House group he chaired on aerospace goals. He thinks officials have "jumped on" goal number three, the idea of building a hypersonic plane, as a way to get money in the budget for a military project. But in doing so, they have cast aside goal number two, the plea for research on a commercial supersonic plane.

After sitting through one recent briefing, Steiner went over to a military official and chided him for opening his presentation with a drawing of a hypersonic plane with passengers at the windows sitting on a runway at Dulles Airport. Steiner called it a shoddy sales technique. The response, Steiner says, was something to the effect that, "This is the way you've got to talk in front of Congress."

One watchdog of space programs, John Pike of the Federation of American Scientists, thinks the aerospace plane is a hot item strictly because it fits in with plans for the Strategic Defense Initiative. "The SDI people have been quite frank about the need to reduce the cost of launch by an order of magnitude," he says.

After completion of a new SDI architecture study in the fall, according to Pike, it became clear that the system would demand on the order of not 100 large space platforms but 1000 small ones. In addition, the new design called for periodic maintenance trips to space. This architecture would be impossible to support with the present shuttle. Of the hypersonic plane, Pike says:"It makes a lot of sense for SDI, but I can't imagine why anybody else would look at it."

Because of the military's interest in a new space vehicle, research on the hypersonic plane will surely go forward. But the debate about its commercial future may be made academic by money problems. The Gramm-Rudman-Hollings resolution, which aims to end the federal deficit in 5 years, will take a heavy toll on ambitious technological start-up programs in 1986, and the aerospace plane could be one of the victims. It may be possible to continue the kind of conceptual and engine research NASA and DARPA have proposed for the next few years by trimming other programs. But at the moment, it is hard to imagine where the program will go beyond that. ■

ELIOT MARSHALL

A Risk Reduction Center Gains U.S. Support

A series of shrewd maneuvers by two congressmen led to an agreement at the summit to start bilateral talks on risk reduction centers

FOUR years ago, in a brief letter to an official of the Strategic Air Command (SAC), Senator Sam Nunn (D–GA) posed the following question: What would happen if a single nuclear weapon were to explode on U.S. or Soviet soil at the height of an international crisis? After a detailed study, SAC concluded that the origin of the blast might be unclear and that the superpowers could respond in such a manner that global nuclear conflict became inevitable.

This alarming conclusion attracted little public attention at the time, but it made a deep impression on Nunn and several of his colleagues. With the assistance of arms control specialists in the academic community, they set in motion a chain of events that culminated in the only substantive arms control progress by President Reagan and Mikhail Gorbachev at the November summit. Specifically, the two leaders agreed to discuss the establishment of "centers" that could be used to reduce the risk of accidental nuclear war stemming from scenarios such as that involving a single nuclear detonation.

The agreement was apparently hard-won on both sides. In the United States, it was resisted for a long time by elements of the diplomatic and military bureaucracies that presently concern themselves with crises, partly out of concern that their own roles could potentially be diminished and partly out of genuine skepticism that such an idea could be made to work. In the Soviet Union, according to U.S. officials, it was resisted primarily out of concern that progress in such a peripheral area would detract from the central topic of strategic arms reductions.

The process by which Nunn and his colleagues overcame this resistance and placed their pet idea on the agenda for discussions between the world's two most powerful leaders is virtually a model of successful political action in Washington. Having established a nucleus of support in the Congress, they reached out to a community of well-regarded independent experts, skillfully exerted pressure on the executive branch, and ultimately served as go-betweens in the delicate negotiations leading up to the summit itself.

The notion of a risk reduction "center," at which various experts can jawbone about minor scrapes and help avert a nuclear cataclysm, is at least 25 years old. Henry Kissinger, while still a professor at Harvard University urged in 1960 that ranking officials jointly staff centers in Moscow and Washington, that could dispatch special surveillance teams for on-site dispute resolution. But the concept largely lay dormant until 1981, when Nunn, a widely respected member of the Senate Armed Services Committee, asked General Richard Ellis, who was then the SAC commander, to perform the study.

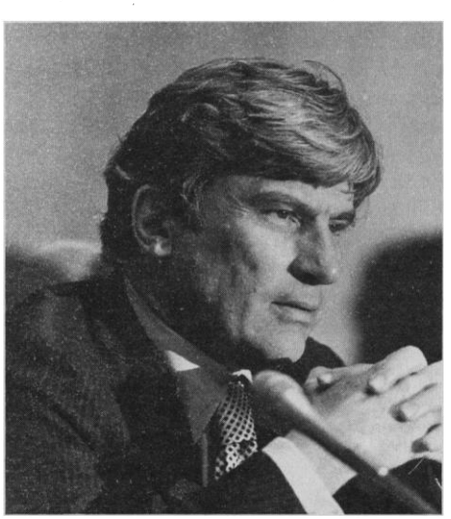
As Nunn explained at a hearing before the Senate Foreign Relations Committee last year, "the study that was done by the Strategic Air Command . . . started with a classified analysis of how many nations and which nations could conceivably have nuclear weapons by the year 1991. When you look at that list in a classified way, it is overwhelming in terms of the message that it delivers." The study persuaded Nunn that the most likely cause of a general nuclear war might be the fear and uncertainty that would follow the detonation of a nuclear bomb by terrorists, rather than a straightforward first strike, he told *Science*.

Nunn discussed the study with Senators Henry Jackson (D–WA) and John Warner (R–VA) and together they seized on the notion of a multinational crisis control center as the best means of averting such a conflict. Warner, a former Secretary of the Navy, was the chief U.S. negotiator of a 1972 U.S.–Soviet agreement aimed at preventing accidents and confrontations at sea. He says that he likes the idea because it has a parallel goal. Nunn, Warner, and Jackson proposed a successful amendment to the 1982 defense bill requiring the Reagan Administration to conduct a formal study of the concept, along with several additional "risk reduction" ideas, such as modernizing the U.S.–Soviet Hotline for crisis communication and reducing the vulnerability of

military command and control systems.

Six months later, the Pentagon concluded that a risk reduction center of the type envisioned, staffed jointly and located in a neutral country, was a bad idea. One objection was that, at a considerable distance from either capital, it would probably be bypassed in a crisis; alternatively, it would add a cumbersome extra layer of bureaucracy. In addition, the Pentagon said, the existence of the center would constrain U.S. "flexibility" by creating an unavoidable forum for negotiations even when discussions with the Soviets are not in U.S. interests. Finally, there would always be a danger that the staff would inadvertently disclose sensitive intelligence, or that the forum might be used for deception. Notably, the Pentagon did support the Hotline upgrade, as well as a new bilateral link between military headquarters and better communications between capitals and embassies. Thus far, the Soviets have agreed only to the Hotline upgrade.

Anticipating some resistance, Nunn and Warner had in the meantime formed a panel of bipartisan experts to review the idea and lend their support. The panel, which included a number of former high-ranking defense and intelligence officials such as James Schlesinger, William Perry, Brent Scowcroft, Bobby Inman, and William Hyland, also



Senator John Warner

Favors regular consultation similar to those involving ships at sea.

disliked the notion of a distant, multinational center, but it warmly endorsed a more limited arrangement of independent centers, located in each capital but linked by superb communications. According to this concept, officials at the centers would negotiate standard procedures for handling nuclear incidents and exchange information on provocative military activities and nuclear proliferation; only later might they eventually engage in crisis management.

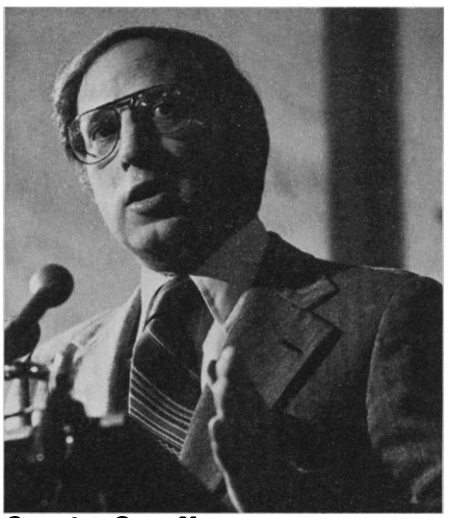
Perry says that his interest stems in part from a moment in 1979 when he worked at the Pentagon and was awakened with a message that NORAD computers were indicating that 200 Soviet missiles were headed for the United States. The incident was of course a computer malfunction, but "if the event had occurred at a time of high political tension, if the human intervening had not been as thoughtful as the officer on duty that night, and if the data had been more ambiguous, it could have led to a missile alert." The centers might be used to prevent such an incident from growing into accidental war, he says, as well as to negotiate a ban on such provocative Soviet activities as the firing of multiple missiles from operational silos during military exercises.

Besides the Nunn-Warner group, the idea also gained the endorsement of some academic experts frustrated by the lack of progress on more traditional arms control topics. William Ury of Harvard and Richard Smoke of Cornell produced a favorable study for the Arms Control and Disarmament Agency; John Lewis and Coit Blacker produced a favorable study at Stanford; and Graham Allison, Joseph Nye, and Albert Carnesale of Harvard organized a series of workshops on the topic with substantial support from the Carnegie Corporation.

Armed with this evidence of public interest in the idea of two separate centers, Nunn and Warner proposed a resolution favoring U.S.–Soviet negotiations on it that passed by a vote of 82–0 in July 1984. This in turn allowed them to approach the White House and secure the approval last August of Robert McFarlane, who was then the President's national security adviser.

In a classified letter to the senators, McFarlane stated that the Administration is willing to negotiate separate centers, manned by both diplomatic and military personnel and linked by equipment similar to that used in the Hotline upgrade. (Designated Soviet officials could gain periodic access only under controlled escort.) Initially, the centers could serve as the forum for any notifications of military activities and nuclear events required by arms treaties. In addition, they could serve as a meeting place for "risk reduction" discussions, and "promote a dialogue on nuclear doctrines, forces, and activities."

With a summary of the letter in hand, Nunn and Warner subsequently raised the issue with Gorbachev during a visit to Moscow last September. His positive response set the stage for the summit agreement "to study the question at the expert level . . . taking into account the developments in the Geneva negotiations." Although delicately phrased, the agreement betrays the different approach that each nation favors. The United States, desperate for some evidence of progress in arms control negotiations, favors discussions that are separate from the ongoing strategic weapons talks; the Soviets, who want the world's attention fixed on Geneva, will resist any discussions outside that forum.



Senator Sam Nunn

"The worse our relations get, the more important this type of effort is."

Differences also remain within the U.S. government. "One of the great hurdles that we have to overcome is the understandable reluctance of people in the intelligence area to move in this direction," Nunn told the Foreign Relations Committee. "I do not diminish [the] dangers. I simply believe that we have to put [them] in perspective. The dangers that they postulate in the intelligence area in my view pale in comparison to the dangers of sitting here doing nothing, while we have more terrorism in the world and more proliferation." Only after substantial experience is gained with independent centers should joint staffing be pursued, he says. But Sally Horn, director of the Pentagon's office of verification policy, writes in a forthcoming book, *Avoiding Nuclear War*,* that even then "we should take care to avoid jointly-manned mechanisms."

Nunn says that despite these remaining disagreements, the summit communique indicates that both countries are on the right track. "If the establishment of these centers is not in our mutual interest, it is hard to prove that anything is," he says. "The worse our relations get, the more important this type of effort is." ■ R. JEFFREY SMITH

**Avoiding Nuclear War: Confidence-Building Measures for Crisis Stability*, John Borawski, Ed. (Westview, Boulder, CO, in press).