

Official admits difficulties, defends SDI research

Galèn Gruman, Assistant Editor

Creating software for President Ronald Reagan's proposed defensive antimissile system, the Strategic Defense Initiative, requires addressing thorny problems, US Air Force Major David Audley acknowledged, but research into potential solutions should continue until a "Star Wars" system is created or is proved impossible to create.

"The SDI is a research program, and we don't have preconceived answers to

questions we are still seeking to pose," said Audley, the program manager for battle management and command control and communications in the Defense Department's SDI Organization. There can be no answers yet in a research program begun just over a year ago, he said.

While Audley acknowledges that the reliability and validation problems discussed by a panel at the Software Engineering Conference do exist and

must be addressed, he disagreed with the panel's conclusion that the success of such research was improbable and perhaps impossible. (The details of the panel's discussion are in the accompanying report.)

Monolithic system not wanted. "People think of a highly synchronized, end-to-end system" when they think of the SDI, he said. Most popular scenarios depict a space-based, computer-controlled tracking system that coordinates the destruction of incoming missiles through response missiles and lasers.

"That kind of system *is* impossible. . . . We intend to develop a system that does *not* rely on a monolithic, 10-million-line, homogeneous [software] system," Audley explained. "We need to structure it so it is not so complex.

"We have to have a system that drives down complexity. We need to promote independence of elements in this system," he stressed. The system must be modular, open-ended, and built with redundancy, he added.

The space-based scenario is only one of several, Audley said. He said most elements of a defensive system would likely be ground-based.

Audley compared the government's envisaged system to the nation's air traffic control system. That system relies on multiple, independent nodes. Airplanes carry flight control computers that allow independent navigation. Control towers are dispersed throughout the country to guide pilots.

"We could replace all the flight control computers with a bunch of Crays centralized on the ground somewhere," Audley said. "But we know that it's ludicrous to even think that way. One problem could cause all the planes to fall out of the sky."

Strategic coordination. No SDI system would be software-intensive, Audley said. Instead, it would "take advantage of the strengths of computer hardware and at the same time minimize the vulnerability of the computing software."

Audley used the phrase "strategic coordination" to describe the government's conception of the system. As an example, he described the nation's strategic offensive system, which consists of independent missiles, aircraft, submarines, and the like. If one of 10 missiles tested fail, military analysts expect an overall 10-percent failure rate. However, those 10 percent failures do not stop the 90 percent successes because each element is independent from the others, despite the fact that all the elements are coordinated, Audley explained.