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Report on the Annual AAAS Forum on Science and Technology Policy (2011)

HIROMI OMOE
Life Science Innovation Unit

1 Introduction

The American Association for the Advancement of Science (AAAS) held its annual Forum on Science and Technology Policy in Washington D.C. on May 5 and 6, 2011[1]. The topics for the Forum include trends in the federal budgets for science and technology and key public policy issues that the science community is facing. The Forum brings together scientists, policy-related professionals, and others to understand such trends and issues and provides an important opportunity for discussions. At this year's 36th Forum, the outlines of President Obama's science and technology policies and R&D budget proposed for fiscal 2012 were introduced. The topics at plenary and concurrent sessions included national innovation strategies, American research universities, emerging issues in scientific integrity, and communicating science issues for policymakers.

Fiscal conditions in the United States have been deteriorating and, due to the divided Congress, the implementation of the fiscal 2011 federal budget has been long-delayed. The report on last year's Forum also mentioned deteriorating fiscal conditions[2]. Among OECD nations, the United States ranked 15th in the accumulated government debt-to-GDP ratio in 2007, and the country is expected to rise to a higher rank by 2020. The fiscal deficit in fiscal 2010 (October 2009 to September 2010) was about $1.566 trillion (10.6% of GDP), larger than the deficit in fiscal 2009 (October 2008 to September 2009), which amounted to $1.413 trillion (9.9% of GDP). (See Chapter 3 of this article.) On April 14, 2011, a divided Congress passed the fiscal 2011 (October 2010 to September 2011) federal budget (Appropriations Act: H.R. 1473), and on April 15, President Obama signed the act. However, from the beginning of fiscal 2011 until the passing of the budget, a provisional budget was used to maintain government functions. There were even concerns that federal institutions might shut down.

Under such circumstances, this Forum held a series of sessions with the following question as the basis for discussion: In which areas of science and technology should money be invested and based on what policies?

2 President Obama's Science and Technology Policies—From the Keynote Address by Dr. J. Holden (Assistant to the President for Science and Technology)

Dr. Holden, Assistant to the President for Science and Technology, pointed out some of President Obama's significant efforts to enhance science, technology, and innovation, including appointments of scientists to administrative positions and PCAST studies. He mentioned that five Nobel Laureates in science were appointed to key posts at the Department of Energy (DOE), the Office of Science and Technology Policy (OSTP), the President's Council of Advisors on Science and Technology (PCAST), and the National Cancer Institute (NCI). He also mentioned that more than 25 scientists from the National Academy of Sciences (NAS), the National Academy of Engineering (NAE), the Institute of Medicine (IOM), and the American Academy of Arts & Sciences were appointed to administrative positions. He also mentioned that the president actively called on PCAST for advice, and studies were requested and completed for, e.g., 2009 H1N1 Influenza pandemic, the assessment of the National Nanotechnology Initiative, implementing K–12 STEM education, accelerating the pace of change in energy technologies, and realizing the full potential of health IT to improve healthcare. He also referred to PCAST studies that are underway, including biodiversity preservation and ecosystem sustainability, carbon offsets, and STEM higher education.

In addition, Dr. Holden introduced initiatives on

stem-cell guidelines, Visa MANTIS procedures, streamlining reporting on federal grants, and scientific integrity principles, guidelines, and policies. He also elaborated on NASA's programs and human spaceflight, the setting up of three initial energy-innovation hubs[3], National Oceans Policy (EO 14547, July 2010)[4], other energy and environment topics, as well as international ST&I (Science, Technology, and Innovation) cooperation.

Dr. Holden referred to five challenges surrounding science and technology policy in the United States. 1) Sustaining support for science and technology despite budget cuts: the DoD's basic science, NASA's James Web Space Telescope and advanced technology, NOAA's polar orbiting satellites and climate service, DOE's Carbon Capture Sequestration, NSF's social science, USDA's peer-reviewed agricultural science, EPA and FDA's regulatory science, USGCRP's[5] climate science and sustainability science. 2) Getting key messages across: why science and engineering matter to economy, environment, and security and how science works. 3) Advancing a coherent energy-climate policy. 4) Implementing public-interest IT initiatives: health IT, government efficiency and openness, and public safety. 5) Addressing weak teacher competence and systemic weaknesses in K–12 STEM education. He reiterated that President Obama regarded this as the single most important thing to do for the future of the United States.

3 Budgetary and Policy Context for R&D in Fiscal 2012

According to the Budget Message of the President for fiscal 2012 (October 2011 to September 2012) released in February 2011, the total budget is $3.73 trillion down by 2.4% from fiscal 2011(comparisons with fiscal 2011 are shown in parenthesis here and below). According to the AAAS estimate based on the Budget Message, the total R&D budget is $149.1 billion (up 3.3%) and the details are shown below.

The growth rate for non-defense R&D was significant. In contrast to the proposed budget for defense R&D at $82.3 billion (up 0.2%), the proposed budget for non-defense R&D is $6.68 billion (up 7.3%). The Research Funding is $66.9 billion (up 10.5%), among which $32.6 billion (up 11.1%) is for basic research and $34.3 billion (up 9.9%) is for applied research. Some $79.5 billion (up 0.2%) is for development and $2.7 billion (down 39.4%) is for equipment and facilities. The budget places emphasis on basic and applied research, but the establishment of new facilities is expected to cut back substantially. Education is also emphasized, and $100 million are proposed to educate K–12 STEM teachers.

By agency, $13 billion (up 22.1%) are proposed for the DOE. The energy programs have the most significant increase at $3.5 billion (up 68.2%). Other significant increases are $874 million (up 52.5%) for the NIST and $1.05 billion (up 48.1%) for the DHS. Some $6.1 billion (up 14.6%) are proposed for the NSF: $998 million for climate and energy (SEES: Science, Engineering, and Education for Sustainability[6]), $576 million for clean energy, and $117 million for CIF21 (Cyberinfrastructure for 21st Century Science and Engineering)[7].

During the session titled "Budgetary and Policy Context for R&D in FY2012", demographic patterns that are driving public policy decisions as well as trend analyses of the United States economy were also discussed. Concerning demographic changes, the following five issues were discussed: 1) The growth rate of the United States is declining and the country is an aging society, 2) the number of immigrants is increasing, pushing up the country's population (immigrants made up 12.5% of the total population in 2009), 3) income disparity in the population is growing, 4) the Hispanic and Asian populations are growing in size and dispersing spatially, creating language and education-related issues, and 5) these two populations are exhibiting very different human capital investment trajectories (school education and OJT). The speaker, Dr. R.M. Groves (Director of the United States Census Bureau) stated that other industrialized countries also have issues surrounding immigrants but that the aforementioned five issues should be addressed by American science and technology policy.

Dr. C.L. Mann (Professor at Brandeis University) began her presentation on American economic and innovation prospects by proposing a question: "Global Headwinds or Global Support?" She stated that even though there were some concerns over exports, oil prices, and bank problems at home and abroad, exports to Asia were recovering. She also mentioned that the total fiscal deficit of the United States in fiscal 2010 (October 2009 to September 2010) was about $1.6 trillion (10.6% of GDP), up from $1.413

trillion (9.9% of GDP) in fiscal 2009 (October 2008 to September 2009).

4 Other Topics

This Forum also covered issues regarding strengthening American competitiveness from an engineering perspective, national innovation strategies, emerging issues in scientific integrity, communicating science for policy, and the future of American research universities. The following sections introduce some of the topics that are particularly notable.

4-1 Issues Regarding Strengthening American Competitiveness

The presentation by Dr. C.M. Vest (National Academy of Engineering) was titled "U.S. Competitiveness in the 21st Century—Why an Eternal Optimist Is Worried." He looked back at American science and technology policy in the past and pointed out some issues regarding strengthening American competitiveness. He mentioned that the percentage of undergraduate degrees in engineering in the United States was lower compared to Asian and European countries separately and stated that the United States should produce more engineers. He also proposed that engineering should be promoted in a way that addresses four engineering grand challenges: 1) enhancing energy, water, and climate sustainability, 2) improving medicine and healthcare delivery, 3) ensuring security against human and natural threats, and 4) expanding and enhancing human capability and happiness.

4-2 Communicating Science for Policy

Dr. S. Doney (Woods Hole Oceanographic Institution) pointed out that science communication paradigms are changing. He used ocean acidification and its effects on American fisheries as an example to state that the science communication paradigm was shifting from an old model (scientists to the general public to the government to laws and regulations) to a current model (two-way dialogue between stakeholders). He also stated that efforts by the National Academies and science societies, releasing peer-reviewed syntheses targeting broader audiences, and improving Web-resources were important for community consensus and assessment.

4-3 Prospects of American Research Universities

American research universities are in critical financial condition. State universities are in a financial crisis due to declining tax revenues, and private universities have difficulty managing funds due to the crisis in the financial markets. These conditions have adverse effects not only on research activities but also on education for undergraduate and graduate students. In addition, the future of university assessment and the outlook for financial independence were also discussed at this Forum.

Some speakers pointed out issues surrounding educational program assessment, and they all agreed that such assessments should be stricter. For example, one discussion was that unsustainable or broken educational systems (where students are forced to leave their research field early during their academic careers) should be assessed critically. Another discussion was that graduate programs should be strictly assessed based on the years that students take until graduation and the number of students who acquire degrees. There was also a discussion on whether graduate schools should incorporate corresponding training and skills into their programs, since many doctorate students end up finding jobs in non-academic fields.

There was also a discussion concerning the management of state research universities. In the State of Pennsylvania, the state government substantially decreased its support to state universities. The state government proposed a 52% reduction in General Fund Appropriation for state universities for fiscal 2012 compared to the previous year[8]. Dr. I. Feller (Professor Emeritus, Pennsylvania State University) suggested that this trend actually shifted higher education from a product provided for the public to a private product and that undergraduate and graduate education might be privatized in the future.

5 Conclusion

The United States continues to be in a severe fiscal and economic condition. On February 4, 2011, an updated national innovations strategies entitled "Strategy for American Innovation: Securing Our Economic Growth and Prosperity" was released, and there are movements to strengthen American economic development and international competitiveness. This Forum also

contained presentations and discussions on how to simultaneously pursue fiscal reconstruction, economic growth, and competitiveness.

In the United States, the role of science and technology has been emphasized in order to resolve different kinds of national issues surrounding, for example, public finance, the economy, and education. This recent trend is exemplified by the increase of the total R&D budget proposed for fiscal 2012 by 3.3%. In particular, attention should be paid to the direction of future R&D investments surrounding energy policies. The 2010 Forum[2] referred to the severe financial conditions at state research universities. As the case of Pennsylvania State University illustrates, conditions are deteriorating. Attention should also be paid to opposing trends of emphasized investment in K–12 STEM education by the federal government and decreasing fiscal support of state research universities by state governments.

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Profile

Hiromi OMOE
Life Innovation Unit
Senior Fellow, STFC
http://www.nistep.go.jp/
A veterinarian and a Doctor of Agriculture, Hiromi Omoe was engaged in molecular pathology research on human and animal diseases before assuming her current position. Her main area of interest lies in science and technology policies for ensuring safety concerning living environment factors such as food, microorganisms, and chemical substances.

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