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Science and Technology Policy Trends in the United States — Report on the AAAS Annual Forum on Science and Technology Policy —

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1 Introduction

On April 22 and 23, 2004, the American Association for the Advancement of Science (AAAS) held its Annual Forum on Science and Technology Policy. The Annual Forums have been held each spring since 1976 in Washington D. C. as meetings to discuss science and technology policy. This year's forum was the 29th.

The themes of the Annual Forums are chosen from policy issues, such as funding, currently facing the US science and technology community. The forums are held after the Federal Government announces its budget for the coming fiscal year, when Congressional debate is heating up. The forums thus take place at an appropriate time for those concerned to express criticism of or support for the proposed budget, for government officials to explain policy, and for those concerned to debate the issues among themselves.

This year over 500 people attended, including government officials such as John H. Marburger, III, Director of Office of Science and Technology Policy; members of Congress such as Senator Tom Daschle (D); heads of university research departments; analysts from relevant think tanks; lobbyists from scientific associations; and foreign experts on science and technology policy. Topics discussed included the following:

- Outlook for the Federal Government's FY 2005 research and development (R&D) budget
- The impacts of post-terrorism security policies on US science
- US competitiveness in the face of informatization and globalization

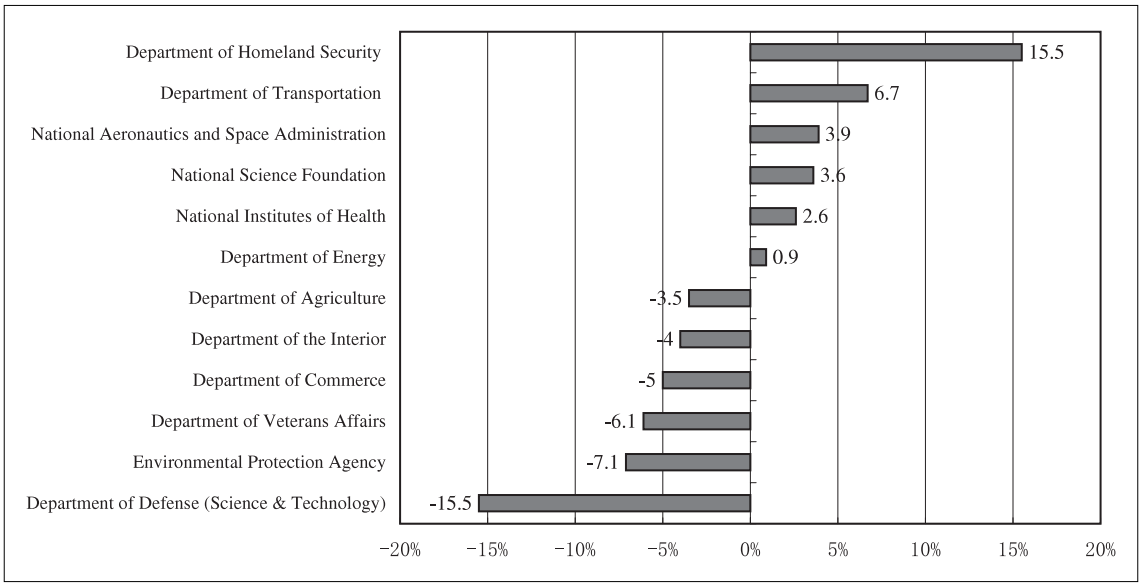
This article will provide an overview of major topics discussed at the Annual Forum[1].

2 Outlook for the Federal Government's FY 2005 R&D budget

Released by the Bush Administration on February 2, 2004, the proposed US federal budget for FY 2005 is $2.4 trillion. The federal budget for research and development is $132 billion. Broken down further, 57 percent (about $75 billion) of that is for defense R&D, while the remaining 43 percent (about $57 billion) goes to non-defense R&D. Compared with the previous fiscal year, the budgets for both defense and non-defense R&D increase, but the rate of increase was greater in the defense sector (4.3 percent overall, 5.9 percent for defense, and 2.3 percent for non-defense).

Figure 1 shows the FY 2005 R&D budget requests of various government agencies in comparison with their FY 2004 budgets. The budget for sectors related to national security is clearly increasing under the Bush Administration. In particular, the proposed R&D budget for the Department of Homeland Security is $1.2 billion, a 15 percent increase over the previous fiscal year. Meanwhile, most of the increase in the Department of Defense R&D budget is allocated to the development of missile defense systems, and the budget for science and technology such

Figure 1 : Comparison of FY 2005 government agency budget proposals with FY 2004 budgets



Source: Prepared by the author based on Annual Forum materials: "Kei Koizumi, AAAS, The Federal Investment in R&D in FY 2005 and Beyond."

as basic and applied research has decreased sharply. The Bush Administration's priorities are i) defense, ii) homeland security, and iii) the economy, and while the federal government's R&D budget reflects those priorities as well, budget increases are going mainly to defense and homeland security.

Kei Koizumi, director of the AAAS R&D Budget and Policy Program said that if the federal R&D budget proceeds in accordance with the Bush Administration's deficit-reduction plan (reducing the deficit to half the FY 2004 level over the next five years), the following would occur in the next five years:

- The defense R&D budget, for the Department of Homeland Security, etc., will continue increasing.
- With the exception of NASA, the non-defense R&D budget will decrease by 5 to 15 percent from fiscal 2004 levels.

The increase in NASA's budget would come from the New Vision for Space Exploration Program (comprising the development of a crew exploration vehicle, plans for manned Moon expeditions, and concepts for future exploration) announced by President George W. Bush in January.

Opinion is divided on the Bush Administration's science and technology policy. In his keynote address, presidential advisor Marburger stated that under the current Administration not only national defense related R&D budgets but also budgets for non-defense R&D aimed at long-term economic development are showing sustainable growth. He also emphasized the establishment of a new advisory board on biosecurity in the US Department of Health and Human Services as an example of cooperation between the government and the scientific community. On the other hand, in his own address, Senator Daschle claimed that although the government has a duty to ensure that scientists can freely carry out research with sufficient resources, the current Administration is neglecting that duty. In addition, he alleged that two members were removed from the President's Council on Bioethics because they actively engage in human embryo research, and that the Administration pressures and twists scientific analysis to obtain the results it wants.

3 The Impacts of post-terrorism security policies on US science

Regarding the impacts of post-terrorism national security on US science, discussion centered on biosecurity and visa issues.

The terrorist incidents using anthrax in 2001

gave rise to an awareness that technology for biological manipulation developed to improve health and other new discoveries could be used in malignant ways that could pose a threat to national security. In accordance with this concept, the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 was established. The law requires the registration of institutions that handle designated pathogens and toxins and background checks on individuals who handle them.

Furthermore, during the current fiscal year, a new advisory board on biosecurity was established in the US Department of Health and Human Services. The National Science Advisory Board for Biosecurity creates policy to prevent biological research from being used in terrorism and provides advice and guidance to government agencies and research institutions.

In addition, as a concrete example of national security policies having negative results, it was pointed out that grants-in-aid and contracts for non-US citizens are being limited and that cases of the publication of research results being restricted are increasing. Visa problems are lessening the desire of students and fellows from overseas to study in the US, and the number of students entering doctoral programs at Massachusetts Institute of Technology has declined since 2003.

As a result, the following concerns and ways of addressing them were discussed

- The outward flow of scientists due to excessive restrictions on non-US researchers
- The influence of strengthened government oversight of joint research on relationships with joint researchers abroad
- The influence of difficulties securing outstanding students and fellows from abroad and their impact on science and technology and US leadership

A glimpse of the large shadow national security issues have been casting on US science since the terrorism of 2001 was provided.

4 US competitiveness in the face of informatization and globalization: The rise of China

The forum showed awareness of advancing technology outsourcing to India and China as informatization and globalization progress. The fact that, unemployment among information technicians and the accompanying declines in competitiveness and wages, was cited as short-term effects of outsourcing. A survey by the Computing Research Association (CRA) that found that young Americans are aware of this trend and that fewer people are entering bachelor's degree programs in computer science was presented. It was also pointed out that long-term effects would include structural changes in employment and impact on military dominance and national security.

In addition, while Japan was seen as an economic competitor in the past, a majority now sees China in that role. In particular, it was pointed out that the technological development model underlying high Chinese growth differs from that of Japan (i.e., Japan: high prices, high wages, advanced technology, industrial policy, and so on; China: low prices, low wages, advanced technology, an active entrepreneurial spirit, and so on).

China has utilized its low-cost manufacturing ability as the basis for high economic growth, but now its ability to innovate is also growing rapidly. Underlying that growing ability is China's characteristic expanding access to overseas research activities through overseas-Chinese scientists and students from China studying abroad. It was further pointed out that US visa issues, linked with China's call-back policy, result in outstanding Chinese scientists returning home and further contributing to China's production strength.

Georgia Institute of Technology professor Diana Hicks presented various data showing the rise of China. According to her data, gross national expenditures on research and development (GERD) for Singapore and China increased rapidly

between 1991 and 2001, when it reached 2.5 to 3 times the 1995 level. China's 2001 GERD was $57 billion, about half that of Japan. Looking at the number Chinese receiving doctorates between 1986 and 1999, the 1999 figure was an astonishing 54 times as great as that of 1986. In absolute terms, the figure is at the same level as Japan in 1998 (about 6,500). In addition, China also published 4 times as many papers in 1999 as in 1986.

Most of the data presented by Professor Hicks showed the US and Japan still leading in absolute terms, but on the other hand they show China rapidly increasing its presence.

5 New directions for R&D: cognitive science

One could also sense that "research on the mind" or "cognitive science" continues to come to the fore as a new direction for research and development.

Senator Daschle also stated that understanding how human beings learn, remember, think, and communicate and how to apply those to areas such as education, safety, and security can be an important direction for research following the Human Genome Project.

Discussion also took place on the concept of NBIC technologies and how NBIC will impact society and ethics.

NBIC is a concept integrating nanotechnology, biotechnology, information technology, and cognitive science. Examples given included the development of technology such as interface between human being and sensors and biochips that connect neurons with electrodes.

By linking the four science and technology sectors mentioned above, NBIC opens the possibility of improving human beings physically, mentally, and socially. Ethical issues and security cannot be ignored in the development of this field. The forum showed an awareness that if NBIC is to be accepted by society, obtaining a consensus on ethics including ethicists, technology transfers that preserve the creativity and originality of the four technologies, and help with their fusion are necessary.

6 Conclusion

This year's Annual Forum was held a year after the war in Iraq, and it provided a glimpse of the large shadow cast over US science by security issues since the terrorism of 2001. That shadow takes forms such as difficulty in securing budgets for non-defense R&D, visa issues, and issues concerning oversight of life sciences research laboratories. In particular, the US scientific community feels a strong sense of crisis because non-defense R&D budget decreases in the next five years due to financial issues and the tendency to put priority on anti-terrorism policy.

China was the focus of much attention and awareness as a powerful economic rival of the United States. Although the US and Japan maintain their leads in areas such as overall R&D funding and papers published, China's presence is rapidly increasing. Japan's presence is in relative decline.

In addition, "research on the mind" or "cognitive science" continued to come to the fore as the next major topic of research and development. Currently there are no national-level projects on cognitive science in the United States, but it is possible that a national project on the subject will be carried out in conjunction with fields such as nanotechnology, information technology, and biotechnology. It is necessary to watch for future developments.

Finally, a few thoughts from the author on having attended the Annual Forum. The Annual Forums are timed to follow the opening of full-fledged Congressional debate on the proposed budget for the coming fiscal year. Persons on the front lines of science and technology policy in various sectors gather in a single venue and vigorously debate various points of contention regarding science and technology policy. This is something that cannot be experienced in Japan. Attending the Annual Forum was extremely valuable as a means of learning the science and technology policy issues of the United States. I sensed that it would be highly meaningful if Japan would also hold this kind of forum to openly debate science and technology policy and dispense information

about its S&T policies to other countries.

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References

[1] The website of the 29th Annual Forum on Science and Technology Policy (the Annual Forum's program and other informational material):
http://www.aaas.org/spp/rd/forum.htm

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