EC–130J performing defensive maneuver during training over Fort Indiantown Gap, Pennsylvania

193d Special Operations Wing (Matt D. Schwartz)

Technology

Force Multiplier for Special Operations

By DALE G. UHLER

The global war on terror has brought new attention to Special Operations Forces (SOF). Their performance in Afghanistan and Iraq and around the world reflects the high standards they have maintained for years. A relatively small number of carefully selected, capable, well-trained, and well-led people are the key to that high quality. Although SOF operators, regardless of mission or service, remain the essence of the force, they often rely on advanced technology to achieve superior speed, stealth, precision, survivability, and lethality.

Today, U.S. Special Operations Command (USSOCOM) is developing technology in a radically different environment from just a few years ago. Through streamlined development and acquisition processes, maximized use of commercial technologies when feasible, and technology applications modified to its requirements, USSOCOM provides the technology solutions that will enable its warfighters to become even more capable.

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Technology Solutions

In the early days of Operation *Enduring Freedom* in Afghanistan, SOF warriors were beneficiaries of responsive acquisition when they requested advanced technology solutions and received them in days and weeks rather than the normal months and years. For example, consider the times that elapsed between USSOCOM receipt of combat mission needs requests and initial operating capability for the required equipment:

- laser targeting devices to assist in the close air support for deployed SOF operators: 7 days
- remote camera controllers as part of the reconnaissance and surveillance kit to help operators manage up to 16 sensors in both line-of-sight and satellite communications modes: 11 days
- coalition video teleconferencing capability so members of the Northern Alliance could communicate over hundreds of miles: 28 days
- force protection equipment for a safe house including advanced cameras, videocassette recorders, and bulletproof blankets: 21 days
- Blue Force tracking capabilities to allow positive identification of friendly forces and reduce fratricide (perhaps the hardest problem the command faced): 6 months.

In addition to rapid fielding processes, technology push has been a key strategy component over the past decade. Examples include:

- The "pointer," a man-portable unmanned aerial vehicle capable of carrying tactical video cameras and transmitting imagery back to the controlling ground station. A commercial-off-the-shelf (COTS) item was upgraded, production restarted, and a cadre of SOF operators trained to operate and deploy the system in under 8 months.
- The remote miniature weather station and companion laser ceilometer, a small, autonomous weather station capable of recording, storing, and reporting meteoric data for SOF aircrews. It provides accurate data and reduces the need to deploy a two-man weather team into high-risk environments.
- The multiband inter-/intra-team radio, a 2.2-pound, hand-held radio providing ground-to-ground or ground-to-air communication. It offers embedded security (indicator encryption) for both AM/FM voice and data communications and is satellite-capable. The radio was designed and prototyped by USSOCOM in response to a specific SOF requirement but has become a standard radio for the Army, Navy, Marine Corps, and Air Force.
- The hemostatic dressing, developed for use by tactical combat care providers to stop the flow of blood from penetrating trauma wounds such as gunshots and shrapnel. Hemostatic technologies are saving lives today.

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USSOCOM early on recognized the pivotal role advanced technology would play in special operations capabilities, and in 1992 Congress expanded the command's ability to develop SOF-unique technology. Congressional language encouraged defense research activities to assist the command with basic research and advanced engineering to "develop technologies that have special operations potential."[1] Although the legislation establishing the command in 1987 provided for "development and acquisition of Special Operations–peculiar equipment,"[2] technology developments did not begin in earnest until 1992. Since then, USSOCOM has managed hundreds of projects to support operations around the world.

Current Technology Focus

Four areas are central to technology development in USSOCOM: the SOF warrior-as-platform concept, sensor technology, advanced power and energy, and support systems.

The *warrior-as-platform* development area focuses on the individual and the mission equipment carried.[3] The nature of SOF is to be disruptive enough to break the enemy's will to fight as well as to damage him physically. To accomplish these tasks, we need to enhance survivability, sustainability, lethality, situational awareness, maneuverability, communications, and physical performance. Of these abilities, USSOCOM has chosen to focus on survivability and lethality. In the first area, we see the greatest potential in developing a passive, tunable signature management capability for the dismounted operator. Several promising technologies are being considered to make this a reality. As for lethality, SOF is interested in low-weight, low-volume directed energy systems. The command has had some success with these technologies and is partnering with other agencies on two platform-mounted systems.

Special Operations Soldier drives ATV in Afghanistan during Operation *Enduring Freedom*

U.S. Army

160th Special Operations Aviation Regiment (Kelly A. Tyler)

Special Forces Soldiers at roll-out of MH–47G in Pennsylvania

The second development area is *sensor technology*, which includes sensors for manned and unmanned platforms, sensors for remote and fixed site placement, man-portable sensors, and sensors for identification and tagging, tracking, and locating (TTL). The USSOCOM focus is on TTL, robotic systems (including lighter-than-air platforms), and persistent, pervasive sensors. Special Operations Forces use a variety of sensors for TTL, and tagging technologies are becoming quite mature. Nonetheless, TTL remains an area of intense interest for SOF. Regarding robotic systems, developers are working to provide a family of unmanned autonomous and semiautonomous systems (air, ground, and maritime) in sizes appropriate for Special Operations. We need such systems to deploy sensors and to serve as persistent intelligence, surveillance, and reconnaissance sources, thus allowing SOF elements access to denied areas through full situational awareness. Development of persistent and pervasive sensors is a relatively new focus for USSOCOM, but there is potential with some emerging technologies. All these sensor and sensor-related systems will be designed to operate on reduced power, with minimum logistic support, and in extreme environments.

The third development area is *advanced power and energy*. Because SOF teams primarily fight dismounted, weight is often a major impediment. Power sources must be small, lightweight, inexpensive, high-performance, high-power, durable, rechargeable, and versatile enough to power a variety of equipment. USSOCOM is investigating variable/regulating fuel cells to power man-pack systems. These cells may provide a long-term solution, but improved batteries appear to offer the best mid-term options. Special Operations Forces do not want and cannot afford to develop SOF-unique power sources. Through the mid-term, they will rely on service-common batteries, while encouraging advances in battery technology as well as new designs for equipment with significantly decreased power requirements.

Support systems constitute the final development area. These are all the other vital systems and platforms not falling within the first three categories and include command, control, communications, computers, and intelligence systems; information operations systems; logistic systems; fire support systems; training systems; and mobility platforms. Each is critical to SOF effectiveness, but the best potential exists for rapid development of network-centric communications, technologies, and devices, with particular focus on tactical bandwidth and data compression. In these areas, the command has a successful "proof of principle" project fabricating a conformal polyimide microelectro-mechanical antenna for aircraft application. USSOCOM, in conjunction with the services, will continue to upgrade and plan for the replacement of existing mobility platforms to meet emerging operational requirements and will upgrade support equipment to maintain a clear technological edge over the enemy.

Processes

The command equips and supports SOF with various strategies to solve 80 percent of problems with technological developments alone. The process begins with a capability need or current operational requirement. If the requirement has user support and can be validated, USSOCOM will attempt to integrate it into an ongoing program. If that is impossible, other development options allow us to proceed with minimal risk. The first involves finding a COTS item or nondevelopmental item that can be modified to satisfy the specific need. This is the preferred option, as the majority of development and testing is complete and the task is limited to making the item sufficiently rugged to function in an operational environment. A second low-risk option is competitive prototyping, allowing two or more companies to develop prototypes that users can test to determine which are worthy of further consideration.

Spiral development is the preferred approach to product creation and improvement. In each spiral, the next increment of an increasingly effective or complex system is developed and integrated, producing a constantly improving capability. This process allows technology to adapt rapidly to the latest changes in terrorist tactics or evolve ahead of the enemy and exploit areas they believe are safe. Utilization of systems engineering principles and innovative risk management, combined with streamlining the acquisition and procurement processes, have significantly shortened the time from design to production to fielding.

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Under Major Force Program (MFP)–11, the USSOCOM program in the Federal budget, the command manages 52 percent

of all acquisition programs in-house and delegates varying degrees of management for the balance to the appropriate military department.[4] The command also partners with the military departments, other Government agencies, and foreign governments to conduct research and develop the technologies SOF needs.

While the same overarching statutes and policies used throughout DOD apply to USSOCOM, the command is adept at harnessing the flexibilities inherent in these guidelines to provide solutions for the SOF operator. Various headquarters centers integrate technology development with concept development, requirements generation, and validation process to generate innovation at all levels. Furthermore, whenever possible, our contracting office uses Federal acquisition regulation waivers to shorten or expedite the acquisition process.

The war on terror will be protracted and will require a technology investment strategy looking out 20 to 25 years. Future technology development needed to support the special operations warrior should not be made to compete with current wartime operating budgets. The future of SOF depends on maintaining a commitment to harvesting emerging technologies and applying them in a visionary way to its missions. We must also identify sufficient funds to support future technology development to prevail in the battle environment of the 21st century.

Multiple Development Programs

Providing current and future technology to the SOF warrior is the responsibility of the Special Operations Acquisition and Logistics Center of USSOCOM. Within the center, the Advanced Technology Directorate currently manages four development programs: technology development, special technology, advanced technology, and medical technology.

The Special Operations Technology Development program has the longest planning horizon of the four programs within the directorate and focuses on technologies that promise to meet a future need but are currently not mature enough to field. This program provides a valuable way to influence and leverage external technology development that may not otherwise be affordable within limited command development resources. These projects tend to be driven by technology rather than by requirements and are often structured to leverage ongoing developmental efforts in other DOD and Federal organizations. While studies and laboratory prototypes are the primary focus of this program, some projects focus on transition, such as the Lightweight Counter Mortar Radar. By service standards, the technology development program is small, but it provides the command entrée to the larger science and technology community and provides options to develop systems and subsystems to meet future needs peculiar to Special Operations.

The Special Operations Science and Technology program, a companion to the technology development effort, encompasses advanced engineering development, rapid prototyping, and demonstration and evaluation of developmental items in operational environments. Here, USSOCOM matches advanced technologies with mission requirements or, where appropriate, accelerates system development to meet urgent needs in the SOF community. Theater Special Operations Commands

Special Forces Soldier providing security during attack at Bagram Air Field, Afghanistan, Operation *Enduring Freedom*

55th Signal Company (Thomas Bray)

and deployed combat commanders may sponsor projects to put field-ready prototypes into the hands of operators for evaluation before committing to further development or large-scale procurement. One project nearing transition to acquisition is the Machine-Based Language Translation device, conducted in coordination with the Defense Advanced Research Projects Agency to develop a hand-held speech and language translator known as the Phraselator, a one-way, phrase-based voice-to-voice machine translator. Special Operators in *Enduring Freedom* and *Iraqi Freedom* are using it to interpret and translate words and phrases. At 5 by 8 inches, the current model weighs 2 pounds and has up to 50 languages. The operator speaks or chooses a stored phrase from a menu and the device repeats the words in the targeted language.

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The Advanced Technology Directorate provides technical support to the Small Business Innovation Research program. This Federally mandated program allows small businesses to conduct exploratory and advanced development engineering to create innovative items for government and commercial use. Two examples of producing operational equipment for SOF in this area are the Miniature Multi-Band Beacon, which is used as a point designator enabling aircraft to deliver ordnance and mark parachute drop zones, and the Extreme Environment Hand-Wear System, which allows operators to use equipment with warm hands in cold climates. The program gives USSOCOM unique access to an important segment of the national industrial base.

The Special Operations Medical Technology Program focuses on physiological and informational studies and nonsystem development to protect, enhance, and restore the health of Special Operators. Its projects support the medically related requirements of both operators and medical personnel. Research and development studies provide operational guidelines or recommendations on procedures and proposed equipment. Products are normally disseminated to field organizations through medical channels. Successful prototype equipment typically transitions to acquisition as a component of a set or as a commercial item available for unit purchase. The development and rapid fielding of the one-handed tourniquet provided SOF with a greatly enhanced life-saving product.

The Advanced Technology Directorate manages a multitude of projects. Since 1992, over 40 percent of completed projects have progressed from development to acquisition. Transition, however, is not the only measure of success. It is equally important to identify technologies that are *not* ready for fielding to avoid delays and target funding toward the most promising projects. Acquisition programs will continue to be forward leaning, creative, and flexible, yet fiscally judicious.

Command-Wide Effort

The headquarters centers and component commands (Army Special Operations Command, Naval Special Warfare Command, and Air Force Special Operations Command) are all active participants in the technology development and acquisition processes. The component commands are responsible for combat development, in addition to developing nonmaterial solutions for deployed and deploying forces. They cooperate in user evaluations for emerging technologies with the Special Operations Research Support Element taking the lead. In addition, the components provide ranges to test equipment and systems, as well as platforms (aircraft, surface craft, or ground mobility) to support testing and cover the costs of SOF personnel participating in user evaluations. Finally, the components coordinate on joint requirements and interoperability needs during the capabilities documents staffing process. These vital documents are the basis for systems engineering; if they are not produced in a timely fashion, costs can rise and initial operating capabilities can be delayed.

Forward-deployed Special Operators also have the opportunity to see and use the latest in high-tech weaponry, communications, personal equipment, and sensors from around the globe. They feed this information to the headquarters, often through USSOCOM components, for evaluation and possible integration into existing equipment. Technology scouts throughout the headquarters help identify emerging technologies, regardless of source, with potential for satisfying existing deficiencies or enhancing operational capabilities. All these activities and programs have a common purpose: to ensure that the SOF warrior has access to the finest equipment available.

Opportunities Outside USSOCOM

The command pursues multiple leveraging opportunities each year outside the command. Options can include advanced concept technology demonstrations (ACTDs), technology transition initiatives (TTIs), partnerships with other agencies or services, open communication and active

Airmen position a Predator UAV at Tallil Air Base, Iraq

U.S. Air Force (Deb Smith)

participation with industry in research and development efforts, engagement with national laboratories, foreign comparative testing programs, and collaboration with operators in the field.

ACTDs, initiatives approved by the Office of the Secretary of Defense (OSD) to demonstrate mature or emerging technologies as solutions for critical operational needs, complement USSOCOM technology efforts. These demonstrations assess the military utility of an item and propose or refine a concept of operations. If the sponsoring commander certifies the utility of an item, OSD provides a minimum of 2 years of sustainment funding for the residual capability. Although this can be a fast track for fielding hardware, there are liabilities. OSD provides only a portion of the funding; the balance, including the needed staff and management support, comes from the participants.

SOF is one of numerous beneficiaries of the Technology Transition Initiative Program, recently established by OSD, which is designed to expedite the movement of new technology from developer to user.

USSOCOM maintains liaison officers from various government labs on its staff to assist in the transfer of emerging technology

Under the program, OSD provides near-term funding to support continued development of promising technology, provided the receiving command agrees to commit sufficient funds to provide program stability in the next budget. USSOCOM has accepted TTI funds to expedite development of wide-field-of-view night vision goggles, a voice response translator, and the Sea-Air-Land Delivery Vehicle Advanced Reconnaissance System. All these items are critical, and TTI funding will shorten the time needed to place them in the hands of SOF warfighters.

In recent years, the military has become much more a user than a developer of technology, and little of the technology used by SOF is developed in-house. The robust USSOCOM technology harvesting programs access technologies of special operations interest regardless of source. Within the headquarters, the technical industrial liaison officer manages the annual Advanced Planning Briefing to Industry to state SOF needs and frame the command's side of the dialogue, allowing vendors to present their technological and corporate capabilities to the headquarters staff.

USSOCOM also works closely with DOD and national laboratories and maintains liaison officers from various government labs on its staff to assist in the transfer of emerging technology. This has been especially effective with the Defense Advanced Research Projects Agency, whose programs focus on high-payoff technologies with unique operational applications for SOF.

Through the Foreign Comparative Testing Program, USSOCOM tests nondevelopmental items from allies that appear to have potential for SOF use. The Defense Acquisition Challenge Program evaluates new technologies and enhancements that often result in technology insertions and improvements in ongoing acquisition programs. This program emphasizes the use of small domestic companies.

It is critical to maximize the use of commercial technologies and technology applications, modified to SOF requirements, to satisfy near-term needs. Since the commercial research and development horizon is normally at the mid-term range (3 to 5 years), SOF technology development efforts must have a concern for longer-range development. Some of the limited Major Force Program funds must continue to focus on development that can truly transform SOF but that is currently beyond the comfort zone of commercial development, such as directed energy and signature management.

The SOF technology development community participates in wargames to assist key decisionmakers in identifying technologies for fighting the war on terror now and in the future. We recognize that these tools are only as good as the plans and concepts they support. We are invested in working with other staff elements to ensure cogent technology inputs and keep pace with new requirements, plans, and concepts.

USSOCOM recognizes that technology cannot solve all operational problems. To be effective, equipment must meet the operational need and provide a persistent problem for the enemy. Modern warfare involves the application of all types of equipment. Special Operators regularly use an extraordinary range of technologies, as was demonstrated by supplying Special Forces teams in Afghanistan with AK–47 ammunition, oats for horses, and leather saddles to replace wooden saddles, as well as satellite-supported laptops for directing air strikes against Taliban and al Qaeda targets.[5] The results were staggering operational successes. The synergies of the combined no-tech, low-tech, and high-tech equipment in the hands of skilled and innovative operators were simply too much for their adversaries, and will continue to be so in the future.

It has been said that today's science is tomorrow's technology. U.S. Special Operations Command will continue to partner with agencies and organizations that are on the leading edge of science to take advantage of technology breakthroughs when they occur, which will enable Special Operators to be ever more capable. **JFQ**

NOTES

[1] U.S. Senate, Department of Defense Appropriations Bill 1992, Report 102–154 (September 20, 1991), 74.

[2] U.S. Code, Title 10, subtitle A, part 1, chapter 6, sec. 167, (f) Budget (1), available at <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+10USC167>.

[3] Interview with General Bryan D. Brown, USA, *Special Operations Technology*, online edition 1, issue 5, available at <http://www.special-operations-technology.com/article.cfm?DocID=371>.

[4] Dale Uhler, briefing, "How We Do Business," Science Applications International Corporation, Arlington, VA, December 17, 2004.

[5] Robert D. Springer, "The Springer Journal: The World War on Terrorism," part IV, WRAL–TV, Raleigh, NC, February 27, 2002.