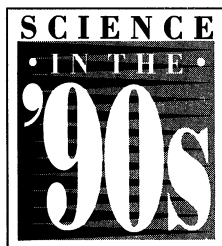


Defense Research After the Cold War

Defense Department funding of basic research and the development of critical civilian technologies could be more important, but more difficult to maintain, in an era of shrinking weapons budgets



Second in series

THE STRING OF political changes that began in the Soviet Union and cascaded through Eastern Europe has finally reached Washington, D.C. As the 1980s drew to a close, the nation's

capital was in the throes of a debate about how deeply the defense budget should be cut to reflect the dramatic changes in the international political climate. The issue, it seems, is not whether the Pentagon's funding will shrink in the 1990s, but by how much.

Defense Secretary Richard Cheney, bowing to the inevitable, last month announced his intent to hold the Pentagon's budget constant over the next 5 years by slicing \$180 billion from the increases planned by his predecessor. But even this radical surgery is already beginning to look conservative. Three former top defense officials recently testified before a Senate committee that the defense budget, now running at about \$300 billion a year, could be chopped in half over the next decade. And some members of Congress are even now selecting candidates for amputation.

It's a far cry from a decade ago, when Ronald Reagan rode to power on a promise to rebuild the nation's defenses. He subsequently presided over the biggest peacetime military buildup in U.S. history. In the process, the Reagan Administration rearranged the federal R&D landscape, boosting defense R&D from \$15 billion in 1980 to around \$41 billion in 1989. By the end of the decade, military programs accounted for two-thirds of the federal government's R&D budget, up from half when Reagan came to power.

The changes in store in the 1990s could have an equally dramatic impact on federal support for R&D. As the total defense budget deflates, defense R&D is also expected to go from boom to bust. Just where the shrinkage will occur is, at this point, anybody's guess. Nevertheless, concern is already being voiced about potential damage to the Pentagon's support for the develop-

ment of technologies, ranging from semiconductor manufacturing to high-definition television, that will be critical for civilian as well as military applications. There is also a fear that the defense department's basic research budget will be eroded.

Although there will be a noisy debate this year over the defense budget, major reductions are likely to come in later years if the thawing of the Cold War leads to solid arms control agreements. A growing number of defense experts are now expressing confidence that a pact to reduce conventional forces in Europe and a START treaty limiting the number of U.S. and Soviet strategic nuclear warheads will be completed soon, and that these should provide a framework for planning force structures in the 1990s. Says Jack Mendelsohn, deputy director of the Arms Control Association, "There's going to be a START treaty. Whether we're going to have it 11 months or 13 months from now, it's going to happen."

The programs now being widely discussed as candidates for the operating table are mostly big weapons systems under development during the Reagan years, such as the B-2 "Stealth" bomber, a mobile version of the MX missile, and the SSN-21 attack submarine. Development and testing directly tied to such systems could be among the first R&D programs to feel the pinch. Indeed, William Kaufmann of the Brookings Institution recently singled out a total of almost \$38 billion he believes should be cut over the next 5 years from advanced development funds for specific weapons.

Another prominent target is likely to be the Strategic Defense Initiative. SDI, in fact, has already begun to shrink, from \$3.9 billion last year to \$3.8 billion this year, and there seems to be a growing consensus that it will settle out around \$3 billion a year in the early 1990s.

How does long-term research fit into an era of fewer weapons and smaller defense forces? Virtually every expert contacted for this article expressed the view that, to hedge against a reversal of recent geopolitical trends, the Pentagon's budget for basic research and its support for critical technologies should be increased rather than decreased. Lewis Branscomb, former chief sci-

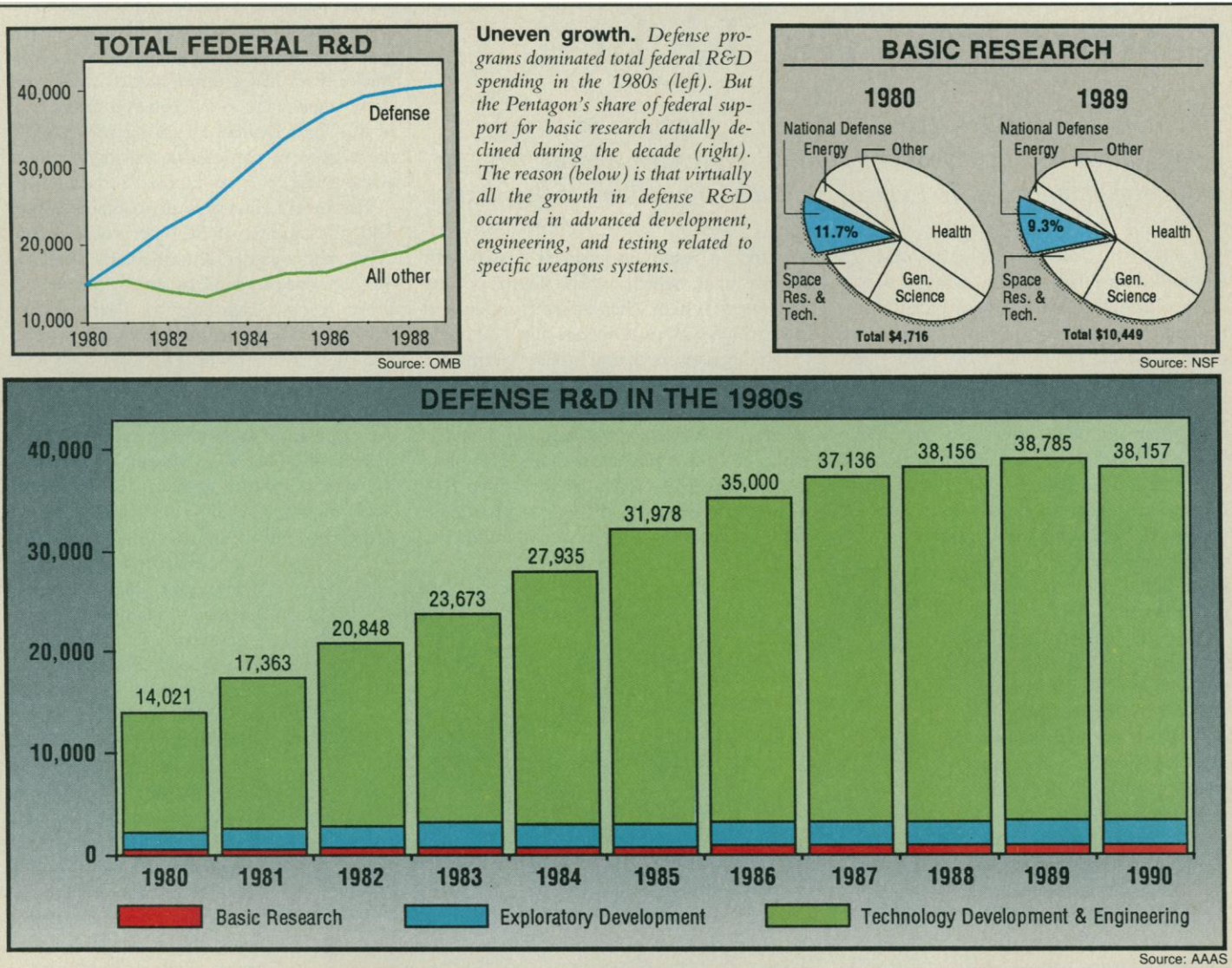
entist at IBM and now a professor at Harvard's Kennedy School of Government, put it this way: "You have to assume that there is some risk that the Cold War will reappear, or that in 20 years' time, some future enemy will materialize and you will have to restore [defense] capability. If you don't have the knowledge base to restore capability, you are in bad shape." But there is also broad agreement that it will be very difficult to protect the research end of the Pentagon's R&D budget. Says one congressional aide involved in shaping the military budget: "It's easier to give up something [that will pay off] 10 years from now than to give up 'rubber on the runway' tomorrow."

Certainly, defense R&D was shaped during the 1980s by the desire to put rubber on the runway as rapidly as possible. The lion's share of the increases was swallowed up by advanced development, engineering, and testing of specific weapons systems. Funding for these activities rose by almost a factor of 4 during the Reagan years—a doubling in real terms—and they now account for more than 90% of defense R&D. In contrast, the increases provided for the other end of the R&D spectrum—basic research and exploratory development—didn't even keep pace with inflation (see charts on opposite page). "That's enough to tell you where [the Pentagon's] priorities are, and I don't see them changing much as the [total] budget shrinks," says Gordon Adams of the Defense Budget Project, a Washington, D.C.-based think tank.

Meager though the growth in long-term research and development has been, the Defense Department is nevertheless a major source of funds for academic research, ranking just behind the National Science Foundation. But its funding for basic research is already declining, from an estimated \$951 million last year to \$923 million this year.

Equally important, the Pentagon has taken on the role of the U.S. equivalent of Japan's Ministry of International Trade and Industry, providing hundreds of millions of dollars a year to industry to develop technologies that will be critical for both civilian and military applications.

The most conspicuous of these efforts is an assortment of programs sponsored by the



Defense Advanced Research Projects Agency, or DARPA. At the top of the list is the \$100 million a year that the Pentagon is channeling to Sematech, an industrial consortium based in Austin, Texas, that is developing semiconductor manufacturing technologies. DARPA is also bankrolling a modest effort to develop high-resolution displays, a key component of high-definition television (HDTV) systems, and it has taken the lead role in supporting high-temperature superconductivity research, the development of expert systems, and research on neural networks.

Outside DARPA, the Pentagon will pump \$175 million this year into the Defense Manufacturing Technology program, an effort to stimulate the development of generic manufacturing technologies in a broad range of industries. And it has a budget of \$36 million to fund an incentives program designed to raise productivity in

industries critical to defense.

The Pentagon's rationale for funding these programs is that it is now relying more and more on commercially developed technologies in its weapons systems—in contrast to the situation in the 1950s and 1960s, when defense technologies were generally more advanced than those on the civilian side. The Defense Department therefore has a clear stake in keeping U.S. industry at the technological cutting edge.

These efforts have strong support in Congress, which may help protect them from the knife. For example, late last year, when word leaked out that the Office of Management and Budget had proposed cuts in DARPA's support for Sematech and HDTV, an uproar broke out on Capitol Hill. The funds have since been restored, according to defense officials, but, says one, the Administration's policy for supporting civilian technologies "is still under review."

The potential shrinkage of these programs is viewed with special alarm because the Pentagon is virtually the only game in town. Efforts to give the Commerce Department a modest role in supporting critical industrial technologies have met with considerable resistance. Eighteen months ago, for example, Congress established new programs in Commerce to fund a variety of technology development efforts in partnership with private industry. The programs are still mostly unfunded, however, and the Bush Administration has yet to name somebody to fill the post of Undersecretary of Commerce for Technology to run them.

If the thawing of the Cold War causes the Pentagon to cut back on its support for civilian technology development, and no other agency is able to pick it up, the fear is that the country will lose some critical defenses in the economic battles that lie ahead in the 1990s.

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