The Dark Side of SDI

Technologies being developed as part of the Strategic Defense Initiative will be inherently capable of offensive uses, claim speakers at the AAAS annual meeting

Chicago

EVER since its inception almost 4 years ago, President Reagan's Strategic Defense Initiative (SDI) has been depicted as a search for a system that would be purely defensive. "I have offered firm and concrete assurances that our SDI could never be used to deploy weapons in space that can cause mass destruction on Earth," Reagan said last September in a speech to the United Nations. According to three speakers at a symposium at the AAAS annual meeting here, however, the President's wholly benign vision may not mesh with reality.

"SDI will not produce weapons which only destroy other weapons. They will also serve as strategic arms, almost perfectly suited to strikes against population centers, or as instruments of coercion and destruction," said Peter D. Zimmerman of the Carnegie Endowment for International Peace. Zimmerman, along with Harvey Lynch of Stanford University and Caroline Herzenberg of Brookhaven National Laboratory, argued that some SDI technologies have at least a potential for striking ground targets, starting numerous fires, and perhaps even conducting attacks on national leaders with almost surgical precision.

All three speakers started with the assumption that strategic defenses would have the power and capabilities needed to fulfill their defensive role, and simply asked what offensive missions might also be possible.

One widely recognized capability of space-based lasers and other so-called directed-energy devices is their potential use as antisatellite weapons. "Compared to destroying a missile, destroying a satellite by means of SDI is a rather trivial task: Satellites move on paths which can be predicted long in advance, and generally speaking they are rather vulnerable targets," said Lynch. This at least opens up the possibility of using strategic defenses to destroy an enemy's key reconnaissance and early-warning satellites immediately before a nuclear or conventional attack.

Less widely recognized—and much more difficult—is the potential use of defensive weapons to attack aircraft. This would require a laser capable of penetrating the atmosphere with sufficient intensity to melt through the aircraft's skin, and a means of tracking targets from space.

According to Lynch, a pulsed infrared laser fired from an orbiting battle station, or a ground-based free electron laser whose beam would be reflected to targets from mirrors in space, offer the best possibilities for attacking targets in the atmosphere—at least on a clear day. Although there are some uncertainties about the effects of ionization of the atmosphere, scattering of the laser beam, and thermal heating of the air, Lynch suggested that it is theoretically possible to use such lasers to punch a hole in an aircraft in a few tenths of a second. The beam would be able to burn through thin clouds with little difficulty, but thick clouds "would be a rather effective protection."

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Finding and tracking the target might be more difficult. The Defense Department is working on a space-based infrared tracking system and an early test, code-named Talon Gold, is scheduled to fly on the space shuttle when it is back in service.

Although developing the ability to attack aircraft might be viewed as a defensive mission, all three speakers pointed out that such a capability could have offensive potential if used to destroy key airborne control centers as part of a coordinated attack.

Compared with the difficulties of hitting moving aircraft, attacks on ground-based targets would be relatively easy because the targeting problems and power requirements would be much simpler. According to calculations presented by Zimmerman, a laser system capable of defending against the 1400 boosters currently in the Soviet Union's arsenal could also start more than 1 million fires over the course of 12 hours. By comparison, he noted that only 6400 fires break out each day in the United States.

Herzenberg pointed out that military and civilian targets would be potentially vulnerable. They include fuel storage tanks, refineries, radars, communications systems, ships, and troop concentrations. Lasers might also be used with devastating effect on cities, starting so many fires that fire services would be quickly overwhelmed, she suggested. However, Lynch pointed out that cities could be set on fire much more easily by conventional high explosives and incendiaries.

As for attacks on people, Lynch has calculated that an SDI laser could be used to produce an intensity 400 times that of the noonday sun in a circle 10 meters in diameter. This would result in a thermal exposure in 1.2 seconds equivalent to that from a 20-kiloton nuclear weapon detonated 2 kilometers away, he noted.

"Because of the great expense of such a use, attacking personnel would only be practical against high-value targets, such as political leaders," said Lynch. Zimmerman took the argument one step further: "In a future attack on Libya, Khadaffi's tent could be attacked directly, with few or no other casualties."

The first defensive system likely to be ready for deployment would consist not of lasers, but of thousands of rockets on orbiting battle stations, which would be used to hit missiles soon after launch. Opinion was divided among the speakers on the potential of such a system for offensive uses. Lynch suggested they would not pose much of an offensive threat, but Zimmerman argued that the battle stations could include some relatively simple single-stage rockets designed specifically to attack important ground targets, such as airfields and communications centers, with great accuracy.

Most possible offensive uses of strategic defense technologies have so far received little attention in the debate over SDI. That may be in part because, as Zimmerman put it, "in a world dominated by thousands of nuclear weapons, the offensive capabilities

of SDI are discountable." However, in the world envisaged by President Reagan at the Reykjavik summit, in which nuclear weapons would be all but eliminated and SDI would be deployed as insurance against Soviet cheating, they would be far more important.

Indeed, at a press briefing following the summit last October, assistant defense secretary Richard Perle suggested that the Soviets may already have discovered "a potential for offensive uses of space," and are anxious to stop SDI because of concerns "that we might somehow in the course of the SDI program stumble upon offensive technologies." According to the speakers at the symposium, offensive technologies would in fact be an inherent feature of SDI. ■

COLIN NORMAN

AAAS Briefing:

Expanding Deserts, Shrinking Resources

In 1977, representatives of 94 countries met in Nairobi and endorsed an ambitious plan to combat the pernicious process of land degradation in many parts of the world. Ten years later, the causes of desertification "remain unaddressed, the effects are misunderstood, and the tools to bring it to an end lie around us unused," according to Noel Brown, director of the North American Office of the United Nations Environment Program (UNEP).

Brown, who was speaking at a symposium on desertification at the AAAS annual meeting, noted that the Nairobi conference estimated that investments of $4.5 billion a year would be required to halt desertification by 2000, but only a tiny fraction of this amount has been made available. Less than $600 million a year is being spent in developing countries, according to Brown, and virtually all of it is going to items such as road construction and training rather than to soil management.

A special account set up by the Nairobi conference for donors to make voluntary contributions to support desert control efforts has attracted a grand total of $50,000, Brown said. And a special 30-nation consultative group that was formed to develop and fund antidesertification efforts has received proposals for projects worth $528 million but raised only $26 million to fund them. "Lack of funding has prevented any implementation of the plan" agreed to in Nairobi, Brown concluded.

"Equally disturbing," said Brown, is that not a single country has put into operation a national plan to halt soil degradation, although Tanzania, Burundi, and Uruguay are in the process of implementing national strategies. And of six regional projects proposed by the Nairobi conference, only two—a "green belt" project in North Africa and an aquifer project involving Egypt and the Sudan—are being implemented.

That bleak international picture was given an even more depressing cast by Jeffrey Gritzner of the National Research Council, who described his own observations of efforts in the Sahel region of West Africa. "There has been a relatively steady deterioration of environmental systems in the region, and a steady deterioration of food production," Gritzner said.

Soil management projects have rarely involved local farmers and herders, Gritzner said. As a result, "some of the best sources of information have been almost systematically neglected," and some of the best plant species "almost never have been species that donors or local governments are interested in." Perhaps not surprisingly, Gritzner concluded that "an overwhelming majority of the antidesertification projects [proposed for the region] would promote desertification."

In June, UNEP is scheduled to produce an assessment of the record since the Nairobi conference. It should be an opportunity for some soul-searching. ■

COLIN NORMAN

Life on the margins. *The United Nations Environment Program estimates that 6 million hectares of land are becoming desert each year.*

Nuclear Tests Defended

Continued testing of nuclear weapons will be critical for the development of strategic defenses and for assuring the safety and reliability of the existing stockpile, a top government weapons scientist contended at a symposium on the prospects for a nuclear test ban. "We should not delude ourselves into thinking that a nuclear test ban will enhance the safety of our country; it may in fact do quite the opposite," said George Miller, associate director for defense systems at the Lawrence Livermore National Laboratory.

Miller argued, however, that the role of nuclear testing in the Strategic Defense Initiative has been "greatly distorted" in the test ban debate. Underground tests have generally been depicted as crucial for the development of x-ray lasers, which have been portrayed as a driving force behind SDI. Miller claimed, however, that the x-ray laser program is aimed not at acquiring the weapons but at "threat assessment"—determining whether x-ray lasers could be used by the Soviet Union to attack space-based elements of SDI. He repeatedly referred to SDI itself as "nonnuclear."

This drew a response from Richard Garwin, a longtime defense adviser and fellow at IBM's Thomas J. Watson Research Center. "If there weren't any testing going on, we wouldn't have to fear the acquisition of a Soviet x-ray laser capability," he said.

Miller also disputed published estimates that 100 to 200 underground tests would be required to develop an x-ray laser. He