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# EDITORIAL

## Universities: At The Center of U.S. Research

There has been much discussion in recent years about the need for a new national science policy, on the premise that the current model, forged in a Cold War environment, cannot provide a blueprint for the 21st century. Vannevar Bush's 1945 report to President Harry S. Truman, "Science—The Endless Frontier," is sometimes dismissed in such discussions as an historical relic. Bush, who had an intuitive sense of the shifting social and political contexts of science policy, would be the first to acknowledge that words written during the final, exuberant months of World War II should not be regarded as holy writ on the threshold of a new century. He might also admonish his critics to study his text carefully, rather than relying on latter-day interpretations, before discarding his entire vision.

It is true that some of Bush's arguments are now questionable and that some of the issues he considered important are now of interest only to students of the period. What remains pertinent is the report's vision of the role of government in research, including his assertion that the federal government had both the authority and the obligation to support basic research. More boldly, by arguing for the primacy of basic research supported according to norms set by scientists themselves, "Science—The Endless Frontier" implicitly asserted that universities defined the U.S. research system. Before World War II, universities were regarded as peripheral to the U.S. research enterprise. Bush gave them pride of place at the center because, as he argued, they had the potential to energize the entire system.

He was unerringly right on that issue. Bush's vision of research universities as the vital center of the U.S. research enterprise has indeed come to pass, thanks in large measure to an extraordinarily successful partnership with the federal government. As a result, both the research enterprise itself and the U.S. economy have prospered. Along the way, the U.S. research system has shown its ability to adapt. During the 1970s, for example, the National Science Foundation initiated a number of programs to encourage industry-university research collaborations. Today, almost one-quarter of all papers by university-based authors published in the peer-reviewed scientific literature are co-authored with at least one scientist from an industrial or government laboratory.

A striking indicator of the wisdom of U.S. science policy is provided by its foreign imitators. Perhaps most tellingly, the Japanese government's July 1996 Basic Plan on Science and Technology, which commits the government to double its research and development (R&D) investments during the next 5 years, emphasizes the promotion of basic research and proposes specific steps, such as improving education and research in graduate schools, to integrate universities more effectively into Japan's research system. A decade ago, Japan's apparent technology-based commercial success was often cited as evidence that the U.S. emphasis on basic research at universities was no longer viable. Today, Japan looks to the U.S. system as a model to help it maintain its position as a leading scientific nation in the 21st century.

But federal investment in R&D is likely to decline as the government struggles to balance its budget. The implications are unsettling not only for universities but also for the U.S. economy. Almost 25 percent of current federal R&D expenditures are invested in universities, compared with less than 3 percent of industrial R&D expenditures.

Can industry take the place of universities as the vital center of the American research enterprise? The evidence suggests not. As recently as a decade ago, several large U.S. firms performed significant basic research in their own corporate laboratories; today, virtually all industrial research focuses on the solution of specific short-term problems, often by building on the results of long-term university research. And even if industry could take on a more central role, the consequences to the nation of a research system dominated by the short-term needs of private industry—similar to the Japanese model so widely admired a decade ago—have yet to be seriously addressed.

In its simplicity and flexibility, Bush's report remains a model for future blueprints of U.S. science policy. Any such blueprint should continue to place universities at the vital center of the U.S. research system. On this point, Vannevar Bush was prescient indeed. His 50-year-old vision remains remarkably current.

**Richard C. Atkinson**

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