Whether it is testimony to the foresight of joint service defense planners or the capabilities of the U.S. defense industry, ongoing 21st-century combat operations have helped identify an array of unexpected capabilities and contributions from systems originally envisioned and planned in the Cold War environment.

The E-8C Joint Surveillance Target Attack Radar System (Joint STARS) is a good example. Developed by Northrop Grumman, E-8C Joint STARS is the most advanced targeting and battle-management system in the world. The system consists of a modified commercial jet aircraft equipped with AN/APY-7 radar (developed by Northrop Grumman Electronic Systems in Norwalk, Conn.), which allows Joint STARS to detect, locate, classify, track and target hostile ground movements from a standoff position, communicating real-time information through secure data links with U.S. Air Force and U.S. Army command posts.

Four Pratt and Whitney TF33-102C engines give the aircraft an optimum orbit speed of 449 to 587 miles per hour, a nine-hour flight time before refueling and an operational ceiling of 42,000 feet. In addition to a flight crew of four, Joint STARS has a normal mission crew of 15 Air Force and three Army specialists (crew size varies according to the mission).

The Joint STARS program evolved from Air Force and Army programs to develop, detect, locate and attack enemy armor at ranges beyond the forward area of troops. In 1982, the programs were merged, and the Air Force became the lead agent.

Around that time, GEN John Wickham, then Chief of Staff of the Army, and Gen. Charles Gabriel, then Chief of Staff of the Air Force, agreed on 31 initiatives that would influence Army and Air Force roles and missions. Announced in 1983, the initiatives were staffed over the following year.

One of the initiatives was the Joint Surveillance and Target Attack Radar System, which was envisioned as a radar-equipped aircraft to provide dedicated support to the Army in place of the Army’s OV-1 Mohawk radar surveillance aircraft.

The resulting service agreement, known as the Gabriel-Wickham agreement and solidified by senior service representatives in 1984, notes that the Army and Air Force agreed that procedures developed would “ensure dedicated support of ground-commander requirements.”

Those ground-commander requirements included a moving-target indicator capability to be provided by Joint STARS around the clock to each of the Army’s corps.

As a result of these agreements, the OV-1 aircraft were retired by the Army in the 1990s, and Joint STARS became the sole provider of wide-area surveillance, ground moving-target indicators (GMTI) for ground forces.

That said, it might raise a few eyebrows that the U.S. Air Force 2010 Posture Statement notes: “We will also maintain
our current JSTARS-based GMTI capability as we begin an analysis of alternatives to determine the future of GMTI.”

“I never refer to this program as JSTARS,” said Dale Burton, vice president and initial production test lead for intelligence, surveillance and reconnaissance and battle management command and control [ISR & BMC2] at Northrop Grumman Aerospace Systems in Melbourne, Fla. “You might see it in the press that way, but I remember when the program was truly joint—in the very beginning—when the Army and the Air Force agreed that this was their way forward to take on this massive threat through Europe and the Fulda Gap scenario. That was the big threat, and our first operational field demonstration was in Europe in October/November 1990, with the [Berlin] Wall having come down in 1989.

“Even though Saddam Hussein was saber-rattling and we were already involved in Operation Desert Shield in late 1990, there were still a lot of questions as to where the system would go,” he explained. “But the system developed for that original threat demanded some significant capabilities. …. We deployed for Operation Desert Storm, where the value of the weapon system beyond a ‘Russian-type’ scenario proved itself.”

Noting that the capabilities were subsequently proven again in Operation Joint Endeavor compliance and peace-enforcement operations over Bosnia-Herzegovina and later Kosovo, he said, “That was another unplanned role for Joint STARS.”

Burton pointed to the missions over the Balkans as an environment that also demonstrated the benefits of some post-Desert Storm company investments in onboard communications like the Fleetsatcom ultrahigh frequency communications system.

Today the program consists of 19 aircraft: 17 operational aircraft based with the 116th Air Control Wing (ACW), Robins Air Force Base, Ga.; one flight trainer for 116th ACW pilots; and a joint STARS test-bed aircraft, known as T-3, based in Florida, where it supports advanced technology development, testing and program upgrades.

The U.S. Army’s Military Intelligence Detachment (JSTARS), U.S. Army Intelligence and Security Command, is part of the 116th ACW and is responsible for training, qualifying and deploying the Army aircrews to serve aboard the E-8C to support surveillance and targeting operations of Army land component and joint or combined task force commanders around the world. Soldiers from the 138th Military Intelligence Company, a component of the MI Detachment (JSTARS), are the linchpin of all JSTARS radar support to Army warfighters worldwide.

Burton explained that the 17 operational aircraft operated by the 116th ACW are the result of a fleet requirement that had diminished from 33 aircraft in 1987 to 13 in the 1997 Quadrennial Defense Review. Congressional funding then restored one aircraft each year for four years, with funding for the 18th and 19th aircraft put on hold in favor of the E-10 MC2A program. Although the E-10 MC2A was terminated in 2007, the funding for those two aircraft did not return to Joint STARS.

“There’s a lot of discussion about the age of our fleet,” Burton acknowledged. “But of the 17 airplanes, the first one wasn’t delivered until [1997], and the last one wasn’t delivered until 2005. This is not an old fleet. In fact, in terms of the airframes and the electronics in them, nothing could be further from the truth. It’s probably one of the newest weapon systems in the fight.”

As evidence of participation in the current fight, he pointed to a total of more than 60,000 combat hours flown since 9/11 with “about 1,000 sorties a year flown in theater.”

“This system was designed to support the ground forces,” said Stephen Bond, director of ISR & BMC2 busi-
ness development at Northrop Grumman Aerospace Systems. “The original tasking agreements say that the ground force commander identifies the area of coverage for the radar. Those agreements are still in place. It really was designed as a ground support aircraft. But what we are seeing today is that the aircraft has been moved up to become a theater support asset. It needs to move back down to where the fight is—at the brigade level and below.”

“It seems like every four or five years Joint STARS is ‘rediscovered’ by an organization that sees something new to do with it,” Burton said. “Probably in the last five years, the airplane has been used to support the intelligence community at the theater level. So we have had a campaign for some time to remind everybody that this is ‘eyes in the sky for boots on the ground.’ There’s a tremendous amount of value in what we are doing, but there is also a tremendous amount of capability to support the real-time operations, which are now required in Afghanistan.

“We don’t do nearly what we think we ought to be doing because we have fallen into a surveillance role for this forensic pattern-of-life analysis,” he continued. “That is a very valuable mission. We agree with the mission. But there are these additional missions that we need to make sure we are going out and doing.”

Burton identified original design requirements to monitor multiple Army Tactical Missile System strikes against enemy armored formations in emphasizing system capabilities to do many “simultaneous surveillance tasks with the sensor, supporting” a number of ground operations. “Because it hasn’t been used like that for a significant amount of time, there has been almost a generational gap in knowledge of what the system can do,” he said.

Elaborating on some of those little-known capabilities, he said, “We talk about the capability of this airplane to ‘see’ individuals walking. Indeed, it does that and has always been capable of doing that. It was not a primary mode going against armored divisions in the Fulda Gap. But because of the types of targets we had to go against, it has the kind of sensitivity that lets you look at the other target sets. … Joint STARS has tremendous residual capability because it had such a complex threat to counter.

“Another aspect of system capabilities involves the communications we have onboard,” Burton added. “You might recall that during [the invasion of Iraq] there was a lot of concern about ‘the picket lines’ that the Army was not erecting to protect its logistics flanks. Believe it or not, it was this weapon system that was providing the electronic picket fence to protect those troop movements.”

Program planners have been working toward expanding communications capabilities through tactical assets like the remotely operated video enhanced receiver family of systems.

“We’re looking at ‘multi-intelligence’ for the airplane,”
Burton said. “Today we have very capable radar. And we try to work very closely in ‘cross-cueing’ things like the Apaches to go and produce additional surveillance or strike, depending on what the rules of engagement and threat look like, and whom we are coordinating with and supporting. Today we also have beyond-line-of-sight chat capabilities so that people on the airplane are talking directly to people at Creech Air Force Base, Nev. We can have multiple chat rooms open, coordinating activity. Now that’s not the best way to do that because we don’t exchange our products—we don’t get to look at that Predator video to confirm an identification and keep track of that target—but we are looking for that kind of increased connectivity over the battlespace.”

Other pending enhancements include a planned flight of an MS177, described as “the world’s largest airborne high-resolution camera” and characterized as “the next generation of what flies on the U-2 today.” The Senior Year Electro-Optical Reconnaissance System will be on centerline mount directly aft of the radar fairing.

Burton added that program planners are also looking at “getting to the fight sooner and staying at the fight longer” through an emerging “re-engining program.” Although the test aircraft was re-engined in 2008, the subsequent fleet enhancement has been slow, in spite of the fact that 23 of the 25 engines replaced in theater last year were “unscheduled.”

Burton also brought up significant cost implications, identifying 159 engines replaced—taken off wings, given programmed depot maintenance [PDM] and replaced—in the last decade. “During that decade, the cost of a PDM has gone from $284,000 to $1.6 million, and today that cost is borne by the National Guard,” he said.

In March, Northrop Grumman announced receipt of an Air Force contract for two Joint STARS Propulsion Pod System shipsets and Federal Aviation Administration certification. The shipsets each contain four Pratt and Whitney JT8D-219 engines, pylon assemblies and associated aircraft system interconnections; delivery should begin in 2011, pending the final military certifications of the engines on the Joint STARS test-bed aircraft. The increased power and fuel economy from the new engines—which are widely used in commercial airline fleets—will enable the E-8C to fly higher and longer, providing a more detailed picture of the battlespace.

Although representatives for the supporting industry team characterized the award as moving “a step closer to re-engining the Joint STARS fleet,” they also acknowledge that there are some remaining issues in the propulsion system upgrade program.

Emphasizing that the industry partners are not complaining but rather attempting to educate a broader audience about the significance of the Joint STARS program, Burton was quick to cite the outstanding efforts and contributions of the aircraft crews and their support personnel.

“One of the many great things that our crews do today is ... looking at where they are going to fly before they go,” he said. “Then they get on the phones to track down the units operating in that area, saying, ‘We’re going to be airborne. Here’s our communications plan. Talk to us and let us know if something comes up in your area and if there’s something we can do.’”

“The Air Force obviously has fiscal realities,” Burton concluded. “We understand that. But there are these arrangements, agreements and understandings, and if you talk to the combatants, they will say good things about it. The only negatives seem to be, ‘We wish Joint STARS was there more often and that there were more of them.’”