William Perry and the Weapons Gamble

The Pentagon's retiring chief of R & D says America must continue to bet on brains, not brawn, in weaponry

America's best weapon against the Soviet military, the Carter Administration recognized, is the ability to produce new ideas and sophisticated gadgets sooner than the enemy. This notion, which has grown from a gambler's hunch to an article of faith among many defense strategists, has no more ardent defender than William Perry, the departing under secretary of defense for research and engineering. As he was preparing to leave the Pentagon, Perry reiterated his belief that the United States must rely on its ingenuity more than anything else to overpower Soviet muscle. He told *Science* that his most important contributions along these lines were to reverse a 12-year decline in Department of Defense (DOD) funding of basic technological research and to invest heavily in making "smart" (electronically guided) weapons even smarter, through miniature circuitry.

Perry's parting thoughts reflect a view of military hardware that is in the ascendancy at the moment, but seems to be headed for some criticism. The hawks of 1981 are frankly skeptical of any strategy that tends to downplay the importance of sheer numbers. The Soviets have a significant numerical advantage in several areas of weaponry at the moment. The quality of equipment is important, the new hawks have pointed out, but not enough to offset overwhelming odds. This concern and the perennial drive at DOD to keep the military cornucopia filled with new varieties of weapons could make it difficult to find funds for the basic research projects that Perry thinks are so important.

Although Perry claims to have made great strides—he occasionally uses the word "revolutionary"—in adapting advanced technology to military uses, his successors may have a more difficult time. This is so because the public has grown more skeptical of the value of technology. There is a widespread feeling at the moment that the military's taste for "gold-plated" armor has led to oversophisticated weapons: things that work in the laboratory but not on the field. As one congressional critic put it, the DOD is producing weapons engineered for engineers, not soldiers.

Perry denies this. It is a gross misperception, he thinks, and one that could have catastrophic consequences if it begins to affect government policy. A decision to slow the pace at which new technologies are exploited would be self-defeating. Perry thinks it would eliminate the one certain advantage America has over the Soviets, and lead to a dangerous competition centered on quantitative superiority alone.

It is ironic that Perry, who professes such admiration for excellence in design, should have been asked to spend so much time defending the desert-based plan for the MX missile. Sidney Drell, the deputy director of the Stanford Linear Accelerator Center and determined opponent of the plan, called it a "Rube Goldberg" contraption. His label stuck. He and other critics challenged Perry to defend the logic of the system and got him to agree that in certain circumstances it could lead to a form of quantitative competition with the Soviets. If the Soviets were to place additional nuclear warheads on their land-based missiles, it turned out, the United States would have to build additional concrete shelters for the MX. Part of the problem here is that it will be increasingly difficult to determine how many warheads the Soviets have made ready for launching. Drell saw other weaknesses in the land-based plan, such as greater vulnerability to spying. He recommended that the MX be put to sea on small submarines, where it would be invulnerable to any foreseeable targeting system.

The critics say that Perry chose loyalty to the Administration over fairness and accuracy when he gave his technical reasons for putting the MX on land. Perry so overstated the weaknesses of submarines, one submarine fan says, that the Navy asked for and got a retraction of one of Perry's assertions. Among the arms control advocates, this is considered the low point in Perry's career at DOD, a period when he played the good soldier despite his private misgivings about the MX plan. However, it should be borne in mind that while Perry was trying to answer the arguments on the MX, his office continued to fund the very research by his critics that gave strength to their case.

Today Perry sounds flexible on the MX question, although he doubts that anyone will come up with a better solution than Carter's people did. The new Administration is reconsidering all the options and, meanwhile, the desert-based program is "chugging along at a cost of $100 million a month," Perry says. If changes are to be made, it is obviously best to make them right away.

One possibility would be to reexamine the need for action. The theory is that Soviet missiles will become so accurate in the 1980's that they will be able to score a direct, knockout hit on American land-based missiles. Perry believes that since the same experts who advised Carter on this issue would be called in again, Reagan's Administration would get the same interpretation Carter got: something must be done to compensate for the vulnerability of the missiles.

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Second, Perry says, "We could basically give up on the land-based missiles and expand our submarine missile force. That was very seriously considered in the Carter Administration. You cannot give strictly technical arguments as to why that cannot be done. It's much more a policy consideration than a technical consideration. . . . Deterrence exists as much in the minds of your opponents as in your technical capability." Reagan might decide that submarine missiles are just as frightening to the Soviets as land-

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based missiles, and in that case, Perry says, there is no technical reason to avoid putting the MX out to sea.

"The worst of all possible solutions," according to Perry, would be to place the new MX missiles in the old silos that now hold Minuteman III missiles. This, too, is being considered by the new Administration. Perry thinks it would do nothing to solve the problem of missile vulnerability, but would increase the Soviets' interest in striking first in a nuclear war. It would probably force the United States to adopt a policy of "launch on warning," in which our missiles would be fired after military radars had spotted something resembling a nuclear attack. Perry says he cannot even discuss this option "without breaking into tears." Fundamentally, it "amounts to turning over to a computer the decision to start World War III." Perry says his enthusiasm for electronics does not extend that far. For this reason he thinks the Reagan Administration will opt for some version of the mobile land-based MX now in development.

William Perry

Investments in electronics will revolutionize defense in the 1980's, he thinks.

Perry mentioned three specific areas in which he thinks his investment in electronics will pay in improved weapons during the mid-1980's: in armor-piercing shells, penetration of enemy territory by aircraft, and ability to shoot down enemy (tactical) aircraft. In all three areas, Perry says, the Soviets now have a significant quantitative advantage. Their tactical planes, for example, outnumber America's by two to one.

Because it was "infeasible" to compete with the Soviets on a one-for-one basis, Perry says, the DOD decided to "offset" the enemy's quantitative edge by developing more lethal weapons. The chief hope of the day lies with the "precision guided munitions," which use miniature electronic sensors and computer brains to guide them to their target.

Improved accuracy should make it possible for each shell, missile, or bomb to score a direct hit. In an air battle, Perry says, American fighter planes should be able to hold their space against superior numbers of roughly equivalent enemy planes. An American plane should be able to engage and knock out several opponents simultaneously by using electronically guided missiles and by having better information about the enemy's position. The battle data will be supplied by computerized field command systems now in development. Enemy locations will be displayed on a video screen in the cockpit, arrayed in exact relation to the pilot, as in computerized video games.

Perry thinks U.S. ground forces will be revolutionized in the same way. As "smart" munitions are deployed, the inventory of aging howitzers will be converted from shell-lobbing devices to launchers of accurate, armor-piercing rockets. The new "shells" will cost more than the old ones, but because of their accuracy, fewer will be needed. The net cost of waging war should be less.

These weapons are intended to give the United States and its allies a credible defense against the Soviets' greater stock of tanks and tactical planes. In addition, the new air technology known as "stealth," which was at the center of a campaign ruckus about military secrecy, should give the West some help in overcoming Soviet air defenses, Perry claims. Because the Soviets have invested heavily in this area, the United States hopes to develop planes and missiles that will be invisible to radar. Perry would not discuss details, but the plan is to minimize dimensions of U.S. aircraft, use plastic-like construction materials, conceal metal parts, and employ irregular contours that will reflect an ambiguous radar image.

None of these technologies has been tested in war, and as the DOD has noted, stealth systems will not be available until the 1990's, if then. But Perry points out that improvements are being made rapidly. Electronic technology is about to give birth to a third generation of precision weapons, in a total development period of about 15 years. The first generation relied on wire-guided systems, and the second on laser targeting. The latest, to be deployed in a few years, relies on natural microwave radiation to illuminate the target and on a computer inside the projectile to distinguish the target from the background. The newest munitions are revolutionary, according to Perry, because they do not require a human "spotter" to guide them, and they can find a target even if it is obscured by smoke or bad weather. These new tools of war, Perry thinks, make it inconceivable for the Soviets to carry out a successful invasion of Western Europe.

Even if these weapons prove as good as their promise, it will still be risky to count on them to offset quantitative advantages. What would happen if the Soviets were to duplicate American equipment? Perry's short answer is that they won't try, and they won't succeed if they do try. "In the underlying technologies which are most critical to success in these programs, we have a 5- to 10-year lead over the Soviets," Perry says. DOD investments in research on miniature circuitry in the last few years should widen the lead. Furthermore, Perry says, "We are the ones that are confronted with the massive armor disadvantage and the massive disadvantage in air defense, and therefore we are the ones that need the [technological] offset." It would be a "great waste" for the Soviets to try to mimic American systems. Because they have "no strong incentive" to do so, Perry believes they will not try. He seemed thoroughly unimpressed with the Soviets' attempts thus far to develop precision guided munitions.

Asked to identify the most difficult problems he will leave to his successor, Perry named two: the public's failure to grasp the "critical importance" of advanced technology for defense and the "totally inadequate" methods of dealing with inflation at DOD, leading to "major errors in planning and running our programs."

It is true, Perry says, that the army is burdened with "complex, expensive, largely obsolete equipment" which is "hard to operate and hard to maintain." But to conclude, as some have, that the new equipment will be even worse is to "draw exactly the wrong conclusion." Perry claims that the difference between the new weapons in development and those now on the field will be as great as the difference between the electronic handheld calculators one can buy today for $20, and the clunky electromechanical desk calculators that used to sell for $800. Perry predicts the new weapons will be reliable, easy to use, durable, and—eventually—cheap.

Speaking of management problems, Perry says the Defense Department has never adjusted to the new era of inflation in which we live. This has had a "debili-

tating" effect on weapons procurement. Because DOD persistently underestimates the amount of inflation it will encounter each year (recently by as much as 7 percent), the weapons buyers have been running short of cash each year. It is virtually impossible to cancel a program once it has been launched. Thus, economies are made by stretching out production schedules, making for greater inefficiency and driving costs even higher.

Perry's solution is not to train managers in greater fiscal self-discipline, but to seek an automatic cost-of-living increase for procurement, so that funding will always keep pace with inflation. As he says, if DOD can give this benefit to employees and pensioners, why not give it to the weapons as well? This is not an idea likely to provoke a storm of protest in the Pentagon.

Whether or not the new DOD chiefs relish the prospect, Perry thinks their first chore will be to bring a sense of reality into the weapons procurement process.—ELIOT MARSHALL

Energy, Security, and War

Sharply contrasting views are presented in two recent studies that focus on national security as it relates to energy. A book put together at Harvard calls for massive oil stockpiling to insulate the country from possible oil cutoffs, whereas a study for the Federal Emergency Management Agency (FEMA) urges decentralization of the country's energy systems in order to reduce vulnerability to attack.

The Harvard book, *Energy and Security*, edited by David A. Deese and Joseph S. Nye, deals with narrower issues than its title implies. The book, a report of Harvard's Energy and Security Research Project, says that the United States has placed too much emphasis on reducing foreign oil imports and not enough on reducing the country's "vulnerability"—that is, the damage that might be done by a cutoff of oil. It states that few long-term policies—such as price decontrol, the synthetic fuels program, conservation, or coal conversion—will significantly reduce the country's near-term vulnerability. Thus, it urges large increases in both strategic and industrial petroleum stocks. The book says the long lead time required for development of synthetic fuels will prevent them from changing the picture during the 1980's, and "a dollar invested in synthetics is worth much less, in the short run, than a dollar invested in stockpiles." The book dwells at some length on the political situation related to energy in both oil-producing and oil-consuming countries and advocates various measures to deter crises in the Persian Gulf area. It also proposes that the U.S. government develop more detailed strategies for dealing with oil emergencies. But basically, the emphasis is on increasing the stocks of the United States and its allies, with an eye toward the ultimate creation of an international strategic petroleum reserve.

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A more frightening question, that of the ability of America's energy network to withstand an enemy attack, is addressed in *Energy Vulnerability and War*, done for FEMA. Asserts Wilson Clark, the energy consultant who headed the study team, "the increasing centralization and energy/materials intensity of our energy systems is increasing our nation's vulnerability, in the name of decreasing it." Although the national petroleum reserve is not discussed in the report, Clark says stockpiling petroleum in a few locations is just the kind of centralization of resources that supplies an inviting target. Drawing from the experience of World War II, the report notes that Germany was crippled when its main synthetic fuel and electricity plants were decimated at the end of the war, whereas it would have been impossible to destroy Japan's network of small, decentralized hydropower facilities.

Clark's report calls the U.S. energy system "highly centralized" and notes that the trend has been toward large size and consolidation in power plants. The proposed Allen-Warner Valley Power System in southern Nevada and Utah, which is to comprise two large power plants and a coal slurry pipeline to the nearby Alton coal field, represents the type of concentration the report decries. Both nuclear plants and synthetic fuels facilities are also regarded as by nature centralized. The report concludes that this country can reduce both its vulnerability to oil import cutoffs and its vulnerability as a target by moving toward dispersed, decentralized, renewable energy supplies. Various forms of energy conservation are discussed at length, including cogeneration—the use of waste heat to power industrial processes—and home insulation. Another study is quoted to the effect that $10 billion a year, over a decade, supplied as interest-free loans for home insulation, would save the country 75 percent of the heat content of the oil now imported into the United States. This was contrasted with the $88 billion synfuels program, which is not expected to replace more than 15 percent of imported oil by 1990.

The report claims that the widespread use of electronics makes us more vulnerable than ever before to a nuclear attack. The reason is the little-remarked phenomenon of electromagnetic pulse (EMP) which occurs when a nuclear bomb is detonated at high altitudes. The EMP is a microsecond burst of electromagnetic energy, a hundred times more powerful than a lightning bolt, which can incapacitate solid-state electronic equipment (vacuum tubes are less vulnerable). Two years ago, the Office of Technology Assessment, in a nuclear war scenario, postulated that in a "limited" strike the Soviets could wipe out the American petroleum industry with 80 MIRV'd missiles. Now, says Clark's report, it appears that "one or two well-placed nuclear warheads detonated in the upper atmosphere could cause failure in the entire national power grid, including destroying the sensitive control facilities at modern electric power plants."—CONSTANCE HOLDEN

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