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"Until the production of nuclear weapons is no longer profitable, there will be no meaningful reduction of the fuel that fires the nuclear madness."

—Quoted from a Letter to the Editor of Harper's Magazine August 1985, by James E. Fox, Rifle, Colorado.

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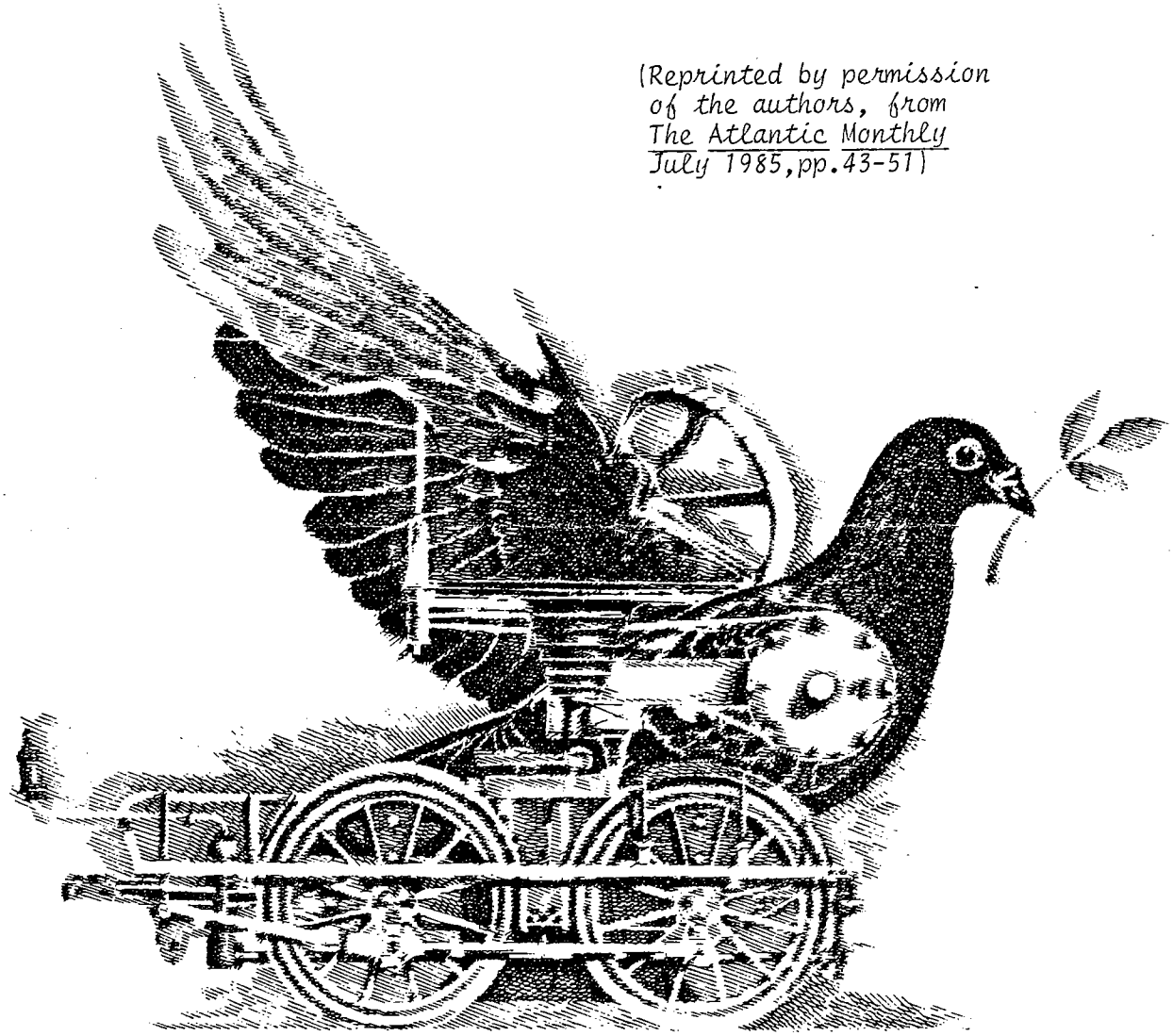

Geneva can be a giant step toward a more secure twenty-first century

REDUCING THE RISK OF NUCLEAR WAR

BY ROBERT S. MCNAMARA AND HANS A. BETHE

THROUGHOUT HISTORY WAR HAS BEEN THE FINAL ARBITER of disputes and a finite disaster. Unbounded calamities—the apocalypse, Armageddon—were left for mythology. Forty years ago Hiroshima put an end to that distinction. This insight was expressed with exceptional clarity by President Reagan when he said that "a nuclear war cannot be won and must never be fought." And yet both superpowers' policies rely on thinking that is mired in the pre-nuclear past. Each strives ceaselessly to improve its arsenal and lays plans for fighting the war that must never be fought.

Although the risk of war between East and West seems low at present, should a military confrontation occur the chance that it would escalate to all-out nuclear war is very, very high. That danger will haunt us as long as we persist on our present course. The combination of these factors—a high probability that war would destroy our society, and an indefinitely long exposure to that danger—produces a risk that is unacceptable. There is a widespread intuitive awareness of this peril.

When the President proposes a "Star Wars" space defense that would make nuclear weapons "impotent and obsolete," there is, therefore, an understandable outpouring of public support, even though most technical experts, inside the government and out, consider his proposal to be a nostalgic dream without a discernible connection to the realities of nuclear physics.

How, then, are we to escape our predicament? By heeding Einstein's admonition that "the unleashed power of the atom has changed everything save our modes of think-

ing." If we clearly face the implications of nuclear weapons, we will see the path through the hazards that science has forever unveiled. The path is not easy, but if it is followed with persistence, the risk of nuclear war will constantly recede and confidence that we are masters of our fate will be rebuilt.

The first large step toward our goal can be taken at the Geneva arms talks. It should be possible to pursue a ballistic-missile-defense research program, as desired by the President, and at the same time to negotiate a strengthening of the Anti-Ballistic-Missile Treaty. By that means the U.S. and Soviet positions on space defense could be reconciled and the way thereby opened to sharp cuts in offensive forces shaped in a manner that would lead to a much safer world in the twenty-first century.

In developing this thesis we will discuss:

—The situation today: a world with tens of thousands of nuclear weapons, with both sides pursuing nuclear war-fighting strategies, and with each fearing that the other is seeking to achieve a first-strike capability.

—The President's recognition of the danger in the present situation; his proposal to substitute a defensive strategy, based on a perfect defense, that would permit the destruction of all nuclear weapons; and the reasons why virtually all the experts consider such a goal unattainable.

—Alternative "partial" defensive systems, which would be added to, not substituted for, offensive nuclear weapons, and which would almost certainly lead to a rapid escalation of the arms race and its extension into space.

—A totally different strategy, which would build on the ABM Treaty, move away from the nuclear-war-fighting mania, permit us to enter the twenty-first century with radically smaller nuclear forces (perhaps no more than five percent of the size of present inventories), and dramatically reduce the risk that our civilization will be destroyed by a nuclear conflagration.

—The way in which the Geneva negotiations can be structured to lay a foundation for a more secure tomorrow.

The Situation Today: Nuclear Forces That Reflect War-Fighting Doctrines

THE SUPERPOWERS' ARSENALS HOLD SOME 50,000 nuclear warheads. Each, on average, is far more destructive than the bomb that obliterated Hiroshima. Just one of our thirty-six strategic submarines has more firepower than man has shot against man throughout history. Thousands of nuclear weapons are ready for immediate use against targets close to hand or half a globe away, but just a few hundred warheads could utterly demolish the largest nation.

To deter war, each side seeks to persuade the other, and itself, that it is prepared to wage a nuclear war that would have the military objectives of a bygone age. What is known of Soviet nuclear-war plans is open to interpretation, but these plans appear to rely on tactics derived from Russia's pre-nuclear military experience. Current U.S. defense policy calls for nuclear forces that are sufficient to support a "controlled and protracted" nuclear war that could eliminate the Soviet leadership and that would even permit the United States to "prevail."

Nuclear-war-fighting notions lead to enormous target lists and huge forces. Our 11,000 strategic warheads are directed against some 5,000 targets. And NATO's war plans are based on early first use of some 6,000 tactical nuclear weapons in response to a Soviet conventional attack. Both NATO and the Warsaw Pact countries routinely train their forces for nuclear operations. War-fighting doctrines create a desire for increasingly sophisticated nuclear weapons which technology always promises to satisfy but never does. Today both sides are committed to programs that will threaten a growing portion of the adversary's most vital military assets with increasingly swift destruction.

These armories and war plans are more than macabre symbols for bolstering self-confidence. Both Moscow and Washington presume that nuclear weapons are likely to be used should hostilities break out. But neither knows how to control the escalation that would almost certainly follow. No one can tell in advance what response any nuclear attack might bring. No one knows who will still be able to communicate with whom, or what will be left to say, or whether any message could possibly be believed.

When our secretary of defense, Caspar Weinberger, was asked whether it really would be possible to control forces and make calculated decisions amid the destruction and confusion of nuclear battle, he replied, "I just don't have any idea. I don't know that anybody has any idea." Surely it is reckless to stake a nation's survival on detailed plans for something about which no one has any idea.

It would be vastly more reckless to attempt a disarming first strike. Nevertheless, the arms race is driven by deep-seated fears held by each side that the other has, or is seeking, the ability to execute just such a strike.

The large force of powerful and increasingly accurate Soviet ICBMs has created the fear of a first strike in the minds of many U.S. leaders. According to this scenario, the Soviet missiles could, at one stroke, eliminate most of our Minuteman ICBMs; our surviving submarines and bombers would enable us only to retaliate against Soviet cities; but we would not do so because of our fear of a Soviet counterattack on our urban population; and thus we would have no choice but to yield to all Soviet demands.

A more subtle variant of this nightmare would have the Soviets exacting political blackmail by merely threatening such an attack.

Those who accept the first-strike scenario view the So- →

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viet ICBMs and the men who command them as objects in a universe decoupled from the real world. They assume that Soviet leaders are confident that their highly complex systems, which have been tested only individually and in a controlled environment, would perform their myriad tasks in perfect harmony during the most cataclysmic battle in history; that our electronic eavesdropping satellites would detect no hint of the intricate preparations that such a strike would require; that we would not launch our missiles when the attack was detected; and that the thousands of submarine-based and airborne warheads that would surely survive would not be used against a wide array of vulnerable Soviet military targets. Finally, they assume Soviet confidence that we would not use those vast surviving forces to retaliate against the Soviet population, even though tens of millions of Americans had been killed by the Soviet attack on our silos. Only madmen would contemplate such a gamble. Whatever else they may be, the leaders of the Soviet Union are not madmen.

That a first strike is not a rational Soviet option has also been stated by President Reagan's own Scowcroft Commission, which found that no combination of attacks from Soviet submarines and land-based ICBMs could catch our bombers on the ground as well as our Minutemen in their silos. In addition, our submarines at sea, which carry a substantial percentage of our strategic warheads, are invulnerable: in the race between techniques to hide submarines and those to find them, the fugitives have always been ahead and are widening their lead. As the chief of naval operations has said, the oceans are getting "more opaque" as we "learn more about them."

Despite all such facts, the war-fighting mania and the fear of a first strike are eroding confidence in deterrence. Though both sides are aware that a nuclear war that engaged even a small fraction of their arsenals would be an unparalleled disaster, each is vigorously developing and deploying new weapons systems that it will view as highly threatening when the opponent also acquires them. Thus our newest submarines will soon carry missiles accurate enough to destroy Soviet silos. When the Soviets follow suit, as they always do, their offshore submarines will for the first time pose a simultaneous threat to our command centers, bomber bases, and Minuteman ICBMs.

The absurd struggle to improve the ability to wage "the war that cannot be fought" has shaken confidence in the ability to avert that war. The conviction that we must change course is shared by groups and individuals as diverse as the freeze movement, the President, the Catholic bishops, the bulk of the nation's scientists, the President's chief arms-control negotiator, and ourselves. All are saying, directly or by implication, that nuclear warheads serve no military purpose whatsoever. They are not weapons. They are totally useless except to deter one's opponent from using his warheads. Beyond this point the consensus dissolves, because the changes of direction being advocated follow from very different diagnoses of the predicament.

The Strategic Defense Initiative

THE PRESIDENT'S APPROACH HAS BEEN TO LAUNCH the Strategic Defense Initiative (SDI), a vast program for creating an impenetrable shield that would protect the entire nation against a missile attack and would therefore permit the destruction of all offensive nuclear weapons. The President and the Secretary of Defense remain convinced that this strategic revolution is at hand.

Virtually all others associated with the SDI now recognize that such a leakproof defense is so far in the future, if indeed it ever proves feasible, that it offers no solution to our present dilemma. They therefore advocate other forms of ballistic-missile defense. These alternative systems range from defense of hardened targets (for example, missile silos and command centers) to partial protection of our population.

For the sake of clarity we will call these alternative programs Star Wars II, to distinguish them from the President's original proposal, which will be labeled Star Wars I. It is essential to understand that these two versions of Star Wars have diametrically opposite objectives. The President's program, if achieved, would substitute defensive for offensive forces. In contrast, Star Wars II systems have one characteristic in common: they would all require that we continue with offensive forces but add the defensive systems to them.

And that is what causes the problem. President Reagan, in a little-remembered sentence in the speech announcing his Strategic Defense Initiative, on March 23, 1983, said, "If paired with offensive systems, [defensive systems] can be viewed as fostering an aggressive policy, and no one wants that." The President was concerned that the Soviets would regard a decision to supplement our offensive forces with defenses as an attempt to achieve a first-strike capability. That is exactly how they are interpreting our program; that is why they say there will be no agreement on offensive weapons until we give up Star Wars.

Before any further discussion of why Star Wars II will accelerate the arms race, it would be useful to examine why the President's original proposal, Star Wars I, will prove an unattainable dream in our lifetime.

The reason is clear. There is no evidence that any combination of the "defensive technologies" now on the most visionary of horizons can undo the revolution wrought by the invention of nuclear explosives. "War" is only one of the concepts whose meanings were changed forever at Hiroshima. "Defense" is another. Before Hiroshima, defense relied on attrition—exhausting an enemy's human, material, and moral resources. The Royal Air Force won the Battle of Britain by attaining a 10 percent attrition rate against the Nazi air force, because repeated attacks could not be sustained against such odds. The converse, a 90-percent-effective defense, could not preserve us against even one modest nuclear attack.

This example illustrates that strategic defense in the

missile age is prodigiously difficult at best, an impression that is borne out by a detailed examination of all the schemes that propose to mount defenses in space. The term "defensive technologies" may conjure up images of mighty fortifications, but it refers to delicate instruments: huge mirrors of exquisite precision, ultra-sensitive detectors of heat and radiation, optical systems that must find and aim at a one-foot target thousands of miles away and moving at four miles per second, and so forth. All these marvels must work near the theoretical limit of perfection; even small losses in precision would lead to unacceptably poor performance. Quite feeble blows against orbiting "battle stations" bearing such crown jewels of technology could render them useless.

Such attacks need not be surgical. If the Soviets were about to demolish us with a nuclear attack, they would surely not shrink from destroying our unmanned space platforms. And they have had nuclear-armed ABM interceptors ideally suited to that task for two decades. Such weapons could punch a large hole in our shield of space platforms, through which the Soviet first strike could immediately be launched. Hence any defense based on orbiting platforms is fatally vulnerable, or, as Edward Teller has put it, "Lasers in space won't fill the bill—they must be deployed in great numbers at terrible cost and could be destroyed in advance of an attack." The wide variety of countermeasures that have been developed during decades of ABM research show that every other proposed space-defense scheme has its own Achilles' heel.

The prospect of achieving the goal of Star Wars I has been succinctly put by Robert S. Cooper, the Pentagon's director of advanced research: "There is no combination of gold or platinum bullets that we see in our technology arsenal . . . that would make it possible to do away with our strategic offensive ICBM forces." Until there are inventions that have not even been imagined, a defense robust and cheap enough to replace deterrence will remain a pipe dream. Emotional appeals that defense is morally superior to deterrence are therefore "pernicious," as former Secretary of Defense James Schlesinger has said, because "in our lifetime, and that of our children, cities will be protected by the forbearance of those on the other side, or through effective deterrence." Harold Brown, also a former secretary of defense, has expressed the same thought.

"Since nuclear weapons are unlikely to be eliminated by negotiation in the foreseeable future, increasing numbers of people are looking to Star Wars defense systems as a means of returning to a world which, although it existed once, can never exist again. As we have done so often in the past, we are dreaming of things that cannot be, and the transition to the real world is painful."

—*Quoted from "Star Wars Once Funny, Now Frightening" by Harrison Brown, Bulletin of the Atomic Scientists, May 1985, p.3.*

Star Wars II

VIRTUALLY EVERYONE IN THE ADMINISTRATION NOW agrees that a leakproof defense of population is not in the cards for decades, if ever. Therefore, while the President and the Secretary of Defense adhere to their original proposal, the technicians and others working on the SDI program are producing less radical rationales that blur crucial distinctions between hard-point defense, which is technically feasible, and comprehensive defense, which is not. These ever-shifting and intermingled rationales for Star Wars II call for careful scrutiny.

The most prominent fallback position is that even a partially effective defense would introduce a vital element of uncertainty into Soviet attack plans and would thereby enhance deterrence. This assumes that the Soviet military's sole concern is to attack us and that any uncertainty in their minds is therefore to our advantage. But any suspicions they may harbor about our wishing to achieve a first-strike capability would be inflamed by a partially effective defense.

Why? Because a leaky umbrella offers no protection in a downpour but is quite useful in a drizzle. That is, such a defense would collapse under a full-scale Soviet first strike but might cope adequately with the depleted Soviet forces that had survived a U.S. first strike.

Americans often find it incredible that the Soviets could suspect us of such monstrous intentions, especially since →

we did not attack them when we enjoyed overwhelming nuclear superiority.*

Nevertheless, the Russians distrust us deeply. They know that a first strike was not always excluded from U.S. strategic thinking, and they have never forgotten Hitler's surprise attack on them, in 1941, a disaster that dwarfed Pearl Harbor.

It would be foolhardy to dismiss as mere propaganda the Soviets' repeated warnings that a nationwide U.S. strategic defense is highly provocative. Their promise to respond with a large offensive buildup is no empty threat. Each superpower's highest priority has been a nuclear arsenal that can assuredly penetrate to its opponent's vital assets. No partially effective space defense can alter that priority.

Nor will those who now fear a Soviet first strike see their fears allayed by such a defense. On the contrary, these fears will be aggravated. The Soviet response will be based on traditional worst-case analysis, which will inevitably overestimate the effectiveness of our defense, just as in the 1960s and 1970s we targeted many more warheads on Moscow as soon as it was surrounded by dubious ABM defenses. Being keenly aware of the fragility of our defenses, we would feel compelled to respond with a buildup of our own.

The claim that a Star Wars II defense would be a catalyst for arms reduction is therefore specious. Furthermore, arms control has been difficult enough when it has had to deal only with large offensive forces whose capabilities are relatively clear. It would be vastly harder to strike a bargain over space defenses whose effectiveness would be a deep mystery even to their owners, because they could never be tested under remotely realistic conditions.

Important support for Star Wars II stems from the belief that it best exploits our technological advantage in the inescapable competition with the Soviet Union. Those who hold this view ignore post-Hiroshima history and have less respect than we for the Soviet regime's ability to match our weapons and extract sacrifices from its people.

The authors have personally observed and participated in the nuclear competition for decades. The U.S. invention of the atomic bomb was the most remarkable technical breakthrough in military history. And yet the Soviet Union, though devastated by war and operating from a technological base far weaker than ours, was able to create nuclear forces that gave it a plausible deterrent in an astonishingly short time. Virtually every technical initiative in the nuclear arms race has come from the United States, but the net result has been a steady erosion of American security. There is no evidence that space weapons will be an exception, for a crude nuclear blunderbuss can foil sophistication.

Then why are the Soviets so worried by Star Wars? Because strategic defense probably could succeed if the Russians played dead. For that reason they must respond. This will require vast expenditures they can ill afford, and will ultimately diminish their security. But that is equally true for us, whether we recognize it or not.

To summarize, these rationales for Star Wars II propose to achieve a superior strategic posture by combining unattainable technical goals with a policy rooted in concepts whose validity died at Hiroshima.

An Alternative Vision for the Twenty-first Century

THE PUBLIC'S INTUITIVE AWARENESS OF THE UNACceptable risk posed by our present nuclear strategy is well founded. Our security demands that we replace that policy with one that is in firm touch with nuclear reality. If neither Star Wars I nor Star Wars II is the answer, what is?

The risk of catastrophic escalation of nuclear operations, and the futility of defense, lead us to base our proposal on the axiom that the initiation of nuclear warfare against a similarly armed opponent would be an irrational act. Hence, as we have said, nuclear weapons have only one purpose—that of preventing their use. They must not do less; they cannot do more. Thus, a restructuring of nuclear forces designed to reduce the risk of nuclear war must be our goal. All policies, every existing program, and each new initiative must be judged in that light.

Post-Hiroshima history has taught us three lessons that shape the present proposal. First, all our technological genius and economic prowess cannot make us secure if they leave the Soviet Union insecure: we can have either mutual security or mutual insecurity. Second, while profound differences and severe competition will surely continue to mark U.S.-Soviet relations, the nuclear-arms race is a burden to both sides, and it is in our mutual interest to rid ourselves of its menace. And third, no realistic scheme that would rid us of all nuclear weapons has ever been formulated.

The ultimate goal, therefore, should be a state of mutual deterrence at the lowest force levels consistent with stability. That requires invulnerable forces that could unquestionably respond to any attack and inflict unacceptable damage. If those forces are to remain limited, it is equally essential that they not threaten the opponent's deterrent. These factors would combine to produce a stable equilibrium in which the risk of nuclear war would be very remote.

This kind of deterrence posture should not be confused with the one currently prevailing among U.S. and Soviet nuclear forces. The 25,000 warheads that each nation possesses did not come about through any plan but simply descended on the world as a consequence of continuing technical innovations and the persistent failure to recognize →

*In terms of numbers of strategic nuclear warheads, for example, the United States in 1960 had 6,300 to the Soviets' 200; in 1965 the figures were 5,000 to 600; in 1970, 4,500 to 1,800; in 1975, 8,000 to 2,700; in 1980, 9,200 to 6,000; in 1985, 11,100 to 8,500; and by 1990, assuming that U.S. and Soviet strategic forces are constrained by the SALT II agreement, the figures will be 13,600 to 13,000.

that nuclear explosives are not weapons in any traditional sense.

The forces we propose could include a mix of submarines, bombers, and ICBMs. The land-based components should be made invulnerable in themselves, by some combination of mobile ICBMs and reductions in the number of warheads per missile. Two considerations would determine the ultimate size of the force: that it deter attack with confidence, and that any undetected or sudden violation of arms-control treaties would not imperil this deterrence. We believe that, ultimately, strategic forces having as few as 10 percent of the currently deployed warheads would meet these criteria, and tactical forces could be eliminated entirely. In short, the present inventory of 50,000 warheads could be cut to perhaps 2,000.

Before this goal is reached, other nuclear powers (China, France, Great Britain, and possibly others) will have to be involved in the process of reducing nuclear arsenals, lest their weapons disturb the strategic equilibrium.

The proposed changes in U.S. and Soviet strategic and tactical forces would require, as would the President's SDI, complementary changes in NATO and Warsaw Pact conventional forces, or appropriate increases in NATO's conventional power. If the latter was necessary, it could be achieved at a fraction of the costs we will incur if we continue on our present course.

Having identified our goal, how can we move toward it? Some of our new policies would depend solely on the United States and its allies; others would require Soviet cooperation. The former should be governed by the dictum, attributed to President Eisenhower, that "we need what we need." Were we to drop futile war-fighting notions, we would see that many things we already have or are busily acquiring are either superfluous or downright dangerous to us, no matter what the Soviets do. Tactical nuclear weapons in Europe are a prime example, and the Administration's policy of reducing their numbers should be accelerated. Other examples are programs that will haunt us when the Soviets copy them: sophisticated antisatellite weapons, sea-based cruise missiles, and highly accurate submarine-launched ballistic missiles. We are more dependent on satellites than the Soviets are, and more vulnerable to attack from the sea. Many of these weapons are valid bargaining chips because they threaten the Soviets, just as so much of their arsenal gratuitously threatens us.

The Geneva Negotiations

GENEVA PROVIDES AN INVALUABLE OPPORTUNITY TO take a giant step toward our goals. Is that not a preposterous assertion, the reader may well ask, for have we not claimed that Star Wars, which the President refuses to abandon, precludes arms control and guarantees an arms race? Surprisingly enough, it is not, if one takes account of a remarkable speech that Paul Nitze, the Administration's senior adviser on arms control, gave in Philadelphia on February 20. If the points that Nitze made are accepted, it should be possible for the President to negotiate toward the goals we have set without abandoning a strategic-defense research program.

Mr. Nitze presented two criteria that must be met before the deployment of strategic defenses could be justified: the defense must work even in the face of direct attack on itself, and it must be cheaper to augment the defense than the offense.

As we have seen, nothing that satisfies these criteria is on the horizon—a judgment in which Nitze apparently concurs, for he foresaw that during an initial period of "at least the next ten years" no defenses would be deployed. During that period we would, in Nitze's words, "reverse the erosion" of the ABM Treaty. That is a window of opportunity, as we shall see.

Nitze envisioned the possibility of two additional periods following the first. In the second phase some form of Star Wars II would be deployed alongside our offensive weapons, provided the two criteria he laid down had been met. If we entered the second phase, it probably would last for at least decades.

Ultimately, if Star Wars I proved practical, the second phase would be followed by a third, in which the leakproof shield would be deployed and offensive weapons destroyed.

Mr. Nitze acknowledged that the problem of how to write an arms-control agreement during the second phase that would limit offensive arms while permitting defensive systems had not been solved. He said it would be "tricky." We agree. We know of no one who has suggested how to do it. But by implication Nitze was saying that this is an issue for future negotiations and that it need not stand in the way of a new agreement at this time.

Now back to the first phase, the window of opportunity. Why the fixation during this phase on the ABM Treaty? Because the treaty formalizes the insight that not just the deployment but even the development of strategic defenses would stimulate an offensive buildup. Were the treaty to collapse, we could not move toward our goal of reducing the offensive threat. Hence the fleeting window of opportunity: strengthening of the ABM Treaty coupled with negotiations on offensive strategic forces.

The treaty forbids certain types of radars and severely restricts the testing of components of ABM systems. Both of these provisions are endangered.

The Soviets are building a radar in Siberia that apparently will violate the ABM Treaty once it is completed. While this radar is of marginal military significance, it has great political import and poses an issue that must be resolved to the satisfaction of the U.S. government.

In the near future the United States will be violating the restrictions on tests in spirit and probably in law if we place our research program on the schedule implied by Lieutenant General James Abrahamson, the director of the SDI, when he said, on March 15, that a "reasonably confident decision" on whether to build Star Wars could be made by →

the end of the decade or in the early 1990s. If we are unwilling to refrain from the tests associated with such a schedule, the Soviets will, with good reason, assume that we are preparing to deploy defenses. They will assiduously develop their response, and the prospect for offensive-arms agreements at Geneva will evaporate. The treaty's central purpose is to give each nation confidence that the other is not readying a sudden deployment of defenses: we must demonstrate that we will adhere to the treaty in that spirit.

The ABM Treaty does not forbid anti-satellite weapons, and unless that loophole is closed we will have an arms race in space long before we have any further understanding of what, if anything, space defense could accomplish. Hence a verifiable ban on the testing of anti-satellite weapons should become a part of the ABM Treaty regime. Because we are much more dependent on satellites than the Soviets are, such a ban would be very much in our interest.

A strengthened ABM Treaty would allow the Geneva negotiations to address the primary objective of offensive-arms control: increasing the stability of deterrence by eliminating the perceptions of both sides that the other has, or is seeking, a first-strike capability. This problem can be dealt with through hard-headed arms control. There is no need to rely on the adversary's intentions: his capabilities are visible. Mutual and verifiable reductions in the ratio of each side's accurate warheads to the number of the other side's vulnerable missile launchers could reduce the first-strike threat to the point at which it would be patently incredible to everyone. Both sides have such immense forces that they should concentrate on quickly reducing the most threatening components—those that stand in the way of stability and much lower force levels.

What is needed is deep cuts in the number of warheads, but cuts shaped to eliminate the fear of first strikes. Because the two sides have such dissimilar strategic forces, this process will be very difficult, but it should be possible in the first phase to accomplish reductions of 50 percent. It would be reasonable, for example, for the United States to insist on large reductions in the number of Soviet ICBM warheads, but in the bargaining we must be ready to make substantial cuts in our counterpart forces, including, for example, the silo-killing submarine-based D-5 missile.

Conclusion

IN SUM, THE ARMS NEGOTIATIONS NOW BEGINNING IN Geneva represent a historic opportunity to lay the foundation for entering the twenty-first century with a totally different nuclear strategy, one of mutual security instead of war-fighting; with vastly smaller nuclear forces, perhaps 2,000 weapons in place of 50,000; and with a dramatically lower risk that our civilization will be destroyed by nuclear war.

Several themes should govern our attitudes and policies as we move through those negotiations toward our long-term objectives.

Each side must recognize that neither will permit the other to achieve a meaningful superiority; attempts to gain such an advantage are dangerous as well as futile.

The forces pushing each side in the direction of a "first-strike" posture must, at least from the standpoint of the adversary, be reversed. A stable balance at the lowest possible level should be the goal.

Our technological edge should be exploited vigorously to enhance our security, but in a manner that does not threaten the stability of deterrence. Space surveillance and data processing, which form a large portion of the SDI program, illustrate what technology could contribute to treaty verification.

We must not forget Winston Churchill's warning that "the Stone Age may return on the gleaming wings of science," and we must learn to shed the fatalistic belief that new technologies, no matter how threatening, cannot be stopped. While laboratory research cannot be constrained by verifiable agreement, technology itself provides increasingly powerful tools that can be used to impede development and to stop deployment. For example, only an absence of political will hinders a verifiable agreement preventing the deployment of more-threatening ballistic missiles, because they require many observable flight tests.

We must also allay legitimate fears on both sides: the Soviets' fear of our technology, and our fear of their obsessive secrecy. These apprehensions provide an opportunity for a bargain: Soviet acceptance of more-intrusive verification in return for American constraints on applications of its technological innovation. Penetration of Soviet secrecy is to our mutual advantage, even if the Kremlin does not yet understand that. So is technological restraint, even though it runs against the American grain.

We have reached our absurd confrontation by a long series of steps, many of which seemed to be rational in their time. Step by step we can undo much of the damage. The program sketched in this article would initiate that process. It draws on traditional American virtues: striving with persistence and resourcefulness toward a high but attainable goal.

This program would steadily reduce the risks we now face and would begin to restore confidence in the future. It does not pretend to rid us totally of the nuclear menace. It addresses our first duty and obligation: to assure the survival of our civilization. Our descendants could then grapple with the problem that no one yet knows how to attack. □

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In Defense of "Star Wars"

Reagan Administration officials tell laser scientists that defense initiative is misunderstood

In March 1983 President Reagan called for a crash program to develop a space-age defense system against nuclear missiles. Two years later, administration and Department of Defense (DOD) officials are worrying whether they can sustain a long-term drive to develop systems for destroying enemy missiles before warheads are deployed. Just how the Administration's Strategic Defense Initiative (SDI) is perceived over time, officials say, may have as much to do with it succeeding as mastering the program's technical challenges.

The President's ultimate goal is to render ineffective the Soviet Union's growing fleet of offensive nuclear weapons and to compel them to negotiate an arms reduction agreement. Right now Congress is behind the White House, and is expected to increase funding for the SDI or "Star Wars" research program from $1.39 billion in fiscal year 1985 to more than $2 billion in 1986. But there appears to be a growing uneasiness among White House and defense officials about how the public and even industry view the SDI.

This concern was reflected most recently at a symposium on lasers and particle beams held at the University of Rochester 17–19 April by Fusion Power Associates, an industry trade group. Administration speakers addressing a friendly group of 185 participants from government, industry, national laboratories, and academia repeatedly sought to clarify the purpose of SDI and the Administration's goals.

"There is a great amount of confusion within the public and the press about what the role of our program is," says Louis C. Marquet, director of DOD's directed energy office. "The goal of the program is not to build a perfect defense system. The goal of the current Strategic Defense Initiative is to bring to the table the technical issues," says Marquet, that are needed to assess the feasibility of building such a defense system.

But administration officials fear their program goals are being misconstrued by unfounded charges that such a defensive system will be too costly and technically unworkable. Their concerns are not entirely unreal, says John E. Mansfield, a staffer for the House Armed Services Committee. "I have my worries that we might be locked into some prejudices."

From a cost and technology standpoint, Marquet emphasizes that the SDI effort is looking beyond existing technology to assess the possibilities for using ground-based lasers and/or space-based guided munitions, lasers, or particle beams. The focus, he adds, is to produce a concept that will discourage the Soviets from simply trying to build more missiles to overcome the SDI system. "If we can't do that," exclaims Marquet. "We won't build the system."

Another notion administration officials are trying to dispel is that SDI is a program aimed at protecting offensive missile systems. That idea has been fanned in part by the media's Star Wars label, DOD officials say. Indeed, after two years, concedes George A. Keyworth, II, director of the White House Office of Science and Technology Policy, "ambiguity over SDI's goals remains in people's minds."

> "Ambiguity over SDI's goals remains in people's minds."

Keyworth contends that SDI's image as an offensive system is fostered by three general misconceptions: that "threatening deterrents" must be a major goal of the SDI; that the system is meant to protect intercontinental ballistic missile silos; and that it is designed to protect European targets against tactical ballistic missiles. The President in recent weeks, he says, has sought to counter such misinformation. And in trying to set the record straight for industry and academia Keyworth cites the president's own words: "We seek to render obsolete the balance of terror or mutual assured destruction as it is called, and replace it with a system incapable of initiating armed conflict or causing mass destruction, and yet effective in preventing war."

In addition, Keyworth pointedly told conference participants that the chances are slim for nuclear-pumped x-ray laser technology being adopted for the defense system. Although, he says DOD will continue to explore the technology, if for no other reason than because the Soviets have a similar program. "I think it is unlikely that the American people will maintain full and enduring support for these systems," says Keyworth, "if they continue to rely upon nuclear weapons as defensive means when there is no assurance that the defense weapon is not potentially as damaging as the threat that they confront."

Credibility is crucial to the survivability of the SDI program, says Gerald Yonas, chief scientists for SDI. "The real problem is how do you get from here to there. How do you get support for a long-term R&D program," Yonas observes. Not only does the purpose of SDI need to be understood, but DOD will have to demonstrate progress. "We have a responsibility in such a program to report achievements, they have to be real and have to be significant on the road to our long-term goal.

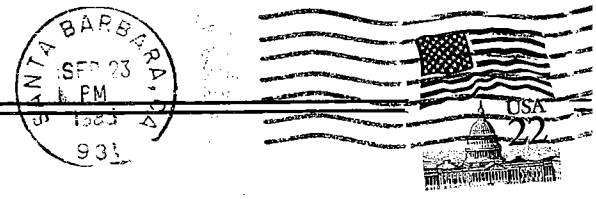
Furthermore, if the program is to be credible, it must remain flexible in the near term. "We can't afford to be wedded to any one concept. . . . We have to be willing to take our pet project and dump it." In fact, concept supporters of the program wish they could dump the media's Star Wars label and the administration's even more obscure SDI designation.

Both could prove deadly to the defense effort, advises Robert L. Sproull, president emeritus of the University of Rochester, a pioneering institution in laser technology. "We have to find a better name, something better than the Strategic Defense Initiative." The program should not be cast aside simply due to a public relations goof, he says. "If it (the program) becomes discredited, it will be a loss for the country and the world."

But a new package in itself, observes Sproull, will not assure that SDI can hang on through the next decade. "We have to raise the level of discourse," he says. And, this heightened debate, Sproull adds, must be coupled with arms control talks.

"Basically, I don't think we really have much choice. If we can't create the technology to make defense a reality, I am afraid we are faced with a continuing offensive weapons buildup," says DOD's Yonas. "And I share with Bob Sproull the notion that if we just continue to build those offensive weapons they will eventually be used and that's something none of us want."

—MARK CRAWFORD



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