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PCAST Releases Tech Transfer Report

E. Floyd Kvamme

A report on the U.S. federal structure for encouraging technology transfer was approved by the President's Council of Advisors on Science and Technology (PCAST) in May. The report reaffirms the effectiveness of existing legislation meant to foster technology transfer, but calls for some minor improvements to the surrounding processes. It is a companion to an earlier PCAST report released in February, "Assessing U.S. R&D Investment," which was produced by the PCAST Subcommittee on Federal Investment in Science and Technology and Its National Benefits, chaired by G. Wayne Clough, president of the Georgia Institute of Technology.

The subcommittee was charged with exploring issues surrounding the historical patterns of federal investment in science and technology (S&T). It examined trends and patterns of federal support of research and development (R&D) over the past 25 years, comparing U.S. investment in both the federal and private sectors with that of other countries that compete with the United States in the global marketplace.

Based on its findings, the subcommittee provided several key recommendations. It particularly noted that the doubling of the National Institutes of Health's budget is now complete and recommended targeting the physical sciences, including metallurgy and materials, and certain engineering fields (electrical, mechanical, chemical) for future funding increases. Input from the PCAST report played a vital role in the ultimate approval of H.R. 4464, the National Science Foundation Authorization Act (commonly known as the NSF doubling bill), and PCAST co-chair E. Floyd Kvamme noted that the president's fiscal year 2004 budget request acted on a number of PCAST recommendations.

Notably absent in the final version of the report is the use of the word "doubling" with regard to NSF, which Kvamme said was deliberate. Instead, the emphasis is on bringing the physical sciences and engineering "collectively to parity with the life sciences" with a series of funding increases over the next four fiscal years.

"Just because a doubling has been done once [with NIH] doesn't mean it has to be done every time," said Kvamme. "You'd constantly be out of balance with that approach. So we didn't use that terminology, although we did call for a 'rebalancing' between the life sciences, the physical sciences, and some areas of engineering."

To address S&T work force concerns, the panel recommended the establishment of a fellowship program to attract U.S. students to graduate studies in the physical sciences and engineering. The report also suggested that the administration's Office of Science and Technology Policy create a classification system to help assess patterns of federal R&D investment in light of its ability to meet national needs, to closely monitor research investments of other nations and keep abreast of important S&T developments to keep the United States globally competitive, and to assess the adequacy of the future science and engineering work force in light of shifting national priorities.

However, that report was only half of the task assigned to the subcommittee on federal investment, according to Clough. The second half is addressed in a new report, which covers the issue of the federal structure for encouraging technology transfer. Of particular interest was existing legislation that has garnered criticism from some circles: the Baye–Dole Act, which requires private industry and small-business researchers that receive federal funding to commercialize any scientific discovery they patent; and the Stevenson–Wyler Act, which does essentially the same thing for national laboratories.

The rationale for the legislation is that before its enactment, the federal government retained all intellectual property (IP) rights for federally funded research, resulting in a backlog of IP rights that were not being developed and in many cases not even being patented, enabling governments from other countries to step in.

"Most federal agencies don't have commercial branches," said Clough. "What these two acts did was outsource the commercialization. We held lots of hearings to understand the criticisms of those Acts, but ultimately we decided that the basic tenets are sound; all the right incentives are there."

However, there is still room for improvement. The new report recommends that the Department of Commerce develop a better educational process to assist universities and small businesses entering the commercial arena for the first time; it also suggested that federal agencies include language on technology transfer in their mission statements. There is a need to develop suitable metrics to measure progress and performance in technology transfer, such as the number of patents awarded, the number of licenses issued, and the number of companies and jobs created. The panel requested that Commerce monitor what other countries are doing to commercialize scientific breakthroughs. For instance, Germany just approved legislation that is similar to the Baye–Dole Act, according to Clough.

"Our take is that this world is not static, and we need to understand what the competition is doing to remain globally competitive," he said.

JENNIFER OUELLETTE

Japan's NISTEP Releases S&T Trends Report

The National Institute of Science and Technology Policy (NISTEP) of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in Japan has released its quarterly (April 2003) review of "Science and Technology Trends." The report focuses on the analysis of topics within four priority fields as listed in Japan's Second Science and Technology Basic Plan (Fiscal Year 2001–2005), which includes "environment" (with a strong materials component) and "nanotechnology and materials." The report analyzes science and technology (S&T) trends in the study of the influence of aerosols on global warming, ecomaterials, single-electron electronics, a drug delivery system, photocatalysts, and sustainable hydrogen-energy systems.

The influence of aerosols on global warming has yet to be assessed. The quarterly review recommends that Japan take the initiative in improving the system of gathering data in the Asian region, increasing the pool of junior researchers educated in this field, and promoting communication among Japanese research groups and international groups.

According to the report, Japan is leading the field of ecomaterials, playing a central role in international conferences; meanwhile, efforts should be made at the national level to further strengthen research. Rather than strictly improve the efficiency of each material, the report recommends consideration of the relationship between materials and society in order to enhance the success of ecomaterials research. The report calls for an increase in resource productivity in order to satisfy the expected increased demand for materials and energy in developing countries.

As a result of a strategic objective proposed by MEXT in fiscal year 2002, Japan—alongside the United States—is leading the field of research involving the use of nanometer-sized materials such as carbon nanotubes to break through the limits of semiconductor integrated circuits. The report shows Japan to be ahead

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internationally in studies of the integration of single-electron devices and of logic circuits based on binary decision diagrams. Because the United States is heavily researching quantum cellular automata, the report recommends that Japan begin research in this area, too, at the risk of falling far behind. The report also recommends an increase in continuous funding in the field of single-electron electronics.

The report recommends that Japan create a key organization for research and development (R&D) in the area of drug delivery systems, establishing a joint industry–university–government project. The report endorses a proposal by the Biotechnology Strategy Meeting to double bioresearch funding in five years and reduce the time period it currently takes to approve new drugs. Such a proposal converted into policy will support materials R&D in drug delivery systems.

In the area of photocatalysts, the report calls for government-funded basic research focused on finding a material superior to titanium oxide and, in the meantime, for a standardization of products that use titanium oxide as it is industry's material of choice. In the area of energy, the report calls for long-term research in pursuit of non-fossil-resources-based hydrogen production technology with the goal of creating technologies that are easily transferred to developing countries.

The quarterly review, published by NISTEP's Science and Technology Foresight Center, can be accessed at Web site www.nistep.go.jp.

EU Action Plan to Boost Research Efforts in Europe

The European Commission (EC) adopted the communication on "Investing in Research: An Action Plan for Europe" on April 30, which delineates initiatives to increase the level of investment in research in the European Union (EU) from 1.9% to 3% of the EU gross domestic product (GDP), with two-thirds financed by the private sector, as called for by the March 2002 Barcelona European Council (EC). One of the key actions calls for setting up European technology platforms on primary technologies such as rail, aerospace, and hydrogen-related technologies; photovoltaics; nanotechnologies; and information and communication technologies, and to shape and implement a common vision for the development and deployment of these technologies.

Based on information gathered for the EC March 2003 publication of the "Third European Report on Science & Technology Indicators, 2003," the European share of research and development (R&D) investment in 2000 by the top 500 global R&D performers amounts to ~29%, compared to 44% for U.S. firms. German, French, and British firms account for most of the European share—9.7%, 5.8%, and 5.3%, respectively. These countries also rank highest in estimated governmental support for nanoscience and nanotechnology, but still far below investments made by the United States and Japan in 2000 (see Table I).

Table I: Estimated Governmental Support for Nanoscience and Nanotechnology (2000).

Country	Amount (millions of Euros)
European Union	
Germany	63
United Kingdom	39
France	19
United States	270
Japan	175

€1 = ~$1.2 USD.

Source: Adapted from the "Third European Report on Science & Technology Indicators, 2003."

Note: Actual number may differ by ±10% from estimate.

Other key actions listed in the communication include strengthening links between industry and public research, redirecting public spending toward research and innovation, making research careers more attractive, and developing better fiscal incentives for research. More information can be accessed at Web site http://europa.eu. int/comm/research/era/3pct.

Australian "Flagship" Programs Include Light Metals and Energy

The National Research Flagships initiative in Australia brings together science and industry across the country to tackle key challenges in vital fields, including light metals and energy, according to Geoff Garrett, chief executive of the Commonwealth Scientific & Industrial Research Organisation (CSIRO). In an announcement made in April, Garrett said that the goals of the initiative include doubling the economic value of Australian production of light metals to $10 billion AUD over 10 years while reducing the environmental impact and helping Australia to position itself as a world leader in clean, cost-efficient, and secure energy.

The Light Metals Flagship program aims to help develop novel manufacturing systems for light metals and alloys, reduce by one-third the energy needed to make light metals, develop technology for a new titanium metal industry, and cut the life-cycle environmental impact of light metals in half.

The Energy Transformed Flagship program will help develop efficient, zero-emission coal-fired power, leading to large-scale hydrogen production from fossil fuels; new-generation low-emission vehicles, traffic systems, and clean fuels, leading ultimately to hydrogen-powered vehicles; and high urban air quality, through the eventual use of hydrogen as an energy carrier.

Garrett said, "Each flagship is the result of wide consultation between CSIRO, government, other scientific institutions, and with industry. As a result, they align closely with the National Research Priorities."

NRC, NSERC of Canada Lead S&T Exploratory Mission to Central Europe

Arthur Carty, president of Canada's National Research Council (NRC), and Thomas A. Brzustowski, president of Canada's Natural Sciences and Engineering Research Council (NSERC), led exploratory missions to Hungary and Poland in early May to identify prospective science and technology (S&T) collaborative opportunities among Canadian and Central European scientists.

The primary S&T research areas of shared interest among the three countries include microelectronics and nanotechnologies, new materials technologies, and alternative and renewable sources of energy such as fuel cells.

Carty said, "By exploring prospective international collaborations with strategic partners, NRC strives not only to enhance Canada's access to knowledge, technology, and research networks, but also to provide opportunities for Canadian firms and entrepreneurs."

Brzustowski, who looked for openings for Canadian graduates, said, "NSERC is interested in identifying outstanding academic departments in science and engineering where Canadian students might wish to pursue graduate studies." □

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