

The undamaged target surrounded by craters is already becoming a thing of the past.

One Target, One Weapon

Paul G. Kaminski is the Clinton Administration's under secretary of defense for Acquisition and Technology. On May 2, he delivered the Ira C. Eaker Distinguished Lecture on National Defense Policy at the US Air Force Academy, Colorado Springs, Colo. Here are excerpts from Dr. Kaminski's address.

Dramatic Transformation

"America's armed forces are going through a dramatic transformation—everything from objectives and strategy to weapons and force structure to doctrine and tactics. The world is changing, and just like the larger civilian society that we protect and serve, so, too, must we adapt to the changes driven by the information revolution.

"At the time I was born, the country had one overriding national security objective: to win the Big War. We did that. In 1964 [the year Dr. Kaminski entered the Air Force Academy], our objective was to deter a bigger war. We have done that, too.

Now our objective is to deter smaller wars and the use of weapons of mass destruction, the so-called NBC weapons—nuclear, biological, and chemical."

Mean Value and Variance

"In the post-Cold War world, the United States no longer faces a single galvanizing threat, such as the former Soviet Union. Instead, there is increased likelihood of our forces being committed to limited regional military actions—coalition operations—in which allies are important partners. . . .

"I would sum up our current national security environment in statistical terms by saying that the mean value of our single greatest threat is considerably reduced. But the irony of the situation is that the variance of the collective threat that we must deal with and plan for, and must counter, is up.

"This gives us some pause in trying to plan intelligently. In response to reduced mean value of the threat, the United States has cut end strength by about a third from 1985 levels. But at the same time, the increase in variance has caused deployments of US forces to go up by a third. In the defense acquisition and technology program, this means we are focusing on fielding superior operational capability and reducing weapon system life-cycle costs."

Better Than the Storm

"We are succeeding in this effort by exploiting the opportunities made possible by the information revolution. As impressive as our military accomplishments were against Saddam Hussein, our forces are qualitatively superior today. The NATO combat operation in Bosnia [-Hercegovina]—Operation Deliberate Force—showed that and gave us a hint of what combat will look like in the twenty-first century.

"In [Operation] Desert Storm, only two percent of all weapons expended during the air war were precision guided munitions, or PGMs. In Bosnia, they accounted for over ninety percent of all ordnance expended by US forces during Operation Deliberate Force."

"One Target, One Weapon"

"The bomb-damage assessment photographs in Bosnia bear no resemblance to photos of the past, where the target, often undamaged, is surrounded by craters. The photos from Bosnia usually showed one crater where the target used to be, with virtually no collateral damage.

"We are moving closer to a situation known as 'one target, one weapon.' It was actually more than one—but less than two—weapons per target in Operation Deliberate Force. This has been the promise for the past twenty years. Now it is becoming a reality.

"Our weapons focus now is to preserve accuracy while reducing cost, increasing standoff range, and providing all-weather capability. These are the major imperatives behind our development of systems like the all-weather Joint Direct Attack Munition, the Joint Standoff Weapon, and the Joint Air-to-Surface Standoff Missile."

World Chessboard

"A chess analogy is useful for explaining what this means for the changing nature of warfare. Today, precision weapons have made it possible to take any piece on any square of the chessboard with no collateral damage to adjacent squares. Given this one target, one weapon capability, commanders now need to know where all one's forces are and where all the targets are on a 100 by 200

kilometer battlefield. This is analogous to seeing all the pieces on the chessboard—something we take for granted when playing chess.

"Imagine how fast you would win the game if you could see all the pieces on the board, but your opponent could see only his major pieces plus a few of your pawns. This is what it means to have 'dominant battlefield awareness.'"

Joint STARS

"A number of new systems are helping us see all the pieces—[E-8 Joint Surveillance and Target Attack Radar System] and unmanned aerial vehicles like the Predator, for example. . . .

"We've used these capabilities to great advantage in Bosnia. For example, Joint STARS has flown fifty-one missions in Bosnia, covering a total area of 747 million square kilometers, or about seventy-five times the land area of the United States. On a typical mission, Joint STARS spends an average of eight and a half hours on station, fills up the sixty [gigabytes, or billions of bytes] of mass storage on board, and acquires 100 radar images at three-meter resolution. There have been thirty-eight million total detections and 26,000 total revisits. Over the fifty-one missions, 6,950 radar service requests were met."

Dominant Cycle Time

"To secure an overwhelming advantage, commanders will need [command, control, and communications] and planning tools to achieve something I call 'dominant battle cycle time'—or the ability to act before an adversary can react. Back to the chess analogy, dominant battle cycle time would be, well, gaining an unfair advantage by breaking the rules. It means to keep moving your pieces without giving your opponent a chance to move his. To do this on the battlefield, one must have superb command-and-control systems, like Joint STARS, fast transportation, and highly mobile maneuver forces.

"To support [NATO's implementation force] in Bosnia, I recently approved spending about \$80 million on an information-communications initiative to be sure we have superb command, control, and communications systems for Operation Joint Endeavor. The impetus for this

initiative came from a 1994 Defense Science Board summer study co-chaired by [Gen. James P. McCarthy, USAF (Ret.)]. This initiative is improving our communications capabilities in two ways: first, by using commercial TV satellite technology to provide a direct-broadcast communications capability; second, by fielding a wide bandwidth, secure tactical Internet connection through fiber and commercial satellite transponders."

Where's the Remote?

"These communications allow war planners and logisticians on the ground in Bosnia, in the European Command headquarters in Germany, and back in the Pentagon to have access to the same data at the same time. This access is available to virtually anyone with a twenty-inch receive antenna, cryptologic equipment, and authentication codes. We've designed the system in such a way that we are giving local commanders a 5,000-mile remote control to select the programming that they receive over their . . . downlinks from direct-broadcast satellites.

"There are many striking aspects to this Bosnia [information-communications] initiative. First, we're pushing hard to get the most advanced information capabilities to our forces, and we are succeeding. We've accomplished in four months what it normally takes ten years to do for a new system. Second, we are demonstrating our willingness to use—even to lease—commercial systems. And third, we are proving the need to possess system engineering and system integration skills."

Going Off-Board

"If I compare . . . today's major Air Force acquisition programs with those that existed thirty years ago, I am led to the conclusion that we are now paying much more attention than we have in the past to enhancing the performance of our combat platforms with off-board information. In 1966, our focus was on the combat platforms—ships, tanks, and planes. The weapons, more often than not, were inertially guided. Today, we have clearly shifted our emphasis toward working with system-of-systems architectures involving sensor, communication, and command-and-control systems."

Commercial Brilliance

"In 1966, I had been working on the seeker for the Maverick missile, when TV videotape recorders were invented. The Maverick, being a TV-guided bomb, benefitted greatly from this commercial development because we were able to preserve television images from flight tests for subsequent analysis and evaluation.

"In this way, commercial TV videotape recorders helped improve the Maverick missile—one of our first precision guided munitions. It came about because of commercial sector investment in R&D [research and development]. It is also an early example of . . . a dual-use technology . . . that is, a technology that has both commercial and military applications.

"In aggregate terms, commercial industry surpassed DoD in R&D spending back in 1965. The disparity between defense and commercial sector investment in R&D has been growing wider ever since. This difference means that this nation's technological momentum is driven to a greater extent by commercial market forces."

No Defense Industrial Base

"Today's global economy allows everyone, including our potential adversaries, to gain increasing access to the same commercial technology base. To the extent that commercial technology can enhance military capability, the military advantage will go to the nation that has the best cycle time to capture technologies that are commercially available, incorporate them in weapon systems, and field new operational capabilities first.

"In this environment, we have no choice but to move from separate industrial sectors for defense and commercial products to an integrated national industrial base. Leveraging commercial technological advances to create military advantage is critical to ensuring that our equipment remains affordable and the most advanced in the world. . . .

"We are surrounded by change. The world is moving fast, information is moving fast, information technologies are moving fast. Just as mass production-based manufacturing replaced agriculture in the nineteenth century, the information age promises to reward the best integrator of knowledge, men, and machines in the twenty-first century." ■