**Up in the Air**
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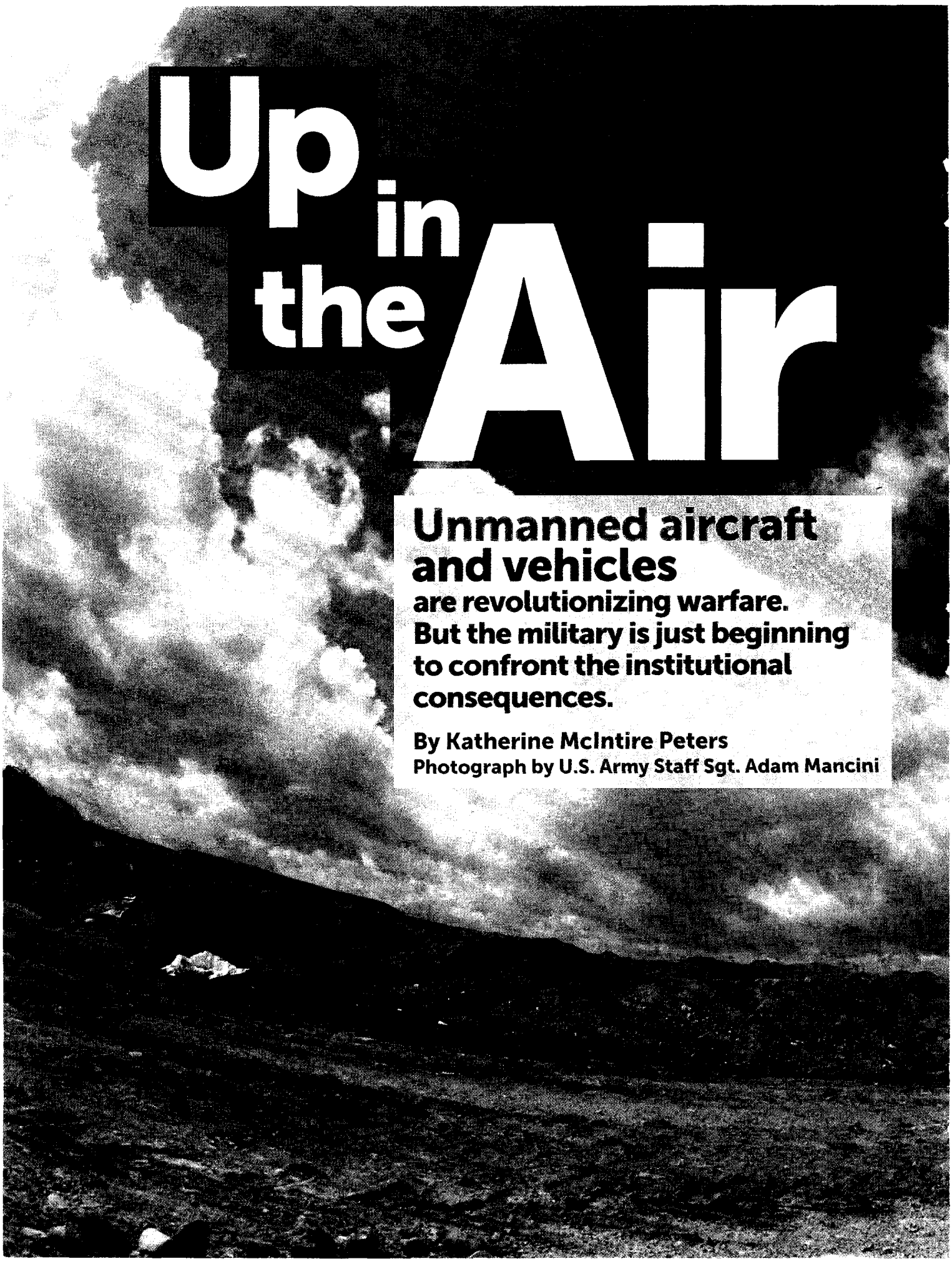
# Up in the Air

## Unmanned aircraft and vehicles are revolutionizing warfare. But the military is just beginning to confront the institutional consequences.

By Katherine McIntire Peters
Photograph by U.S. Army Staff Sgt. Adam Mancini



# In late 2008

Army Sgt. Michael Arons was flying a reconnaissance mission over a main supply route in Afghanistan when he saw three men concealing a bomb along the roadway. Arons called for an Air Force F-15 to bomb the site, most likely saving the lives of soldiers who later traveled that road. But it's what took place after the strike that was most impressive. After the fighter jet left the scene, Arons loitered in the sky, waiting to see what would happen next. Soon, two of the men who had placed the bomb emerged from hiding and ran off. Arons followed them, hovering overhead out of sight and hearing. When they ran to a nearby house, Arons alerted ground troops. What soldiers found there stunned them: The house was filled, wall-to-wall, with explosives and weapons—the raw material for countless roadside bombs and ambushes against U.S. and coalition troops.

"Had we not been there, who would have known?" Arons says. But his role in the confiscation of a major weapons cache was something unthinkable just a few years ago in the Army. Because the aircraft he piloted was a Predator drone, he was able to watch the situation develop undetected, from miles away. The information he provided ground troops undoubtedly thwarted casualties. Soon after that incident, Arons' unit started using armed Predators, giving the Army even greater control over how it shapes the battlefield. It would have eliminated the need, in that instance, to call on the Air Force to take out the roadside bomb.

"This has revolutionized the way we fight on a tactical level," says Col. Christopher Carlile, director of the Army's Unmanned Aerial Systems Center of Excellence at Fort Rucker, Ala. "There's not an infantryman out there who can call up and have the National Security Agency turn a satellite so he can see what's on the back side of a building. That doesn't happen. Up until now, the way that infantryman found out what was on the back side of that building was when he had fire coming from it."

The revolution in robotics technology has had a huge impact on the military. A decade ago, the services had a handful of unmanned aircraft. Today, they have nearly 20,000 unmanned air and ground vehicles. The machines are going places on the battlefield commanders would never send troops, either because the risks are too great or because humans simply are incapable. They can loiter in the sky for hours without eye strain or fatigue or the need for a cigarette break. They even can explore tunnels and caves too narrow or dangerous for soldiers. They've neutralized countless roadside bombs, uncovered invaluable information about terrorist plans, and killed or led to the arrest of hundreds of enemy operatives.

But the machines are raising difficult organizational, legal and ethical questions for government leaders. For military officials, the technologies portend major organizational and cultural changes. "Something is revolutionary not because of the incredible capabilities it offers you, but because of the tough questions it forces you to ask. Questions about not only what's possible, but about what's proper," says P.W. Singer, director of the 21st Century Defense Initiative at the Brookings Institution and author of *Wired for War: The Robotics Revolution*

EYE ROBOTS Unmanned vehicles gather many hours of data from the air and ground.

CORBIS

*and Conflict in the 21st Century* (Penguin Books, 2009).

## Demographics of War

Among other things, unmanned systems are changing long-held notions of who can do what on the battlefield. Nowhere is this more evident than in the Army and the Air Force, where service leaders have taken wholly different approaches to the use of unmanned aircraft.

Air Force Col. Dale Fridley flew F-16 Fighting Falcons for 15 years, before herniated disks forced him out of the cockpit on his 40th birthday. "It's a young man's game pulling 9 Gs," he says. He transferred to the Air Force Reserve in 1998, and soon after began flying for American Airlines. But after the 2001 terrorist attacks on New York and the Pentagon, Fridley wanted to return to the Air Force, which had begun recalling rated pilots to service. He applied, but was rejected for medical reasons. Eventually, he heard from a friend that the service was hiring pilots for a new program that didn't involve climbing into a cockpit. "He told me, 'This is the coolest thing. We're killing bad guys from 6,000 miles away.' I thought that sounded like something I could do. There were no Gs involved and they were hurting for guys with tactical experience."

In summer 2004, Fridley sold all his belongings in Texas and moved to Las Vegas to become a Predator pilot and director of operations in the 17th Reconnaissance Squadron at nearby Creech Air Force Base. There he found himself in the vanguard of a new role few in the Air Force were ready to embrace. "There were very few volunteers for the program," he says, noting that most of them did so only because they were no longer medically able to fly. Soon after, Air Force officials decided to create a squadron of armed Predators, and Fridley became its director of operations. "It was an opportunity to build a squadron from scratch," he says. The squadron's commander also was a former F-16 pilot. "We built it around the F-16 model. We knew we were going to be dropping bombs and shooting missiles."

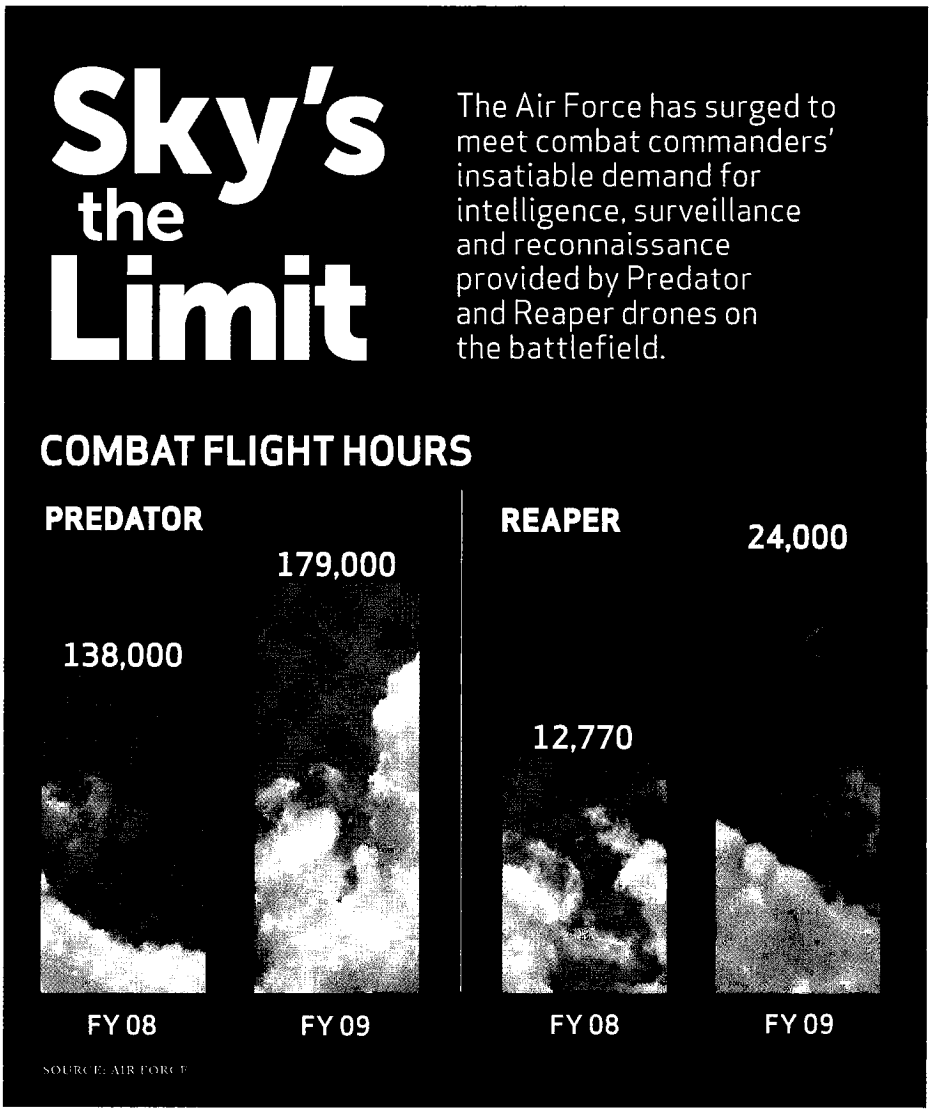
Contrast that with the experience of Army Sgt. 1st Class Brian Miller, who also found career motivation in the Sept. 11 terrorist attacks, when he was an infantryman in the 10th Mountain Division at Fort Drum, N.Y. Miller was coming up on re-enlistment and decided to stay in the Army, but he wanted to develop more marketable skills than those of an infantryman. When he sought the advice of an Army personnel specialist, none of the jobs available sounded very interesting. "Then he found something called a UAV operator. I said, 'What's a UAV operator?' There were probably 10 people in the room and nobody knew what that was. So [the personnel specialist] looked it up and starts reading the description. I said, 'Man, that sounds pretty good.'"

Today, Miller works for the director of evaluation and standardization in the unmanned systems program at Fort Rucker. He spends much of his time overseas evaluating the performance of drone operators on the battlefield. While he's shaping the use of emerging battlefield technology, he remains a grunt at heart: "I really push operators to think like infantrymen in terms of the information they should be looking for," he says. As for Fridley, last fall he moved to Washington where he works on the Air Force's unmanned aerial systems task force, which is charting the service's future path for using the technology.

While Fridley and Miller are shaping their services' use of unmanned aerial technology, their backgrounds couldn't be more different. If officers are the ruling class in military organizations, fighter pilots are the aristocracy in the Air Force. The service spent years and upwards of $10 million to turn Fridley into a fighter pilot. Only officers have what is called weapons employment authority, the decision-making power to shoot down targets on the battlefield. The service's use of unmanned aircraft is mostly pitched to the strategic level. "They're not tied to one specific battalion or one [brigade combat team]. They

**CULTURE SHOCK** Some pilots have been reluctant to leave the cockpit behind and become drone operators.

JIM WILSON/THE NEW YORK TIMES/REDUX




are theater assets, so they need to be able to maneuver around in the airspace, they need to be able to raise communications with different elements and be able to [fire weapons] on very short notice with very little information and to do it safely with no friendly fire incidents," Fridley says. "We really hammer home the weapons employment part of it."

The Army has taken a vastly different approach. "In the Army, [noncommissioned officers] are the backbone of our [unmanned] operations," says Carlile. Most drone operators are NCOs, while their platoon leaders are warrant officers, highly trained technical experts who occupy a category between the sergeants who make up the NCO corps and commissioned officers. Not only is it a less elitist structure, but weapons employment authority is not an issue in the Army, he adds: "If you've ever seen a soldier carrying an M-4 carbine, he has weapons release authority. If you've ever seen a sergeant in command of a tank with a 120 mm smooth-bore, high-explosive round, he is carrying a heck of a lot of firepower and he has weapons release authority." Officers still run the Army, but they typically do so with reverence for the young enlisted men and women who operate on the front lines, making life-or-death decisions.

The debate over who operates UAVs is more than academic, says Singer. "It's really not a question of can, it's a question of should. That 18- or 19-year-old soldier can fly the plane. The data shows that the Army has a lower crash rate than the Air Force does, and oddly enough the [soldiers] are less highly trained," he says, noting that the Army tends to rely more on automated takeoff and landing technology than on manual operation.

"It's a use-of-force question, understanding the battlefield," Singer says. As systems evolve and become more capable technologically, the answer to who should operate these systems is likely to evolve, he says.

"Another [demographic] change here is the civilian role," he adds. "We're carrying out the equivalent of a war in Pakistan right now. We've carried out more air strikes in Pakistan using drones than we did using manned bombers in the opening rounds of the Kosovo war. But it's not one that was authorized by Congress. More important, it's not one the military is conducting. It's mainly a civilian air war, and mainly a CIA air war. Are we at war in Pakistan, or is it not a war because we are using drones? By the old standard, this would be a war."

## Institutional Changes

In many ways, the Army has embraced unmanned technologies much more readily and rapidly than the Air Force. Any day now, the service will have racked up nearly 1 million combat flying hours using unmanned systems from small hand-launched aircraft to the much larger Predator—far more than any other service. The Army will train more than 2,000 unmanned aerial system operators this year, while the Air Force will develop

FLIGHT PLAN The Army and Air Force are sorting out who should be qualified to operate UAVs such as the Reaper.

about 360. The differences are deeper than numbers, however. The Air Force takes pilots and trains them to operate Predators and Reapers (which are essentially advanced Predators), whereas the Army takes enlisted personnel with no pilot training and turns them into drone operators. The Army also trains its unmanned pilots to operate the sensors on the aircraft that collect information from the battlefield. Typically, Army teams of operators alternate between piloting the aircraft and running the sensors to avoid fatigue and eye strain because the aircraft operate for much longer periods than any pilot or sensor operator can handle in a single shift.

Air Force leaders are conducting a beta test to train unrated pilots to become drone operators, but there is deep reluctance to open the positions to enlisted personnel. While enlisted personnel operate sensors, officer pilots operate the craft.

Perhaps most telling of how UAVs have challenged Air Force values and the centrality of pilots to the service's identity, top officials are trying to get away from using the term unmanned system altogether, preferring instead remotely piloted aircraft, or RPAs.

Air Force leaders were slow to embrace unmanned aircraft a few years ago, but they have undoubtedly done so in the last two years, observers say. "A couple of years ago I think we were all a little bit worried about that," says Art Fritzson, a senior vice president at defense contractor Booz Allen Hamilton in McLean, Va. "For the Air Force in particular, it was an identity crisis almost. Control of Air Force policy derived from senior [officials] in the Air Force who at one time or another had been fighter pilots or at least active-duty fliers of manned systems. To see the culture evolve away from that of [manned aircraft] to more unmanned systems, that was hard to take. But surprisingly, it's taken [hold] very quickly. I've seen lots of policy indications in the Air Force that that culture shift . . . maybe it's not being enthusiastically embraced, but it is being embraced."

In July 2009, the Air Force released a UAS flight plan outlining the service's thinking on the future of unmanned systems, from acquisition programs to training and doctrine. The Army expects to release its institutional plan for unmanned systems in April.

Unmanned systems operations "is rapidly becoming a respected career path in the Air Force—more rapidly than many of us thought was possible, so I think that's a good news story," Fritzson says.

Still, service officials would like to drop the term "unmanned" from the lexicon. "There's nothing unmanned about the systems today other than the vehicle itself," said Lt. Gen. David Deptula, Air Force deputy chief of staff for information, surveillance and reconnaissance, in a meeting with defense writers in December.

## Data Dumps

The truth of that assertion will become even more evident in April, when the Air Force expects to deploy new sensors aboard three of the Predators conducting continual surveillance over Afghanistan. The wide-area airborne surveillance systems, more commonly known as the Gorgon Stare pod, will allow the service to transmit up to 10 video streams to 10 users on the ground across a broad area. That means three combat air patrols will suddenly find their data collection increase tenfold. In another year, that level of collection will increase by a factor of 65, Deptula said.

All that imagery begs the question of who will evaluate it and analyze it and scrub it for vital intelligence. Already dur-

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ing the last 13 months, the Air Force has collected 250,000 hours of video. If you sat down to watch it all it would take you 28 years, Fridley says.

There's no question technology will have to play a role in sifting through all that data. Tod Hagan, director of ISR software solutions for Florida-based defense contractor Modus Operandi, says the data handling issues will continue to mount. "For every drone out there, there's also probably a hundred ground sensors also collecting data," he says.

"All types of sensors are getting cheaper and easier to deploy. The challenge we face is how to help analysts make sense of this overwhelming volume of data. To compound matters it's not just one type of data—human intelligence, imagery, signals intelligence, all of which come in different formats," he says. Besides the various types of data being collected, there are often no standardized rules for how information is presented. For example, the Defense Department and military services use electronic systems that represent locations in more than 50 different ways. "Normalizing a measure like location to a common data type is very challenging and really the initial step for data fusion," Hagan says.

The Defense Department has begun to develop standards for unmanned systems, but that process remains nascent. "The way this should evolve is that the government starts to articulate the specifications and standards for interoperability," Fritzson says. "We haven't really gotten all of the government behind that in a unified way. Individual services and buying communities are starting to articulate that, but it takes a while to get the industry to respond."

The need for standards became clear late last year when insurgents were discovered to have hacked into Predator video feeds using cheap, commercial off-the-shelf software. It was a security weakness that some military officials had been aware of for years, but with no single organization in charge of setting standards and acquiring these mostly proprietary systems, it went unaddressed. Military officials say they are working to encrypt the video downlinks to prevent future breaches.

Almost all recent developments in unmanned technologies have been funded through supplemental budgets, as wartime necessities, not through the normal acquisition process. "The acquisitions process is literally not producing anything of value," Singer says. The Defense Department and the military services will have to figure out how to change that if they are to really harness the potential of robotics technologies, he says.

## Human Factors

The first time Fridley flew a Predator in combat he understood immediately how it could have far-reaching consequences for the Air Force. "It wasn't until my plane was flying in Afghanistan and I was sitting in the [ground control station outside Las Vegas] that I realized I didn't even think about the fact that I wasn't there physically," he says. "In fact, to me it felt like I was flying there the whole time. I was a part of my aircraft just like I was part of my aircraft in an F-16. It made it sink home that this is the wave of the future."

That feeling of immediacy was a revelation to Fridley, and perhaps a harbinger of some of the personnel issues the service will grapple with in the future. "It shocked me how much I felt like I was there. But more than that, because I'm able to stare at targets much longer and get better pictures of targets, it feels more personal than it ever did when I was flying an F-16," he says. "In an F-16, you never see the civilians come out and cart away the dead bodies like you do in an RPA. It brings home to you that you really are dealing death and destruction."

Flying Predators and Reapers isn't nearly as much fun as flying F-16s, Fridley says, but it's vastly more rewarding than anything he's ever done in the Air Force.

"You really are doing a lot of great work for those folks who are humping the ground in Afghanistan and Iraq," he says. "You watch them going up the mountain passes and enter a village, follow them out, and give them directions in the middle of the night when they get lost. Or you sit over top of them in the middle of the desert and let them know there's nobody around for 20 miles and they can rest. Every day you're going back to support those guys.

"The job satisfaction is leaps and bounds above what you get flying an F-16," Fridley says. "A lot of guys come kicking and screaming to Creech, but once they get there and they're doing the mission, there's nothing else they'd rather be doing." GE

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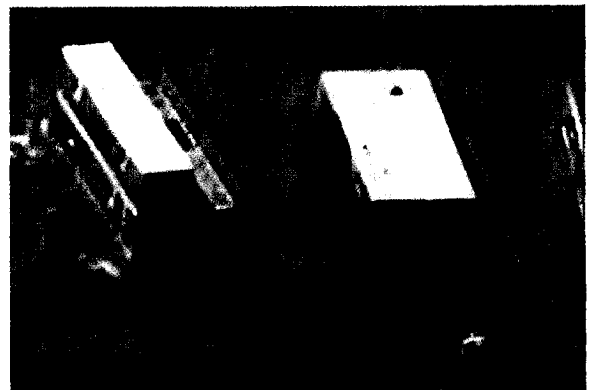
**—COL. DALE FRIDLEY, Air Force**



IN FOCUS Video feeds bring the battlefield closer.

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