget request has large funding increases for clean energy research, through the DOE Office of Science and Energy budgets, the U.S. Global Change Research Program (USGCRP), and NSF.
5. Exceptions to S&T increases in the FY12 request (over FY11) were cuts to budgets for DOD S&T, in particular applied research (so-called "6.3 level" funding or "Advanced Technology Development"), and the VA.

Despite some cuts, S&T budgets generally have remained flat, or in some cases have increased, consistent with the President's focus on investing in research, development and innovation. R&D priorities in the FY12 budget request center around innovation, education, and infrastructure.

How does the US invest in S&T?

In the FY2011 budget, total R&D was $144.4 billion, with $29.3 billion in basic research, $31.2 billion in applied research, $79.4 billion in development, and $4.5 billion in equipment and facilities. Defense R&D accounted for $82.1 billion, and non-defense the remaining $62.3 billion. Non-defense R&D spending includes the NIH, NSF, NASA, DOE, and NIST, which conduct or fund much of the nation's basic research, while defense spending is more heavily weighted toward development spending (5).

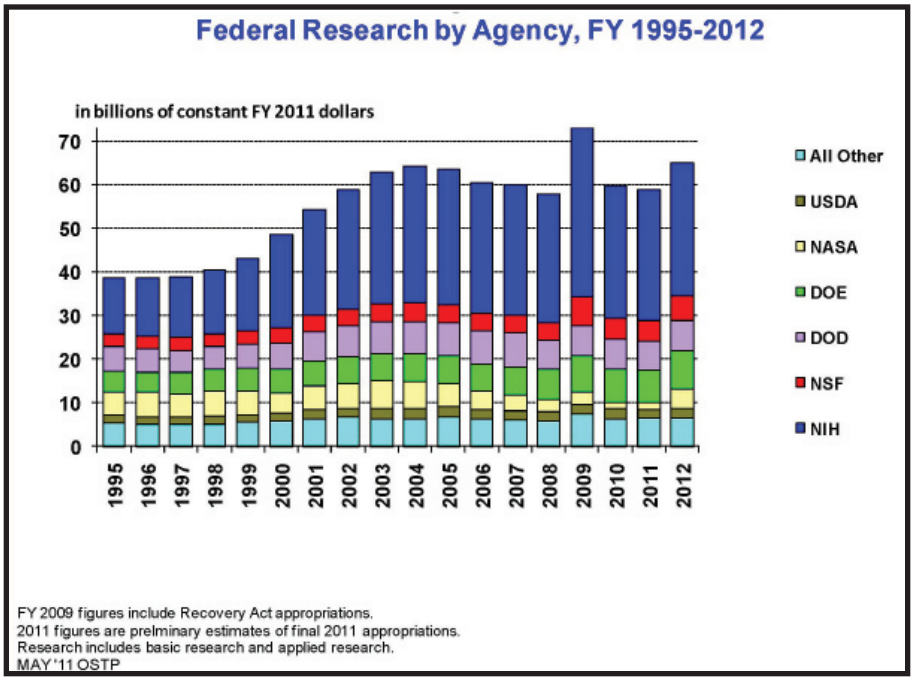

Figure 1. Federal Research by Agency, FY 1995-2012.
Presenter: John Holdren; re-printed here with permission (2)

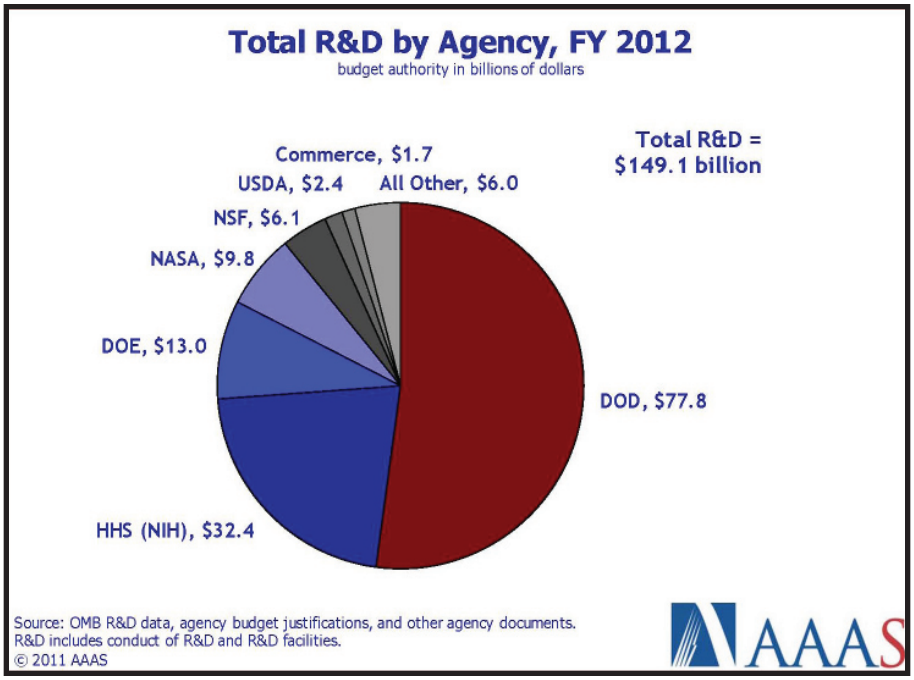

Figure 2. Total R&D by Agency, FY 2012.
Presenter: Patrick Clemins, copyright; re-printed here with permission (5)

The federal government is the primary driver of basic research in the US (3). Industry far outspends the federal government on overall R&D, but the majority of this spending is primarily in areas of applied research and development. Industry performs 73% of the nation's total R&D (including internal and government-funded work), US academic institutions perform 13%, and federal laboratories, non-profit institutions (e.g., research institutes, hospitals), and FFRDCs perform the remainder. Federal R&D funds are allocated 40% to industry, 23% to government laboratories, 22% to academic research institutions, 9% to contractor-operated FFRDCs, and the remainder is provided to other nonprofits (3).

When spending on S&T is examined as a percentage of gross domestic product (GDP), US and EU spending have largely remained unchanged, while other nations, particularly China, South Korea, and Taiwan, have increased significantly over the past two decades. Between 2000 and 2008, China's funding of university R&D increased 253% compared to 37% in the US (6).

Setting national priorities

The US does not have a formal coordinated budget or strategic plan to project government spending of S&T funds; instead, funding priorities and directions are distinct for each agency, and enacted by Congress in separate authorizations. Each agency funds R&D to meet its mission, contributing to a broad and diverse array of funding that is targeted to meet a variety of national needs. Coordination occurs to some extent in the President's budget through OSTP and OMB, which set government-wide priorities which the agencies incorporate into their two-year budget planning processes.

The National Science and Technology Council (NSTC), an interagency body comprised of the President and cabinet officers, has also organized some interagency R&D initiatives, including global change research (USGCRP), information technology (NITRD), and nanotechnology (the National Nanotechnology Initiative, NNI) (3). Following this model, there have been recent efforts to develop a National Neurotechnology Initiative (NNTI) to provide interagency coordination of research efforts in neuroscience and its associated technologies.

Innovation

Innovation has been a major focus of the AAAS S&T Policy Forum over the last several years, with particular emphasis upon the economic, social, cultural, policy (or other) factors necessary for its development. This year, AAAS devoted a panel session to innovation, examining those conditions and variables needed to create enclaves of innovation, such as those of Silicon Valley and the Boston-Cambridge community of academic and venture capital research, and how government might develop strategies to foster and sustain innovation in S&T.

NSF Director, Subra Suresh, spoke to the NSF's approach to cultivating innovation in its programs and those it supports, based on the concept of innovation ecosystems, "…the people, institutions, policies, and resources that promote the translation of new ideas into products and processes and services." (7) Speaker Richard Bendis, CEO of Innovation America, also used the concept of innovation ecosystems, and argued that "…the flow of technology and information among people, enterprises, and institutions is key to a vibrant innovation process." (8) Robert Atkinson, of the Information Technology and Innovation Foundation, argued that markets alone do not produce optimal levels of innovation, so government intervention is necessary to generate technological innovation, which in turn drives economic growth (6).

Speakers on the innovation panel discussed those broader economic and policy conditions necessary to foster innovation, and compared US approaches to those of other nations. Many other countries have developed national plans to guide S&T investments to support infrastructure, education, research and development. These national S&T strategies promote innovation and scientific development as a goal in itself, not merely as means to other ends. Atkinson defined a national innovation strategy as "a well-conceived, strategic approach to drive innovation that proactively anticipates and articulates the interactions among policies," including S&T, R&D, commercialization, education, immigration, tax, trade, intellectual property, and regulation. Many nations have developed strategies for science and innovation, including China, India, Japan, Korea, Taiwan, Thailand, Germany, Denmark, UK, Sweden, South Africa, Albania and Uganda. These efforts generally include focusing investments on key areas of science or technology, setting goals to lead in a given area (such as clean energy or IT), and/or policy changes to issue tax credits or R&D vouchers (6).

The final panel of the AAAS Forum was devoted to the future of US research universities. Major issues identified were the decline in public funding and increased pressure upon universities to transition research into commercial products. The speakers made a case for the role of universities in "innovation ecosystems" as basic research engines, drivers of direct commercialization and economic growth, and centers for social and cultural exchange that many experts point to as essential ingredients in fostering innovation. However, the presentations emphasized that to be successful, universities will need to adapt to a changing economic climate and focus more upon developing relationships with industry for research funding and technology transition.

Conclusions

There has been much concern in the US about globalization trends in science and technology, in particular the ascendancy of other nations in challenging the innovation and economic dominance of the US. For some areas of S&T, particularly defense, these trends are problematic and will require investment in domestic capabilities to meet specialized national security needs. But in other areas, the US could benefit by better adapting to the globalization of S&T, and leverage international investments in R&D while continuing to invest and lead in defined fields that sustain US capabilities upon the world stage. A national S&T strategy could spur innovation and economic growth by focusing investments into priority areas and streamlining policies to generate innovation and growth.

Overall, the speakers at the 2011 AAAS Forum on Science and Technology Policy made strong arguments that government investment in basic and applied research and development are essential to the nation's long-term economic development. Numerous speakers viewed innovation as an economic engine, and cited sustained government investment as key to US competitiveness in a globalized future. They argued for maintaining strong S&T funding despite budget pressures, and some called for development of a national innovation strategy. The salient message of this year's AAAS forum was that government investment and leadership in S&T can, and should, have a strong effect on driving US innovation and economic growth.

Disclaimer

All claims herein made are the responsibility of the author.

Competing interests

The author declares no competing interests.

References

1. Holdren JP. Scientific integrity: Fueling innovation, building public trust. 2010 Dec 17 [cited 2011 Jul 26]. In: White House Blogs [Internet]. Washington, DC: The White House. Available from: http://www.whitehouse.gov/blog/2010/12/17/scientific-integrity-fueling-innovation-building-public-trust-ostp
2. Holdren JP. S&T challenges, initiatives, and budgets under tightening fiscal constraints. Presentation at: AAAS Forum on Science and Technology Policy. Washington DC. 2011 May 5. Available at: http://www.aaas.org/spp/rd/forum2011/presentations/JohnHoldren_AAASForum2011.pdf
3. Clemins PJ. Federal R&D in the FY 2012 Budget: an introduction. In: American Association for the Advancement of Science. AAAS Report XXXVI: Research and Development FY 2012; 2011 May 5-6; Washington DC: American Association for the Advancement of Science. Available from: http://www.aaas.org/spp/rd/rdreport2012/
4. Office of Science and Technology Policy, Executive Office of the President. The President's plan for science and innovation: doubling funding for key basic research agencies in the 2010 budget. 2009 May 7; Washington, DC. Available from: www.whitehouse.gov/files/documents/ostp/budget/doubling.pdf
5. Clemins PJ. Research and development in the federal budget. Presentation at: AAAS Forum on Science and Technology Policy. Washington, DC. 2011 May 5. Available from: http://www.aaas.org/spp/rd/forum2011/presentations/PatrickClemins_AAASForum2011.pdf
6. Atkinson R. National strategies for research and innovation: what can the US learn? Presentation at: AAAS Forum on Science and Technology Policy. 2011 May 6. Washington, DC. Available from: http://www.aaas.org/spp/rd/forum2011/presentations/RobertAtkinson_AAASForum2011.pdf
7. National Science Foundation, Directorate for Engineering. The role of the National Science Foundation in the innovation ecosystem. 2010 Aug 25. Available from: www.nsf.gov/eng/iip/innovation.pdf
8. Bendis R. Innovation America. "Science & Innovation-Based Trends in the U.S." Presentation to the AAAS Forum on Science and Technology Policy. May 6, 2011. http://www.aaas.org/spp/rd/forum2011/presentations/RichardBendis_AAASForum2011.pdf.