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from time to time calls attention to published material that might contribute toward clarification or understanding of issues affecting world peace. The accompanying reprints constitute Reprint Mailing No. 89.

(Mrs.) Eulah C. Laucks, President
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Santa Barbara, CA. 93150-5012

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# The human factor

## *The little plane that could makes Gorbachev's day*

What are we to make of this international incident, wherein a daring young man in his flying machine pierced the thick skin of the world's most belligerent body politic, swooped into Red Square after teasing the ghost of Lenin, and smilingly signed autographs for 15 minutes before unamused Soviet authorities whisked him away?

Mikhail Gorbachev, a Boris-on-the-spot whose luck continues to provide a close personal escort, knew exactly what to make of the embarrassment. He hastened to remove those doddering military fixtures implicated in the lapse — Defense Minister Sergei Sokolov and Air Marshal Alexander Koldunov — and install his own men before the Soviet Old Guard had time for its habitually sluggish coil and strike.

As for the lanky teen-ager who caused all the fuss, Mathias Rust has certainly earned his 15 minutes, and more, as a hero of the Western world — for the insouciance and panache with which he carried off his mission. While the Soviets, conspiracy theorists *par excellence*, methodically turn stones looking for the shadowy motives behind this bit of barnstorming, Rust will become firmly fixed on both sides of the Urals as a symbol of freedom, courage and cheeky good humor. The surrealism of a light plane juxtaposed against the Kremlin, and the gracious enthusiasm of the pilot's impromptu welcoming committee, are now images preserved on videotape of an unintended and delightful form of *glasnost*.

There is a sober side to this, of course — not the least the young man's fate, and what it might have been had Soviet border security proved less penetrable. And of course, there is the profound question raised by this spirited stunt — as it was by the more devastating attack on the USS Stark — of whether the superpowers can any longer afford their commitment to a discredited notion that the best defense is a good offense.

(Laucks Foundation was co-sponsor of a conference held at The Center for the Study of Democratic Institutions, University of California at Santa Barbara, March 6-7 1987, on THE STRATEGIC DEFENSE INITIATIVE AND ARMS CONTROL. The paper following: "Does the SDI Make Good Sense?" by Franklin A. Long, was presented at the conference and is reprinted from The Center Magazine, May/June 1987.)

# THE STRATEGIC DEFENSE INITIATIVE AND ARMS CONTROL

★ WHAT EFFECT WILL PRESIDENT REAGAN'S SDI HAVE ON THE POSSIBILITY OF ARMS CONTROL AND DISARMAMENT?

★ WHAT ARE THE MORAL ARGUMENTS FOR AND AGAINST NUCLEAR DETERRENCE AS THE ALTERNATIVE TO THE SDI?

★ IS THE SDI TECHNOLOGICALLY AND MILITARILY FEASIBLE?

These and other questions were addressed at a two-day conference at the Center funded by grants from the University of California Institute on Global Conflict and Cooperation and the Laucks Foundation.

The first part of a three-part report on the conference begins in this issue with the conflicting views on the practicality of the Strategic Defense Initiative.

# DOES THE SDI MAKE GOOD SENSE?

A 100% DEFENSE IS BECOMING INCREASINGLY REMOTE

FRANKLIN A. LONG

IT IS CORRECT but inadequate to describe the Strategic Defense Initiative (SDI) as a research program. Although its current emphasis is indeed on applied research, the SDI is a goal-oriented effort whose origin lies in President Reagan's 1983 proposal for a major change in the U.S. military posture and policy for avoiding nuclear war.

The President's famous "Star Wars" speech of March 23, 1983, proposed replacing the current U.S. reliance on deterrence by threat of second-strike nuclear retaliation with the development and deployment of a near-perfect defensive system that would give full protection to the people, cities, and military installations of the United States. The SDI is charged to develop the technologies and plan the overall defensive system for responding to the major nuclear threat, that is, Soviet strategic nuclear-armed missiles. The stated goal for the SDI is to have developed the technologies and planned the defensive system so that a decision to deploy can be addressed in the early nineteen-nineties. Presumably, other research-and-development programs will address the problem of defenses against other modes of delivering nuclear weapons, notably, intercontinental bombers and cruise missiles. The President's overall objective, as stated in his "Star Wars" speech, is explicit: to make nuclear weapons "impotent and obsolete."

The remarkable aspect of the President's proposal is that it called for a major new military policy and program *before* there was any firm evidence that the needed technologies could be developed and with little or no consideration of possible Soviet responses to the policy and program. As a result, we are assured of years of

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*Franklin A. Long is a professor emeritus of chemistry and of science and society at Cornell University's Program on Science, Technology, and Society. He was the assistant director for science and technology of the U. S. Arms Control and Disarmament Agency and participated in the 1963 negotiations in Moscow that resulted in the 1963 Limited Test Ban Treaty. This article is adapted from his presentation paper and opening statement.*

uncertainty and argument over what the goal of the SDI is and what the possible Soviet responses to the SDI program are.

President Reagan did, however, ask for prompt, intensive studies "to define a long-term research-and-development program, to begin to achieve our ultimate goal of eliminating the threat posed by strategic nuclear missiles." Three studies were quickly established. The specific reports of the studies were classified and hence were not available to the general public. However, summaries of two of the studies were released. The one that focused on technical aspects was sufficiently optimistic that the technological obstacles could be overcome to lead the President to establish the SDI program of research and development.

Since the inception of the SDI, the Strategic Defense Initiative Organization of the Department of Defense has spent or committed approximately ten billion dollars of research-and-development funds and, from within and without the government, studies have analyzed the technological challenges and political implications of the program.

SOON AFTER THE UNITED STATES and the Soviet Union developed nuclear weapons, studies on defenses against the weapons began, the first of which was against bombers carrying nuclear weapons. The immense destructiveness of nuclear weapons, however, made designing an effective defense extraordinarily difficult. The World War II strategy of defense by attrition of bombers could not be applied in a defense against nuclear weapons because a single nuclear bomb could destroy a large city. The advent of rocket-launched delivery of nuclear-armed ballistic missiles in the early nineteen-sixties compounded the problem of creating an effective defense, because the flight time of a missile coming from the Soviet Union to the United States (or the reverse) was under thirty minutes and the velocity of its final approach was high. Also, because these nuclear weapons could inflict a much greater destructiveness than was experienced at Hiroshima, an effective defense of cities appeared hopeless. American planners, therefore, began studies on "hard-point defense," in particular the defense of nuclear-armed rocket missiles based in heavy-walled underground silos.

By the nineteen-sixties, it was recognized that a nuclear war between the United States and the Soviet Union could be catastrophic to both. Hence, nuclear weapons became a deterrent against either side actually using the weapons. The primary objective of defenses was to enhance deterrence, that is, to insure the survival of enough of one's own nuclear weapons to be able to launch a devastating retaliatory strike. The combination of missiles deployed on invulnerable submarines and land-based missiles in silos that would survive a first strike attack seemed to guarantee an ample deterrence capability for both the United States and the Soviet Union.

FRANKLIN A. LONG

*There has been technical progress in the SDI program. But there have also been serious setbacks.*

Despite the mutual belief in the stability of nuclear deterrence during the nineteen-sixties, both the United States and the Soviet Union began to develop and deploy antiballistic-missile defenses. The Soviet Union's primary defense was of Moscow. After contemplating a defense of cities, the United States chose to defend Minuteman missiles deployed near Grand Forks, North Dakota. By 1969, both nations had well-established deployment programs.

The defenses of both sides were operationally similar: terminal defenses designed to detect, track, and destroy incoming nuclear warheads during their final approach to their targets. High-acceleration rockets were to be aimed and fired so that their defensive

nuclear warheads would be detonated close enough to their targets to destroy them. Although the defenses of both sides appeared workable, the United States was seriously concerned about whether the vulnerable radar components of its antiballistic-missile defense could survive an attack. There was also concern about the cost-effectiveness of the defensive system having to respond to an increasing number of Soviet offensive warheads.

As the United States and the Soviet Union were deploying their defenses, they were planning negotiations on arms control measures to limit the buildup of strategic nuclear weapons. The Strategic Arms Limitation Talks (SALT) started in late 1969, with the idea of limiting both offensive and defensive systems. From those negotiations came an interim SALT Agreement, which froze the buildup of offensive nuclear missiles, and the Anti-Ballistic Missile Treaty, which limited the deployment of ABM systems to one hundred defensive missiles in a single, restricted site. Both the SALT Agreement and the ABM Treaty were signed in 1972.

The Soviet Union chose to continue its defense of Moscow, and the United States chose to continue its defense of a single missile silo field near Grand Forks. Both nations recognized that a defense of one hundred rockets was only a token that defense could be easily overwhelmed by a portion of the thousands of strategic offensive warheads each side could launch. Therefore, in 1976, Congress terminated the defense of the missile silo field near Grand Forks. The Soviet Union, however, still maintains its defense of Moscow.

When the ABM Treaty was signed, Congress stipulated that the military services should maintain a substantial research-and-development program on defense against ballistic missiles. The program had expenditures (in 1986 dollars) of about a billion dollars a year until it was absorbed by the SDI in 1983. It also had a large body of information and ongoing study programs on which the SDI could build.

At its inception, the Strategic Defense Initiative was given special status and a specific objective. The director of the Strategic Defense Initiative Organization reports directly to the Secretary of Defense. The projected research-and-development budget for the SDI was quite large: some twenty-six billion dollars in the first five years, and upwards of sixty billion dollars in the first nine years. And at the end of that nine-year period, the goal was that the SDI would have identified and developed technologies, and sufficiently worked out the control-and-battle-management system so that the nation could decide whether to move ahead to the development and deployment of strategic defenses.

AFTER ITS INCEPTION, the Strategic Defense Initiative Organization quickly established an extensive set of research-and-development programs. It enlisted support from all the armed services and gave research contracts to most of the large defense-oriented industrial corporations. Working through the Department of Energy, the SDIO helped to establish and support a variety of research efforts in the so-called weapons laboratories: Lawrence Livermore, Los Alamos, and Sandia. It also developed a modest program to support research in universities.

SDI spokesmen, SDIO Director Lieutenant General James Abrahamson, and others speak of the great (or amazing) progress the SDI has made from the beginning. There has been technical progress, but there have also been setbacks. Certain serious problems have always been recognized, but they have become much more serious. Two merit attention. The first is that designing and testing a total defense *system* with capabilities ranging from initial surveillance to battle management is a formidable challenge. The second is that likely Soviet responses will profoundly influence the feasibility and cost of a highly effective U.S. strategic defense.

The report of the Strategic Defense Initiative Organization to Congress in June 1986, saw the SDI in terms of three building blocks: a technology base program, technology integration experiments, and demonstration-of-capabilities projects. The first of these is clearly important to the initial stages of the project, and it has, therefore, received much attention. However, a great deal of study and innovation still needs to be done. The 1986 report — under the heading "Among the Important Critical Issues Requiring Resolution *to Be Recently Identified* (emphasis added)" — lists twelve items. Although all seem important, three are most obviously so: (1) "the need for 'smart' high-speed kinetic-kill projectiles"; (2) "good discrimination for exoatmospheric interceptors"; and (3) "battle-management software and hardware, including a simulation and testing-ground facility."

This brief indication of the dimensions of SDI problems and of how much essential information must be garnered in the next few years demonstrates the folly of recent proposals that the government make decisions in 1987 to proceed with the development and deployment of a specific multilayer defensive system with the expectation that the system will provide a highly effective, overall defense against Soviet strategic missiles. That such a crucial decision must be an *informed decision* is elementary. The necessary technologies used must be known and demonstrated; critical issues, such

as the twelve listed in the SDIO's 1986 report to Congress, must be studied and resolved; the battle-management system must be designed, developed, and, to the degree possible, tested. It is clearly evident from the SDIO's report that almost none of the requirements for an informed decision are available now — nor will they be — for the next several years. Nor are there — nor will there be for some time — any answers to such underlying questions as the survivability of the proposed system and the cost-effectiveness against plausible Soviet responses. The idea that decisions can be made now for the development and deployment of the defensive system suggests that it is not a military conclusion but political panic.

***President Reagan's "Star Wars" speech was something of a bombshell. Its goal of an effective defense appealed to the American people, but aroused skepticism and disbelief among informed scientists and engineers.***

Nonetheless, the basic problem for the SDIO remains: to procure, by the early nineteen-nineties, the necessary information on the technologies, the structure, and the cost of a defensive system for an informed decision on the development and deployment of the system.

PRESIDENT REAGAN'S OBJECTIVE — as stated in his 1983 "Star Wars" speech and frequently reiterated — is quite clear: "rendering nuclear weapons impotent and obsolete." However, within months after that speech, members of the Reagan Administration, as well as outside analysts, were arguing for more limited objectives. The commitment to the President's objective has eroded to the point that critics now routinely dismiss it as a totally infeasible "vision," and many supporters continue to argue for limited objectives. A senior SDI official recently finessed the problem in a public forum by saying that the objective of the SDI was to *devalue* the Soviet offensive nuclear delivery systems, implying that any level of SDI effectiveness would be acceptable. He noted, in passing, that if the devaluation went to zero, the President's objective would be reached.

The two most discussed intermediate objectives for the SDI are: (1) a defense that would diminish Soviet confidence in achieving military goals by nuclear attack, that is, they would be deterred because the risks from an attack would exceed the potential benefits; and (2) a hard-point defense that would increase the survival of U.S. missiles in silos and thus strengthen deterrence by threat of retaliation. Cost-effectiveness in the face of Soviet countermeasures has so far not been discussed.

IT IS GENERALLY ACCEPTED that a near-perfect defense against Soviet missiles will require three or four layers of defense. The essential layers appear to be for a defense against: an attack of the launch rockets during the initial boost phase, a mid-course attack of the nuclear warheads during their flight through space, and an attack during the terminal phase as the warheads reenter the atmosphere and approach their targets. Technologies for the successive layers will differ considerably. Satellites will detect and locate rocket launches and determine their trajectory. Laser beams or kinetic-energy weapons from other satellites will "kill" the rocket launches. Discrimination of warheads from decoys during mid-course will require other satellites, and the attack on the warheads may require space-based and ground-based weapons. The final layer of defense will attack the warheads as they enter the atmosphere, after the decoys and chaff have separated from the warheads. For this terminal defense, identification is certain, but the time for attack is quite short. If the kill mechanisms are non-nuclear, as now planned, maneuvering warheads could seriously degrade terminal defenses.

Integration of the surveillance, tracking, and attack

technologies for these layers requires a highly automated and responsive battle-management system. This system, of necessity, will be fully computerized, taking its directions from a sophisticated and integrated set of software programs.

*We have to accomplish a great deal more in the SDI before we can make an informed decision about whether to develop and deploy a full defensive system.*

Only a small fraction of the required technologies are now available. The task of the SDI is to seek new, or greatly improved, technologies that will both perform the needed operations and be able to be assembled into an overall integrated defensive system. If the SDI succeeds in its research-and-development efforts, it could, in the early or mid-nineteen-nineties, recommend the development and deployment of the components of a defensive system that would constitute the very good defense that President Reagan called for in his "Star Wars" speech.

For the components and the system to be fully successful, they will have to meet two central requirements that Paul Nitze enunciated two years ago: Will they survive likely enemy responses? Are they cost-effective at the margin, that is, would the cost of our adding one more unit of defense be less than the cost of the Soviet Union's adding one more unit of offense? Even if we answer yes to those questions, we will continue to be concerned about them, because Soviet responses will undoubtedly continue to improve. Yet, since its inception, the SDI has not addressed either of these areas well.

NEITHER SDI PROGRAM objectives nor needed technologies have been firmly established. Therefore, we can only speculate on the eventual cost of the SDI. Several guide posts, however, suggest that the cost will be quite high:

- The projected expenditure of sixty billion dollars for research and development indicates an elaborate system.
- An attack from space on Soviet Inter-Continental Ballistic Missiles (ICBMs) during the boost phase seems essential for a highly effective defense system, and space is a costly and unforgiving medium in which to operate.
- The annual operational cost of the proposed defensive system will be quite high, given the overarching character of the desired defense and the need to maintain instant readiness.

Also, a recent analysis suggests that the total cost for deployment and ten years of operation of the defensive system will be approximately two-thirds of a trillion dollars.

HISTORICALLY, whenever the United States has taken a major military initiative, the Soviet Union has quickly responded. When we deployed one thousand ICBMs (Minuteman) in underground silos, the Soviets responded with comparable ICBM deployments. When we deployed ICBMs on submarines, the Soviets did the same. Similar action and reaction has occurred with fighter aircraft and nuclear-armed cruise missiles. Their response to our intercontinental bombers was deployment of an extensive air-defense system. The Soviets' response to our SDI has not been the development of a comparable defensive system. However, they will certainly respond if we move toward deployment of a defensive system.

Several obvious and possible Soviet responses could be accomplished in a shorter time, and probably at a lesser cost, than the "full protection" objectives of the President. The Soviets could build more ICBMs and increase the number of warheads per missile; make technical changes in their weapons systems, such as having shorter burn times for their ICBM rocket launchers; employ decoys to counter our attacks on their

warheads during mid-course flight; maneuver their warheads to complicate our terminal defense; increase their nuclear-delivery capability by employing cruise missiles and intercontinental bombers, attack modes for which the United States has not yet developed defenses.

An important corollary to the likelihood of Soviet responses is that we may never be able to feel secure about the effectiveness of our nuclear defenses, because we will have to keep modifying and improving the system in the face of Soviet responses. Therefore, it is doubtful that we will ever feel secure enough to abandon our offensive nuclear weapons as "impotent and obsolete." It follows, then, that even after we expend large amounts for installing a defensive system, we will continue to incur high costs for its ongoing operation, maintenance, and modification.

POLITICALLY, President Reagan's "Star Wars" speech was something of a bombshell. Its explicit goal of a fully effective defense appealed to the American general public, but aroused skepticism and disbelief among informed scientists and engineers. The SDI program of implementation was similarly appealing, but skepticism about its time frame and eventual success has grown. The initially large and rapidly growing expenditures requested for the SDI have been cut considerably by a skeptical Congress. The SDI's FY 1987 budget is $3.5 billion, which is three-fold larger than missile defense expenditures immediately before the establishment of the SDI, but only two-thirds of the Reagan Administration's requested budget for the SDI.

Our NATO allies eventually gave their cautious approval to the SDI, but they had little interest in appropriating funds for parallel or supportive research. The European public, on the other hand, was quite negative about the SDI. They saw the SDI as a move toward establishing "Fortress America," despite President Reagan's 1983 promise that we would honor our commitments to our allies. Europeans were also concerned that the advent of the SDI might lead to a diminished U.S. effort to negotiate arms control and disarmament.

The Soviets see our unilateral push toward strategic defense as threatening their capability to deter a nuclear attack by us; hence, they feel quite vulnerable. Our moves toward installing strategic defenses will most likely force the Soviet Union to respond, not necessarily by installing similar defenses, but by increasing their strategic nuclear offenses.

The growing belief among critics of the SDI program is that it will be virtually impossible for us to obtain a highly effective defense if the Soviets continue to increase both the number and types of their strategic nuclear forces. The favored scenario to overcome this dilemma is for the Soviet Union to deploy defenses and for the two nations to agree to extensive reductions in nuclear forces. The necessary first step in this scenario is to negotiate arms reductions.

A related political problem is what to do about the Anti-Ballistic Missile Treaty. Article 5 of the treaty clearly prohibits space-based antiballistic-missile systems: "Each party undertakes not to develop, test, or deploy ABM systems or components which are sea-based, air-based, space-based, or mobile land-based." That is a direct barrier to the development and testing of our projected space-based system for attacking Soviet launch rockets in their boost phase. A State Department lawyer, however, argues that we can use a controversial "broad interpretation" of the treaty to get around that prohibition.

In view of the broad skepticism on the attainability of the President's goals for the SDI and the increasing concern about the SDI's impact on U.S.-Soviet relations, many opponents of the program hope that the new administration and Congress in 1988 will constrain the SDI as well as negotiate arms control. Supporters of the SDI, however, are pressing for decisions on the development and deployment of a defensive system, to be made in the near future that would make the SDI program unstoppable. The danger in all this is that in an intense political struggle, grave technical uncertainties and international political implications may be virtually ignored.

EVEN IN THE ABSENCE of Soviet countermeasures, it is doubtful that we will be able to deploy a reliable, fully effective — that is, ninety-nine percent effective — defense against Soviet ballistic missiles in the next twelve years. Likely ongoing Soviet responses make it doubtful that the goal of the SDI can even be reached in the long term.

Progress in our defense technologies during the first three years of the SDI have been modest. Some once-appealing technologies — for example, chemical and X-ray lasers — are now less attractive than before. Important requirements — such as a battle-management system and mid-course discrimination that identifies warheads from decoys — now look more difficult to implement. There have apparently been no technological breakthroughs in these areas. Therefore, we must accomplish a great deal more before we can make an informed decision on whether to develop and deploy a full defensive system.

Given the considerable doubt of attaining a fully effective defense, we are looking at partial defenses, such as terminal defense of missile silos, to enhance our deterrence. However, if the Soviets view our partial defenses as being simply stages toward a full defense, they will most likely respond to the full potential threat.

The Strategic Defense Initiative is in significant political trouble, not only because Congress is concerned about the cost of the program, but also because the fundamental question remains: Does the SDI itself make good sense?

# A Debt of Generosity

**If great enmities are ever to be really settled, we think it will be, not by the system of revenge and military success, and by forcing an opponent to swear to a treaty to his disadvantage, but when the more fortunate combatant waives these his privileges, to be guided by gentler feelings, conquers his rival in generosity, and accords peace on more moderate conditions than he expected. From that moment, instead of the debt of revenge which violence must entail, his adversary owes a debt of generosity to be paid in kind, and is inclined by honour to stand to his agreement. And men oftener act in this manner towards their greatest enemies than where the quarrel is of less importance; they are also by nature as glad to give way to those who first yield to them, as they are apt to be provoked by arrogance to risks condemned by their own judgment.**

THUCYDIDES
*History of the Peloponnesian War*

LAUCKS FOUNDATION, INC.
POST OFFICE BOX 5012
SANTA BARBARA, CA., 93150-5012

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