'Star Wars' research feeling boycott?

Galen Gruman, Assistant Editor

More than 6500 scientists, engineers, graduate students, and junior researchers in industry and academia have pledged to boycott Strategic Defense Initiative research, according to the Union of Concerned Scientists.

The pledge was circulated by the Massachusetts-based group, which has about 100,000 member scientists and engineers concerned about the application of technology to political and social problems — mainly weapons development. Its anti-SDI work has been endorsed by 57 Nobel laureates, former President Jimmy Carter, and former Massachusetts Institute of Technology President Jerome Wiesner.

Interviews with some boycotters revealed political, social, and technical reasons for opposing the SDI program. Some questioned the ability to create the software that would coordinate an antimissile system, while others said that seeking a technological solution to a social problem was the wrong approach.

The debate on SDI software research began nearly two years ago when noted computer scientist David Parnas quit a Defense Dept. panel studying SDI computing strategies after concluding the endeavor would not work. The boycott was organized a few months after Parnas began speaking out against the program.

SDI research affected? The boycott has hurt the SDI research program by forcing the Defense Dept. to reinvent software that it might otherwise adapt, said Air Force Lt. Col. David Audley, program manager for SDI battle management, in an interview last fall. He told of telescope-aiming software that "had just what we needed, but the guy who owned the code restricted it so it couldn't be applied for SDI. . . . It hurts. We need all the talent that we have." (Audley declined to name the scientist's name or give his affiliation.)

However, James Ionson, the SDI's director for innovative science and technology strongly disagrees that the boycott has had an effect. "The boycott has been by scientists not germane to the SDI technology," Ionson said. "It hasn't influenced the type of research we're doing."

Wrong approach? "My principal concern is that we increasingly believe we can substitute technology for diplomacy," said Severo Ornstein, president of the 1500-member, California-based Computer Scientists for Social Responsibility and a codesigner of the ARPAnet military communications system. "I simply don't think it's going to work. It's going to fail us and we'll be very sorry. We are putting too much faith in this kind of thing," he said.

"If the consequence of failure were fairly moderate, I'm willing to take the risk," Ornstein said, citing nuclear power plants as a worthwhile gamble. "There is some price to be paid, but when you talk about wiping out 150 million people, the cost is just too high."

Furthermore, "I think the investment is too large," Ornstein said. "We give inadequate attention to other solutions," he added.

Loyalty issue. Undersecretary of Defense Donald Hicks caused a stir 18 months ago when he told first Congress and then *Science* magazine that Defense Dept. funds shouldn't go to SDI critics. "If they want to get out and use their roles as professors to make statements, that's fine, it's a free country," he told *Science*. But "freedom works both ways. I'm also free not to give the money. . . . I have a tough time with disloyalty," he added.

Boycotters revealed political, social, and technical reasons for opposing the SDI antimissile program.

The US Defense Dept. dissociated itself from Hicks' comments, saying the department did not review researcher's opinions before giving them contracts, so it would not be able to discriminate against SDI opponents. A written statement said, "Awards to researchers are made strictly on a merit basis."

But several computer scientists interviewed said they resent the implication that they are anti-American because they believe SDI is impossible or not worth pursuing. "I'm not opposed to DoD support per se. [But] I think the chances [of SDI's success] are very slim," said Robert Tarjan, a Princeton University professor and corecipient of this year's Turing Award, given by the Association for Computing Machinery.

"I'm in no sense a pacifist," said Dan McCracken, computer science professor at City College of New York and former ACM president.

"I'm as absolutely as true-blue as you can get. [But] I have skepticism about how our administration is going about foreign affairs," Ornstein said.

Political bargaining chip? Administration spokessmen agree that SDI is a political issue. "This is a sociomilitary technical program. It is not a scientific program," SDI's Ionson said. In fact, simply pursuing the research may push the Soviets to agree to US arms control suggestions, he said.

Since Defense Secretary Caspar Weinberger began talking about a possible SDI deployment in the early 1990s, Ionson said, the Soviets have backed down on assertions that the 1972 ABM treaty forbids anti-ballistic missile research. (According to Soviet spokesman Boris Nalakhov, the Soviet government actually changed its position several months earlier, just before the Iceland arms summit late last summer.)

Whether or not a software system can be built to handle an anti-ballistic missile defense, "knowing that it probably would work is enough" to keep the Soviets from attacking, Ionson said. "They count on the credibility of the system."

Such statements have made several SDI opponents wonder if the aim of the program is to build a defensive system or to gain a bargaining chip in arms control talks.

"I think the program is very politicized and overblown. I am troubled by the political football" nature of the SDI program, Tarjan said. "I think it's hurting arms control," he added.

McCracken questioned the wisdom of negotiating with SDI. "Why should [the Soviets] believe it will work when so many American scientists say it won't?" he asked.

Added instability? Some boycotters said they feel that SDI could harm the US by giving Americans a false sense of security or by forcing the Soviets to increase their arsenals to overwhelm an SDI system.

"SDI will lessen our sense of security. My technical conclusion leads me to believe we won't ever be able to trust it," said David Benson, a computer scientist at Washington State University whose research interests include perfectability of large systems. Unfortunately, he said, "Americans are gadget-happy. They think gadgets will do anything."

McCracken concurred. "I think we've gotten entranced [with] technology," he said.

"It is a very dangerous development because the outcome is likely to be something other than what we're looking for," said David Redell, a consulting researcher on distributed systems at DEC Systems Research and a frequent anti-SDI writer for the Computer Professionals for Social Responsibility.

Redell likens SDI to the advent of multiple, independently retargetable reentry vehicles in the late 1960s and early 1970s. MIRVs let nations multiply the number of deliverable nuclear warheads without increasing the number of missiles, since each missile could carry several independent warheads.

Their original purpose, Redell said, was to counter Soviet anti-ballistic missile systems. But the 1972 ABM treaty froze the Soviet systems, making the US MIRVs a threat to the Soviets rather than an equalizing response to Soviet antimissile systems. So the Soviets built MIRVs to counter the US MIRVs.

Ironically, MIRVs pose one of the toughest problems for SDI: detecting and stopping missiles before the MIRVs are released, and tracking the many warheads released by missiles that escape detection and destruction.

Redell also sees space-based systems causing further problems. "It will interfere with verification efforts," he said, because there is no ban on antisatellite weapons, and satellites are vital for monitoring arms control agreements.

Technical concerns. Several scientists said they did not want to work on a project they felt would not succeed. "My challenge is: Show me a program where it worked the first time against an enemy," Benson said. He said he knows of no such error-free software. And if an SDI system is built, "there's no way to try it out. For that reason, it's chasing a hopeless chimera of a hopelessly delicate mechanism," Benson said.

"Since you can't do full-scale testing, you have to establish a priori trust," Redell argued. Furthermore, computer scientists don't take Murphy's Law (what can go wrong will go wrong) seriously enough, Ornstein said. "The problems in software have to deal with the limits of human perfection. We're not perfect, we don't understand everything," he said.

Simulation, independent programmer teams don't get rid of the misconceptions embedded in the work of each team, Orsntein asserted. "Even long-term systems have flaws that pop up later," he said. "I'm worried about goal-directed DoD research," Tarjan said.

Early SDI deployment considered

Secretary of Defense Caspar Weinberger has urged an early deployment of an anti-ballistic missile defense. Statements from Weinberger and the Defense Dept. policy spokesmen indicate belief that a basic system could be in place by 1994. "The research results are so promising for a decision of an initial phase," said spokeswoman Jan Bodanyi when explaining Weinberger's comments. The system would grow layer by layer, she said.

But Weinberger's call for early deployment came before a Defense Dept. assessment of SDI research results. That assessment is due this month.

Weinberger's perception of an early SDI deployment is based on work by private foundations, such as High Frontier in Washington, DC, said Army Lt. Col Terry Monrad, an SDI spokesman. High Frontier's director, retired Army Lt. Gen. Daniel Graham, proposed the idea of an antimissile shield to President Ronald Reagan when he was a presidential candidate in 1980, according to a High Frontier press release.

High Frontier's October "Strategic Defense Development and Deployment" report says a space-based first layer could be operational in 7½ years (1995 if a decision to deploy an SDI decisions were made today). But the report does not mention software or computer issues, nor does it discuss how its three-layered system would be coordinated. Instead, it concentrates on the availability of ground-based antimissile missiles and space-based kinetic-energy weapons (essentially machine guns).

When asked what developments occurred that pushed up the SDI timetable from the 2020s to the 1990s, SDI's James Ionson responded, "There's always technology available to deploy some sort of system. We provide information to the policy makers," who decide what they want to do with it. Ionson directs the SDI's innovative science and technology acquisition program.

Despite the talk of early deployment, Ionson sees no change in the research program. "I don't feel that kind of pressure at all," he said.

While the SDI program has chosen a long-range computing architecture (Soft News, November 1986, pp. 82-83), none has been chosen for a near-term deployment, Monrad said. "Nobody knows what that architecture is yet," he said. It will most likely not be the space-based scenario popularized by the "Star Wars" label, he said. "[But] the technology is there for ground-based systems," Monrad added.

Technical reports and interviews with SDI computer scientists have indicated they are cautiously optimistic about SDI software in the long range. The Defense Dept.'s computer issues panel, the Eastport Group, anticipated a 30-year effort to develop a system that overcomes problems of complexity, reliability, trustworthiness, distribution, and decision-making.

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