ARMY AL&T

April - June 2008

Future Combat Systems — Cornerstone of Army Modernization

USA ASC
UNITED STATES ARMY
ACQUISITION SUPPORT CENTER

From the Acting Army Acquisition Executive

Showcasing the Army Future Combat Systems

With this issue, we are showcasing the Army's Future Combat Systems (FCS) in a series of articles designed to give you a better understanding of just how far this program has progressed since System Development and Demonstration began in 2003. One may think that FCS is only about providing future capabilities to our Soldiers, but "FCS-like" capabilities are protecting our Soldiers and giving them a decisive advantage on today's battlefield. Let me provide a few examples.

The Frag Kit 5 armor protection for up-armored High-Mobility Multipurpose Wheeled Vehicles protects our troops from powerful improvised explosive devices. This technology comes from the lightweight composite armor being developed for the FCS family of manned ground vehicles (MGVs). The Micro-Air Vehicle, highly effective in U.S. Navy explosive ordnance disposal (EOD) operations in Iraq and planned for use by the Army's 25th Infantry Division in urban warfare operations there, is a forerunner to the FCS Class 1 Unmanned Aerial Vehicle. The Packbot®, which is used by Soldiers and Marines in Iraq and Afghanistan during urban warfare and EOD operations, is the precursor to the FCS Small Unmanned Ground Vehicle. And, the Excalibur artillery round that is having much success in Iraq is being adapted for use with the FCS Non-Line-of-Sight Cannon. These technologies, in development for the future, are proving their success in the current fight.

FCS is the materiel centerpiece of the Army's transformation. Our plan is to continuously upgrade and modernize our forces to put Cold War formations and systems behind us. We continue to rapidly field the best new equipment to our forces that are fighting every day, upgrade and modernize existing systems, incorporate new technologies derived from FCS research and development and, soon, will begin to field FCS. Ultimately, we are working toward an agile, globally responsive Army composed of modular units enhanced by modern networks, surveillance sensors, precision weapons and platforms that are lighter, less logistics-dependent and less manpower-intensive so we can operate effectively with Joint and coalition partners across the full spectrum of conflict.

The capabilities that FCS delivers will empower our Soldiers with unparalleled situational awareness, survivability and lethality. FCS sensors and robots will enhance battlefield intelligence-gathering capabilities and allow Soldiers to see the battlefield as never before and communicate in real time. The FCS network will consist of layers that, when combined, will provide seamless delivery of both data and knowledge. This network will be embedded in a family of MGVs and extended to the Soldier.

MGVs are designed around a common chassis that will require fewer spare parts and fewer mechanics to perform maintenance and repairs. These vehicles will be powered by the military's first hybrid electric engine that is designed to provide a significant increase in onboard electric power. A lighter vehicle with the hybrid electric engine will yield remarkable fuel efficiencies. Less fuel and less manpower mean a shorter logistics tail and fewer Soldiers in harm's way. It also represents a significant cost savings.

We have assembled a far-reaching and talented team to develop and deliver FCS. In many ways, we are redefining weapon systems development. With more than 20 major defense industry partners, along with more than 600 suppliers — many small or minority-owned businesses — in 41 states, FCS is truly a nationwide program.

It is this government and industry team, along with combat-experienced Soldiers of the Army Evaluation Task Force at Fort Bliss, TX, that will test and refine FCS systems, tactics, techniques and procedures. In fact, the first FCS equipment set is currently in the hands of these Soldiers. In all, the FCS program currently is undergoing roughly 70 tests, and each test is a precursor to the fielding of capabilities to our Soldiers.

That is what our work is all about — the Soldier.

Dean G. Popps
Acting Army Acquisition Executive

ARMY AL&T
April - June 2008

ACQUISITION, LOGISTICS & TECHNOLOGY

PB 70-08-02

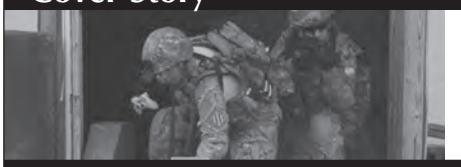
To contact the Editorial Office:
Call (703) 805-1034/1038 or DSN 655-1034/1038

Articles should be submitted to:
DEPARTMENT OF THE ARMY, ARMY AL&T, 9900 BELVOIR RD, SUITE 101, FORT BELVOIR, VA 22060-5567.

Our fax number is (703) 805-4218.
E-mail: **army.alt.magazine@us.army.mil**
or **LetterToEditor@us.army.mil.**

Army AL&T Magazine (ISSN 0892-8657) is published quarterly by the ASAALT. Articles reflect views of the authors and not necessarily official opinion of the Department of the Army. The purpose is to instruct members of the Army acquisition workforce relative to AL&T processes, procedures, techniques and management philosophy and to disseminate other information pertinent to their professional development.

Cover Story



Features

Departments

For more news, information and articles, please visit the USAASC Web site at **http://asc.army.mil**. Click on the *Army AL&T* Magazine tab located on the bottom of the flash banner in the center of the page.

This medium is approved for official dissemination of material designed to keep individuals within the Army knowledgeable of current and emerging developments within their areas of expertise for the purpose of enhancing their professional development.

By order of the Secretary of the Army

GEORGE W. CASEY JR.
General
United States Army
Chief of Staff

Official:

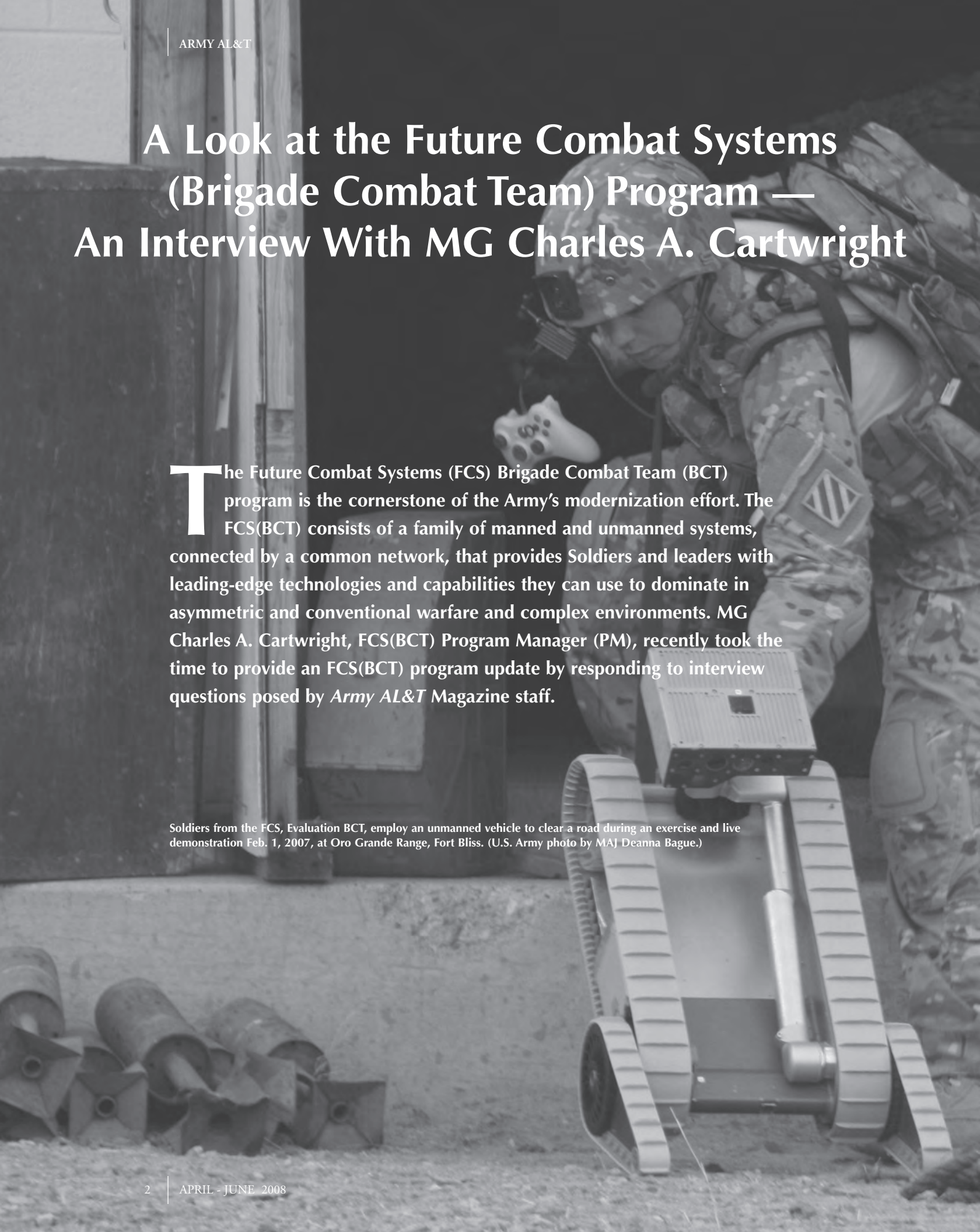
JOYCE E. MORROW
Administrative Assistant to the Secretary of the Army
0807807

Private subscriptions and rates are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 or (202) 512-1800. Periodicals official postage paid at Fort Belvoir, VA, and additional post offices.

POSTMASTER: Send address changes to DEPARTMENT OF THE ARMY, ARMY AL&T, 9900 BELVOIR RD, SUITE 101, FORT BELVOIR, VA 22060-5567.

A Look at the Future Combat Systems (Brigade Combat Team) Program — An Interview With MG Charles A. Cartwright

The Future Combat Systems (FCS) Brigade Combat Team (BCT) program is the cornerstone of the Army's modernization effort. The FCS(BCT) consists of a family of manned and unmanned systems, connected by a common network, that provides Soldiers and leaders with leading-edge technologies and capabilities they can use to dominate in asymmetric and conventional warfare and complex environments. MG Charles A. Cartwright, FCS(BCT) Program Manager (PM), recently took the time to provide an FCS(BCT) program update by responding to interview questions posed by *Army AL&T* Magazine staff.



Soldiers from the FCS, Evaluation BCT, employ an unmanned vehicle to clear a road during an exercise and live demonstration Feb. 1, 2007, at Oro Grande Range, Fort Bliss. (U.S. Army photo by MAJ Deanna Bague.)

AL&T: How is the FCS(BCT) program using the Army Evaluation Task Force (AETF) at Fort Bliss, TX, and Soldiers in testing, evaluation and program development? Will this become the new way of doing business for all of our PMs, program executive officers (PEOs) and project/product managers?

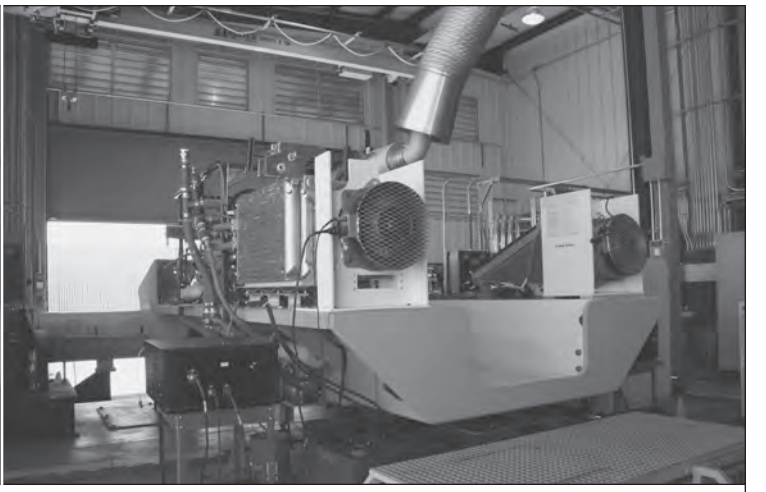
Cartwright: This is really a new way of doing business, as the Army has made a commitment to have a full brigade dedicated to providing feedback on FCS developmental hardware. This is an important step in bringing the end user into the design and developmental phase to ensure an end product that Soldiers can use at fielding. The AETF, a Current Force Heavy Brigade Combat Team (HBCT) that is equipped with a mix of combat and tactical vehicles in the Army inventory, evaluates PM FCS(BCT) spin out (SO) and core technologies/capabilities and provides feedback to the PM FCS(BCT) and platform PMs.

> The FCS(BCT) network represents the greatest advancement in tactical C4ISR that the Army has ever pursued.

The AETF assists the U.S. Army Training and Doctrine Command [TRADOC] in developing and refining doctrine, organization, training, materiel, leader development, personnel and facility (DOTML-PF) products to support the SO and the FCS(BCT) core program for the Current Force and the FCS(BCT). The AETF activated in FY07 with 971 Soldiers authorized to support SO and core training and test requirements in FY08 and FY09. Army leadership has approved a modest growth of AETF to support future SO technologies in FY10. The Army has not made any decisions about using AETF-type units for other PMs or PEOs, but it has decided to expand the AETF's role to cover Army modernization. In this new role, they will help test and evaluate technologies such as Warfighter Information Network-Tactical (WIN-T).

In the next year, the AETF will participate in the following:

- **Technical Field Test.** An event led by the Lead Systems Integrator (LSI) — Boeing Co. and Science Applications International Corp. (SAIC) — to gain technical data on SO 1 systems.
- **Force Development Test and Evaluation.** A TRADOC-led event to develop DOTML-PF products.
- **SO 1 Limited User Test.** An Operational Test Command event to gain data that will support a Milestone [MS] C decision.
- **Integrated Materiel Test 1.** An LSI-led event to support core software development.



Termed "Hot Buck," the MGV Hybrid Propulsion Test Bed (shown here) at the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC) Power and Energy Systems Integration Laboratory (SIL) in Santa Clara, CA, is a one-of-a-kind virtual FCS test bed platform for full-load testing. The Hybrid Propulsion Engine improves mobility, reduces fuel consumption and enables use of future weapon technologies. (Photos courtesy of BAE Systems.)

In the coming years, the AETF will continue to support similar events for both SO and core FCS(BCT) program technologies.

AL&T: What, specifically, is the AETF doing and how will you integrate the feedback they provide into FCS weapon platforms?

Cartwright: The AETF's feedback will be used to improve the full range of DOTML-PF products. Some examples of the products the AETF will affect/improve are as follows:

- Man-machine interfaces.
- Platform designs and software designs/interfaces.
- Interface control documents, doctrinal and technical manuals, unit standard operating procedures.
- Basis of issue plans and fielding plans.
- Unit designs and organizations.
- System requirement documents.
- Parts storage levels.
- Maintenance allocation tables and maintenance task validation.
- Simulation designs and uses.
- Training aid types/designs and special tool types/designs.
- Embedded training.

AL&T: What is the FCS(BCT) program's overall status in areas such as unmanned aerial vehicles (UAVs), unmanned/manned ground vehicles (UGVs/MGVs), sensors and network?

Cartwright: We have made significant strides in hardware, software and network development to the point of conducting field demonstrations of FCS(BCT) systems and their capabilities. There are now more than 68 ongoing FCS(BCT) tests and evaluations. We have conducted numerous training and experimental activities with AETF Soldiers using early prototypes of our Class I UAV, Small UGV [SUGV], Non-Line-of-Sight Launch System [NLOS-LS] (XM 501) and Unattended Ground Sensors [UGS], both Urban [U] and Tactical [T], (AN/GSR-9 & 10). We continue with test firings of our NLOS-Cannon [NLOS-C] (XM 1203), NLOS-Mortar (XM 1204) and Mounted Combat System [MCS] (XM 1202), as well as demonstrating the capabilities of the end-to-end hybrid electric drive that will be used to maneuver these vehicles. We are in the midst of conducting our field test to support the SO program to the Current Force. These activities are a prelude to a series of design reviews, including an intensive network design review, to take place throughout this calendar year. These reviews will evaluate our FCS (BCT) designs and determine our readiness for proceeding into critical design activities. We already held one such event for the Multifunctional Utility/Logistics and Equipment (MULE) (XM 1217), and we are applying those lessons learned to subsequent reviews that will take place over the next 8-12 months.

> The FCS(BCT) program evaluates its needs through a robust SoS requirement process, aligns interfaces and requirements with the complementary communication programs and performs risk management.

AL&T: Is the program maintaining cost, schedule and performance that have been anticipated throughout the System Development and Demonstration (SDD) phase?

Cartwright: The program continues to effectively use our Earned Value Management System to monitor and manage expected cost and schedule performance.

AL&T: What are the major challenges with bringing such divergent systems together in a horizontally integrated network?

Cartwright: Integration, in simplest terms, is the major challenge facing any program (FCS included) that goes beyond the focus of singular platform or subsystem development. In the context of the FCS(BCT) program, integration goes beyond our ability to ensure that the FCS(BCT) core systems can interface with each other, with Current Force systems and with Joint, Interagency and Multinational Force systems. Integration involves a shared understanding of responsibilities for data transmission and utilization, and how a system-of-systems [SoS] comes together during a conflict to execute the assigned mission. The FCS(BCT) program embraces this concept and uses our system engineering processes and design reviews at the platform and network levels to clearly demonstrate our understanding of how each of our core systems must integrate as an FCS(BCT) member before we approve critical design activities. It is that context — bringing network performance in as part of platform reviews and culminating in the SoS Preliminary Design Review — and focus that strengthens our belief in the ability to resolve the complex integration issues associated with network and SoS development.

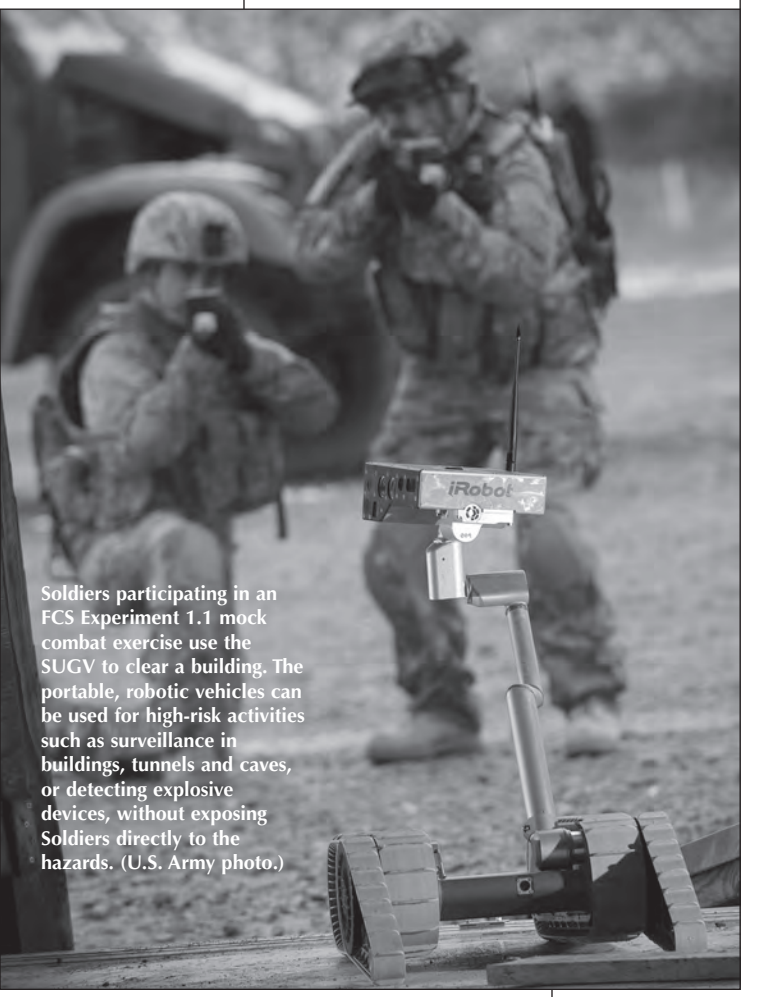
AL&T: What is the status of the SoS network development? How is it being developed?

Cartwright: The FCS(BCT) network represents the greatest advancement in tactical C4ISR [command, control, communications, computers, intelligence, surveillance and reconnaissance] that the Army has ever pursued. The network, from its initial conceptual stages, was envisioned to provide fully integrated, distributed information management. The SoS network development is on track. The first increments of capability are currently under evaluation in Integrated Mission Test 1 and in the field at Fort Bliss and White Sands Missile Range [WSMR], NM, for SO 1. The FCS(BCT) network will have demonstrated integrated battle command [BC] capabilities that provide the underpinnings for a unified BC for the Army. The dynamic, self-healing communications have been synchronized with the Joint Tactical Radio Systems (JTRS) and WIN-T programs. The FCS(BCT) program evaluates its needs through a robust SoS requirement process, aligns interfaces and requirements with the complementary communication programs and performs risk management.

AL&T: Why is the Army using a phased-development approach in building FCS? How will it be used to increase Soldier survivability, sustainability, maneuverability and lethality on the modern battlefield?

Cartwright: FCS(BCT) phased development serves two primary purposes: alignment of software/hardware development and focus of SoS capability maturation over time. We have developed a software build strategy based on phased capability to prioritize development around key BC mission execution and network requirements and have linked that phasing with our hardware development and demonstration schedules to establish a "design, test, build" paradigm. Phased development maintains focus on the SoS by requiring each of our individual platforms/systems to demonstrate its ability to integrate with each other and with Current Force systems as a prelude to final designs. Our management execution strategy does not allow for the final design approval of an individual system without understanding its effectiveness as a member of the SoS.

In phased development, we use multiple means (simulation, analysis, experimentation and test) to determine SoS effectiveness against our stated key performance parameters (KPPs), which include the capabilities mentioned in the question. Our use of phased development requires us to analyze continuously



Soldiers participating in an FCS Experiment 1.1 mock combat exercise use the SUGV to clear a building. The portable, robotic vehicles can be used for high-risk activities such as surveillance in buildings, tunnels and caves, or detecting explosive devices, without exposing Soldiers directly to the hazards. (U.S. Army photo.)

the FCS(BCT) systems and their capabilities to help optimize our approach to meeting the KPPs and gives us the ability to influence both platform and network designs at the earliest stages of development before such changes become cost-prohibitive. The force effectiveness models, simulations in use at the FCS(BCT) program SoS Integration Laboratory (SoSIL) and the other SILs for Integrated Mission Tests, as well as our participation in experimentation exercises, all provide the early feedback on KPP performance to promote continuous improvement. We have structured these test objectives around SoS effectiveness and the KPPs, so we're confident that these events, the feedback they provide and the resulting design changes we make will all contribute to increased Soldier effectiveness.

A Soldier performs an SUGV demonstration at WSMR in January 2008. (U.S. Army photo courtesy of FCS(BCT).)

AL&T: FCS is developing a family of new MGVs. What is the MGV program's development status?

Cartwright: The MGV team is finalizing its preliminary design, which will be completed by January 2009. The MGV design is being developed to achieve the optimal balance of capabilities to ensure that its lethality, survivability, sustainability and force effectiveness attributes are equal to or better than those of Current Force vehicles.

> Phased development maintains focus on the SoS by requiring each of our individual platforms/systems to demonstrate its ability to integrate with each other and with Current Force systems as a prelude to final designs.

Combat vehicle design has always been a delicate balancing act of these competing priorities. Striking the right balance between these constants is always a challenge. Because the FCS(BCT) is a radical paradigm shift in the concept of how we fight, the vehicle systems we design to meet the FCS(BCT) program requirements will not always be traditional in their design. For example, the MGV is designed for facing the most likely threat and incorporates a flexible system to meet the threat that is anticipated but not known. This is not another 70-ton Abrams vehicle. We cannot count on the thickness of our armor to protect troops as we have in the past. We must develop systems that will destroy targets beyond-line-of-sight (BLOS) as the norm and line-of-sight (LOS) as the exception. Our mission is to balance lighter and faster with improved survivability. As we mature advanced armor solutions, we are developing and planning for upgrades and changes to our armor solutions as threats change. These capabilities, coupled with an Active Protection System (APS) that defeats incoming threats, provide MGVs with greater survivability than that found in Current Force systems.

AL&T: What other exciting testing is ongoing for MGV variants?

Cartwright: The NLOS-C (XM 1203) System Demonstrator fired more than 2,000 rounds from 2005 to 2007 and the NLOS-C (XM 1203) Firing Platform has fired more than 1,600 of the scheduled 5,000 rounds since its October 2006 delivery to Yuma Proving Ground (YPG), AZ. The XM 1203 Firing Platform's primary objectives are to provide risk reduction for cannon and mount development, to advance safety certification and manned rating for 2008 prototype deliveries, and to provide reliability growth for weapon module components. Additionally, the MCS (XM 1202) 120 (XM360) Primary Weapon Assembly has fired more than 860 rounds to date. The gun is being developed to provide the performance of the current 120mm M256 cannon on the M1A2 in a lighter weight, more compact design. This assembly will enable the XM 1202 to fire

Soldiers prepare to unload the Container Launch Units (CLUs) for the NLOS-LS demonstration held at Fort Bliss in January 2008. (U.S. Army photo courtesy of FCS(BCT).)

120mm main gun ammunition from a vehicle weighing roughly half the Abram's weight. Successful testing and integration are key factors that will enable the XM 1202 to conduct full-spectrum operations and to "deliver precision fires at a rapid rate to destroy multiple targets at standoff ranges."

AL&T: Many new developments are being employed in robotic research for UGVs. What other platforms are being developed in addition to the MULE vehicle?

Cartwright: The FCS(BCT) UGV team has been one of the first in the FCS(BCT) program to move from Microsoft® PowerPoint to actual hardware. The SUGV (XM 1216) is participating in experiments with the AETF this summer. The MULE Engineering Evaluation Unit [EEU] has conducted numerous demonstrations and is preparing for Critical Design Review [CDR]. Progress with the Autonomous Navigation Systems [ANS] is progressing as scheduled. The ANS has integrated prototype systems on the MULE EEU, Stryker and Light Medium Tactical Vehicle (LMTV) truck in an effort called the Robotic Convoy Experiment and on a TARDEC platform called Crusher. We are excited about the progress the FCS(BCT) program has made to date and look forward to greater accomplishments as we move to CDR in FY09.

SUGV (XM 1216) is a small, lightweight (30 pounds) robot that will support the dismounted Soldier in urban environments to clear buildings, tunnels, caves or sewers. The Army has many small prototype systems in Iraq today that demonstrate the need for the SUGV. The FCS(BCT) SUGV (XM 1216) capitalizes on that success and provides the lightest possible robot for dismounted Soldiers. As the platform weight decreases, the mobility must stay the same. The lightweight XM 1216 can still take on steps found in most buildings, operate in 6 inches of water, tackle tough terrain and inclines, and operate in various climates.

The ANS functions as the "brains" of the robotic platform for UGVs such as the MULE (XM 1217). The ANS is a complex integration of hardware and

Soldiers set up the CLUs for the NLOS-LS demonstration at Fort Bliss in January 2008. The NLOS-LS will provide warfighters with a reliable, sustainable and dependable system. (U.S. Army photo.)

software that interprets what is in front of the XM 1217 and provides a safe and efficient path for it, taking speed and operational tempo into consideration. Ongoing ANS Laser Radar, Laser Detection and Ranging, data processing integration, and testing and evaluation work were successful in 2007 and will continue at a higher level in 2008.

The three MULE variants offer interesting insights into the different situations that UGVs will encounter. The MULE-Transport (XM 1217) must follow the dismounted Soldier over complex terrain at a safe distance and react to the Soldier's movement. The Armed Robotic Vehicle-Assault (Light) (ARV-A(L)) (XM 1219) must be capable of delivering lethal effects on the enemy with its M240 machine gun or Javelin missiles. The Soldier's safety is paramount when considering that the ARV-A(L) (XM 1219) represents the first UGV to deploy firepower against an enemy by the U.S. Army. The MULE-Countermine [MULE-C] (XM 1218) demonstrates the teaming of two UGVs to clear a path of anti-tank mines by detecting, marking or neutralizing the mine and marking the clear path. The two MULE-C (XM 1218) systems must be in constant sync to ensure that the path is cleared.

AL&T: The NLOS-C has fared extremely well in testing over the past 2 years. What can you tell us about this new cannon system? How will NLOS-C technology revolutionize cannon and mortar fire in the close fight?

Cartwright: The NLOS-C (XM 1203) firing platform was delivered to YPG in October 2006 and fired its first round on Oct. 23, 2006. The firing platform consists of a band-tracked surrogate chassis with a threshold mission module that has an automated ammunition handling system, automatic gun pointing and an XM324, 38 caliber, zone 4, 155mm cannon. The NLOS-C firing platform's primary objectives are to provide risk reduction for cannon and mount development, to advance safety certification and manned rating for 2008 prototype deliveries, and to provide reliability growth for weapon module components. To date, 1,659 rounds have been fired.

> Our use of phased development requires us to analyze continuously the FCS(BCT) systems and their capabilities to help optimize our approach to meeting the KPPs and gives us the ability to influence both platform and network designs at the earliest stages of development before such changes become cost-prohibitive.

AL&T: What have been some of the biggest challenges with this system?

Cartwright: One of the system's biggest challenges was meeting the 27- to 30-ton weight requirement for all of the MGVs; this allows multiple MGVs to be transported on a single C-17 aircraft.

AL&T: What are some of the most significant technological breakthroughs associated with NLOS-C?

Cartwright: Perhaps one of the most important breakthroughs is the advancement of hybrid electric propulsion for our MGV fleet. This hybrid electric system is being integrated onto the NLOS-C prototype to enable a lighter-weight, higher-efficiency propulsion system. The system can conserve fuel through the use of regenerative braking to recover electrical power while the batteries provide for peak performance when required.

Another NLOS-C key component is its automated ammunition handling and firing system. This system takes the Soldier out of the loop when firing. The task of manually handling projectiles and setting fuzes, powder charges and rope lanyards to fire each round is a thing of the past. The laser igniter system enables automated high rates of fire while eliminating the sustainment burden of expendable primers and provides increased reliability.

Additionally, the Automated Cannon Cooling System also enables high rates

of fire by eliminating the Soldier task of cannon swabbing while providing tube cooling to maintain rate of fire. The combination of these components allows an efficient, faster and less labor-intensive system.

AL&T: How will NLOS-C technology revolutionize cannon and mortar fire in the close fight?

Cartwright: The NLOS-C (XM 1203) will be able to improve its accuracy round by round and mission by mission, respond rapidly to calls for fire with its networking and high rate of fire, and provide a variety of effects on demand. It will be able to move rapidly, stop quickly and deliver lethal first round fire for effects on target in record time. Last, it allows the commander the ability to service more targets accurately, with fewer systems, and with rapid responsiveness.

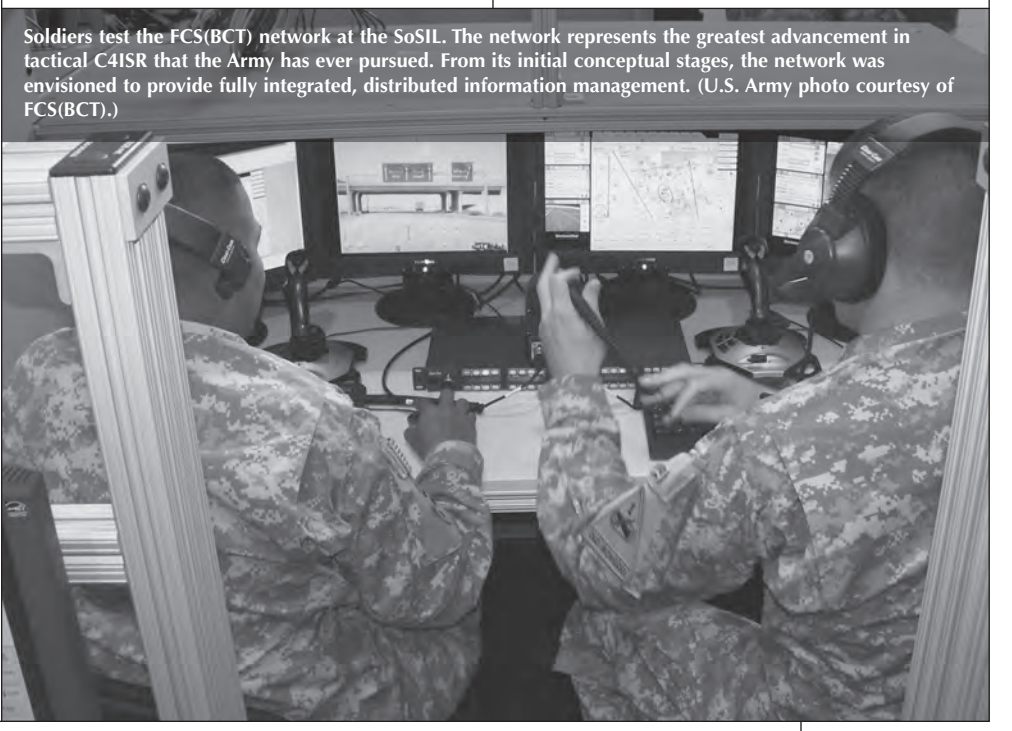
AL&T: How will the MCS and XM360 Mid-Range Munition (MRM) change the face of armored warfare for U.S. forces? What are the system's most awesome capabilities and what are some of the key components that will make it an invaluable weapon system to the HBCT?

Cartwright: The MCS (XM 1202) with the MRM (XM 1111) will revolutionize the way the FCS(BCT) and the U.S. Army conduct traditional "tank-on-tank" engagements. The density of manned and unmanned sensors in the FCS(BCT) will enable the formation to "see first" and detect enemy armored vehicles while out of contact. The combination of FCS(BCT) Battle Command and Sensor Fusion will enable the FCS(BCT) to "understand first" and "act first" by developing orders that facilitate precision maneuvers and fires. By using the robust FCS(BCT) network that links the off-board sensors with the MCS (XM 1202), FCS(BCT) leaders will retain the initiative and the ability to maneuver the XM 1202 to areas of advantage and to engage the enemy while safely out of contact. The MRM (XM 1111) round will provide the capability to expand significantly the engagement area with its extended range capabilities. While traditional tank rounds are designed to conduct LOS engagements at the 3-kilometer [km] range, the XM 1111 round will provide the range and accuracy for the XM 1202 to conduct precision, BLOS engagements and destroy a range of moving or stationary targets out to 12 km when the XM 1202 is stationary or 8 km when it is moving. The XM 1111 round will have a dual-mode seeking capability that allows it to acquire targets that are either laser designated by a sensor or autonomously. Its warhead will have the ability to defeat current and future high-payoff targets on a complex battlefield to include main battle tanks with explosive reactive armor, light armored vehicles, self-propelled artillery and air defense, trucks and bunkers. The increased lethality of the XM 1202 at extended ranges through the MRM rounds will improve this system's survivability and exponentially decrease the number of traditional LOS engagements. Although the XM 1202 will retain the ability to fire current and future LOS 120mm munitions, the XM 1202 in the FCS(BCT) formation will make the traditional tank-on-tank engagements obsolete.

> The MGV design is being developed to achieve the optimal balance of capabilities to ensure that its lethality, survivability, sustainability and force effectiveness attributes are equal to or better than those of Current Force vehicles.

AL&T: How are today's warfighters benefitting from the FCS technology already matured?

Cartwright: Today, the Army is making use of many FCS-developed technologies. Navy and Army units are using the



Soldiers test the FCS(BCT) network at the SoSIL. The network represents the greatest advancement in tactical C4ISR that the Army has ever pursued. From its initial conceptual stages, the network was envisioned to provide fully integrated, distributed information management. (U.S. Army photo courtesy of FCS(BCT).)

Micro-Air Vehicle (MAV) in explosive ordnance disposal operations. The MAV is a precursor to the Class I UAV. Also, armor technology developed for FCS is being used in fragmentation kits placed on our tactical vehicle fleet in Iraq and Afghanistan. The Army has also successfully used the Excalibur artillery round during counterinsurgency operations. This round will be the NLOS-C's chief ordnance.

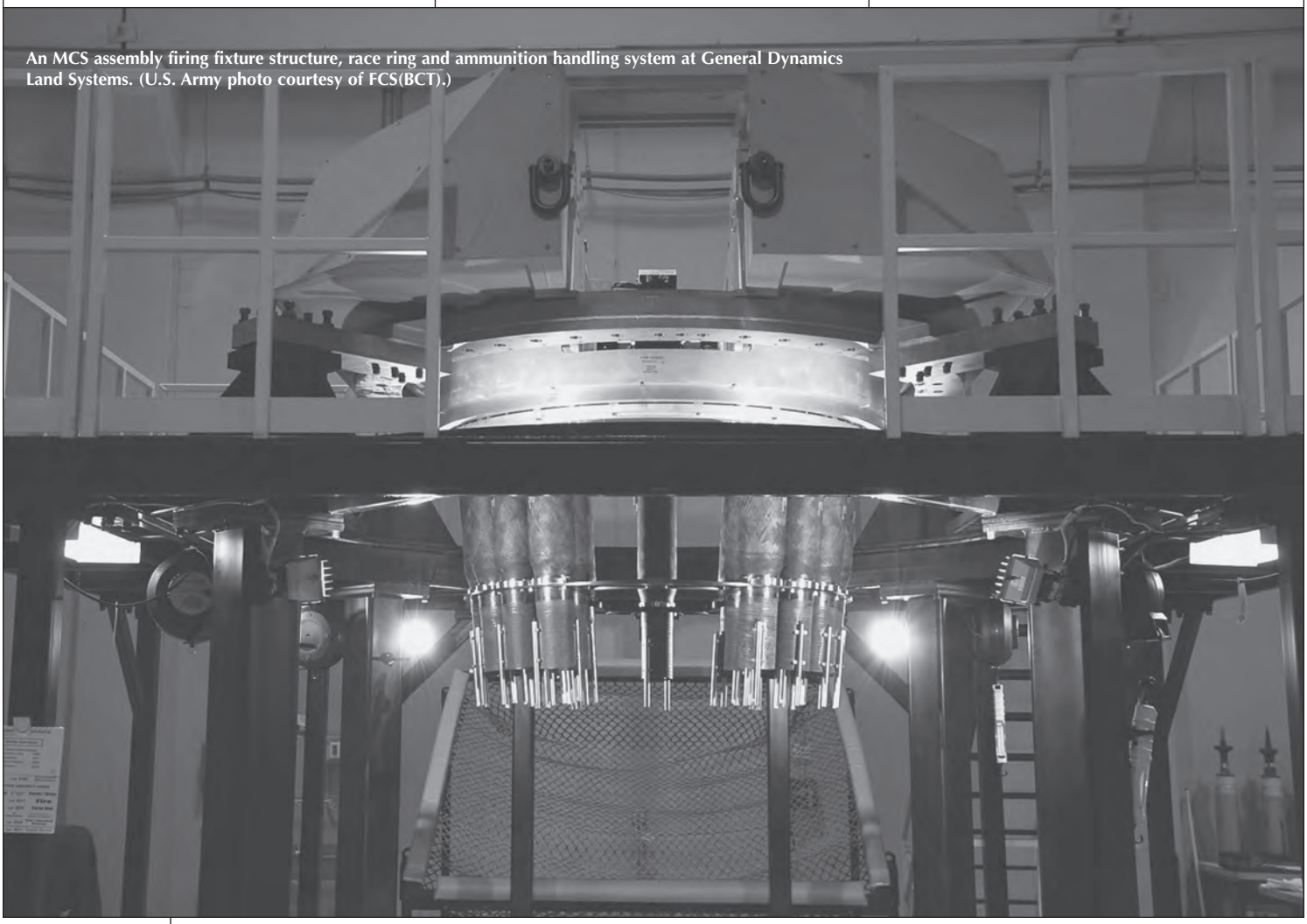
The FCS(BCT) will be optimized for counterinsurgency operations and the Army will accelerate fielding of select FCS(BCT) capabilities (called Spin Outs) to reduce operational risk to the Current Force. The plan expands the scope of the program's SDD phase by adding discrete SOs of capabilities at 2-year increments for the Current Forces. SO 1 will begin this fiscal year and consist of prototypes issued to the AETF for its use and evaluation. Following successful evaluation by the AETF, production and fielding of SO 1 will commence to Current Force units in 2011. SO 1 is under development, program acquisition controls are in place and all systems within SO 1 are progressing through key engineering milestones.

> The NLOS-C firing platform's primary objectives are to provide risk reduction for cannon and mount development, to advance safety certification and manned rating for 2008 prototype deliveries, and to provide reliability growth for weapon module components.

AL&T: How will you spiral that technology into the Current Force?

Cartwright: The Army will field selected FCS(BCT) capabilities to operational forces in the SO fielding concept. The first FCS(BCT) capabilities will be provided to Current Force BCTs beginning in 2011 as part of SO 1. The SO strategy consists of prototypes fielded to the AETF for testing and experimentation. The SOs provide early capability in force protection, networked fires, expanded operational environment and BC in a series of SO capability releases.

AL&T: How will FCS strike the right balance between modernization,



An MCS assembly firing fixture structure, race ring and ammunition handling system at General Dynamics Land Systems. (U.S. Army photo courtesy of FCS(BCT).)

The ANS has integrated prototype systems on the MULE EEU, Stryker and LMTV truck as well as on TARDEC's Crusher (shown here), an unmanned ground combat vehicle that was unveiled in May 2006 by the Defense Advanced Research Projects Agency. (U.S. Army photo.)

recapitalization (recap) and reset when U.S. forces begin returning home from Southwest Asia?

Cartwright: Modernizing the Army is not an option, but a necessity. The FCS(BCT) program is a key component to the Army modernization effort and will provide warfighters with capabilities never before used by a military force. Our goal is to sustain the momentum of Army modernization as we rebalance current capabilities in the Army to ensure that our warfighters maintain a decisive advantage as the preeminent power in the world. FCS(BCT) technology is being designed to work Jointly across all services to bring a new level of battlefield awareness and Joint interoperability.

AL&T: How will this modernization improve tactical and strategic mobility?

Cartwright: The FCS(BCT) program systems were designed from the ground up with supportability and strategic mobility in mind. PM FCS(BCT) has worked closely with TRADOC, the Air Mobility Command and the U.S. Transportation Command during the design process to ensure that FCS(BCT) systems are easier to deploy in a shorter time period. As a result, FCS(BCT) enhances agility, responsiveness and sustainability by using platforms that are lighter, common and have more robust interoperability capabilities than Current Force systems. One of the best examples of this is the family of MGVs, which uses a common chassis for all of its variants. FCS(BCT) formations built around MGVs will have a significantly smaller logistic footprint because of common repair parts stockage, tool kits and component replacement instead of repair to lessen maintenance requirements at unit level. These formations will also be more lethal, more capable and more survivable through a combination of armor, enhanced situational awareness [SA] and APS. As a result, FCS(BCT) units will be able to handle operations in a larger area with fewer Soldiers. This capability provides a greater strategic advantage when quick response is needed around the world.

Our goal is to sustain the momentum of Army modernization as we rebalance current capabilities in the Army to ensure that our warfighters maintain a decisive advantage as the preeminent power in the world. FCS(BCT) technology is being designed to work Jointly across all services to bring a new level of battlefield awareness and Joint interoperability.

AL&T: What new technology will be spiraled into Current Force weapon systems as they go through recap/reset in Army depots?

Cartwright: The FCS(BCT) deployment strategy consists of a series of three SO releases beginning this year with SO 1. Spinning out FCS(BCT) capabilities/systems when they are available will allow the Army to field the FCS(BCT) network elements and some individual FCS(BCT) systems over time, thus reducing the risk to the FCS(BCT) program while simultaneously adding capability to the Current Force. SO 1 addresses Current Force capability gaps in SA, force protection and lethality through the use of the UGS (U&T) (AN/GSR-9 and -10) and NLOS-LS (XM 501). Other technologies include the FCS(BCT) network components, such as the Integrated Computer System, SoS Common Operating Environment, BC, Network Management Services and JTRS, which will be integrated into Current Force Abrams,

Here (left to right), Joe Zinecker, Lockheed Martin, shows MG Cartwright, PM FCS(BCT), and Dennis Muilenburg, Boeing Co., the EEU's progress. The EEU was used in multiple tests and demonstrations throughout 2007. Looking on from behind is Chris Yuknis, a Lockheed Martin vice president. (Photo by Glenn Helm, Lockheed Martin.)

Bradley and High-Mobility Multipurpose Wheeled Vehicle (HMMWV) platforms during SO 1. This network backbone provides control of UGS (U&T) assets and SA of objects detected by these systems, while also providing a start point for the application of increasing capability in subsequent SOs. The FCS(BCT) program has also accelerated to the AEFT for evaluation of the Class 1 UAV (gMAV [gasoline engine MAV] Block 0, early prototype) and the SUGV (Block 1, early prototype) as a result of the overwhelmingly positive results in the testing of their capabilities and the need for these systems in theater. Both systems provide real-time video and pictures to warfighters and combatant commanders while keeping Soldiers out of harm's way. Over the next few years, the FCS(BCT) program will equip the centerpiece of our modernization program, the warfighter, with the most advanced systems in the world to become more lethal, more situationally aware and more confident to deploy anywhere in the world in defense of our Nation.

> FCS(BCT) formations built around MGVs will have a significantly smaller logistic footprint because of common repair parts stockage, tool kits and component replacement instead of repair to lessen maintenance requirements at unit level.

AL&T: What acquisition strategy is FCS (BCT) using and how will this change over the next 5 to 10 years?

Cartwright: The FCS(BCT) program acquisition strategy conforms to the *DoD 5000* framework for systems acquisition. The FCS(BCT) PM is responsible for FCS(BCT) SoS development, production, fielding and support. Additionally, the program will develop and position the SO of FCS(BCT) capabilities/systems for production and fielding to the Current Force.

From its inception, the FCS(BCT) program acquisition strategy was designed to employ an LSI to support the Concept and Technology Development phase and continue through the SDD and Low-Rate Initial Production (LRIP) phases. This strategy was determined to be in the government's best interest. The Army's partnering with the best of industry allowed it to use cutting-edge technology, best business practices and performance objectives in FCS(BCT) SoS development to provide the Soldier with greater capability at lower life-cycle costs. It is the Army's intent to maintain the relationship with its LSI (Boeing and SAIC) through the core program LRIP phase to ensure that SoS operational verification, as demonstrated in the Initial Operational Test and Evaluation (IOT&E), is in compliance with the SDD's contractual requirements.

The Army now uses this LSI arrangement for the FCS(BCT) program SDD acquisition phase, scheduled to complete with a successful MS C decision for the core program in FY13.

In compliance with the FCS(BCT) program acquisition strategy, the program is preparing to enter into production contracts for the MGV Initial Production Platform (NLOS-C) (XM 1203) Special Interest Program and SO 1 beginning with advance procurement items in 2008 and production contracts in early 2009.

These 18 units will be delivered to the AETF in 2010, 2011 and 2012, respectively, at a projected rate of six vehicles per year.

SO 1 involves procurement of 17 BCT sets providing enhanced SA and communication capabilities for the Current Force through technology insertions to the Abrams, Bradley and

HMMWV. These technologies will be delivered to the Current Force in FYs 10-14.

The Army's acquisition plan for the core program LRIP effort is on target to begin in 2013. The minimum core LRIP quantity of three BCTs would be managed under the LSI arrangement that has been used for the program's entire SDD phase.

A Full Rate Production decision MS will be convened in FY17, and will be based upon demonstration of supportability/producability and after IOT&E substantiates FCS(BCT) effectiveness, suitability and KPP achievement.

AL&T: What is the most important message you would like to convey to the Acquisition, Logistics and Technology Workforce and Soldiers who read our family of publications?

> The Army's partnering with the best of industry allowed it to use cutting-edge technology, best business practices and performance objectives in FCS(BCT) SoS development to provide the Soldier with greater capability at lower life-cycle costs.

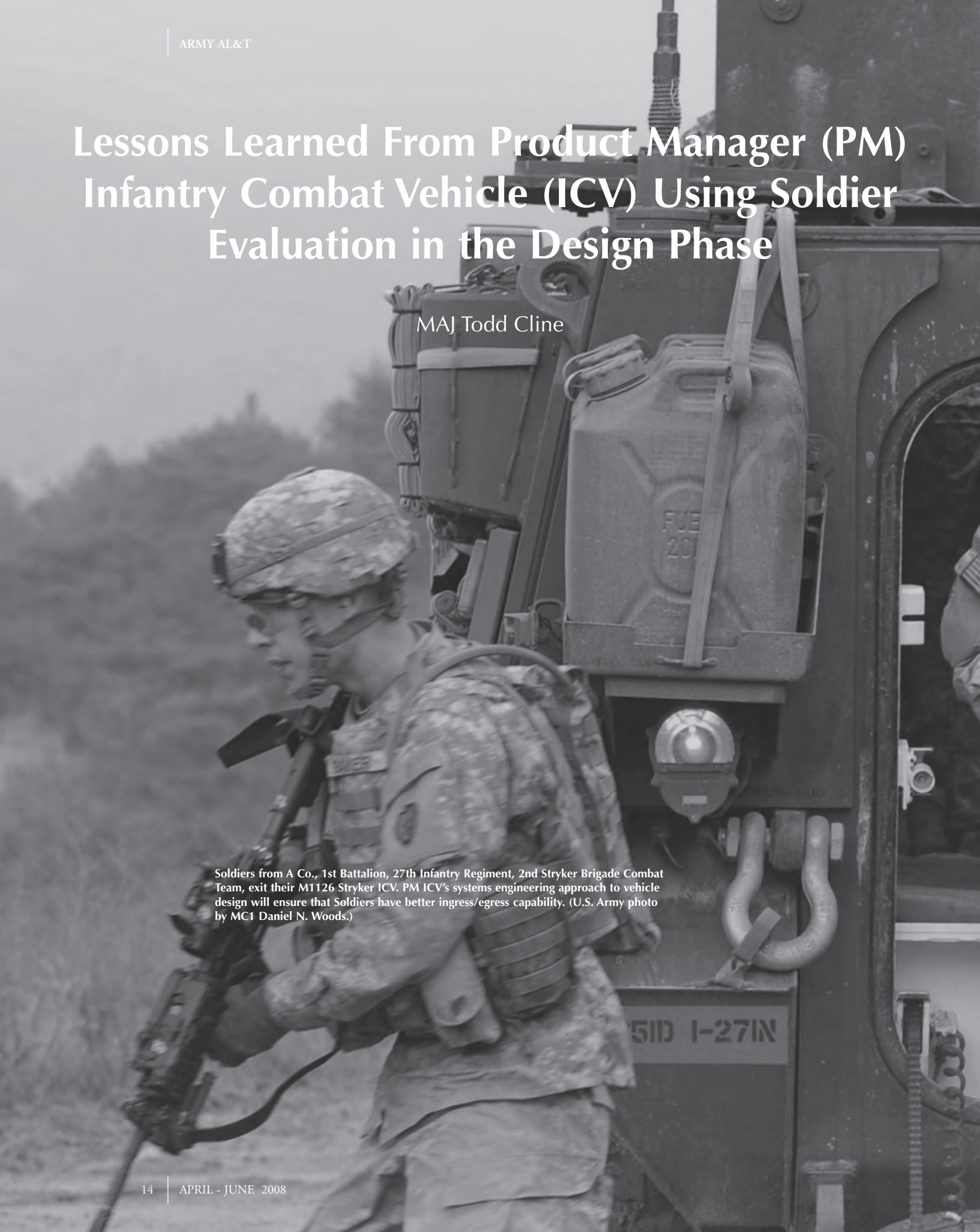
Cartwright: The FCS(BCT) program is a commitment to modernize our Army, not an option. The FCS(BCT) is the Army's promise to provide its Soldiers the best available equipment and technology. This is not just a technology development program; it is also the development of new BCTs. These new brigades, with more infantry, better equipment and unmatched SA and communications, will change the way the U.S. Army fights wars. These BCTs will prove invaluable during asymmetric and stability operations by allowing for precision targeted fires to keep civilians out of harm's way and more infantry on the ground to patrol civilian populations. And through sensors connected to the BCT's network, real-time situational updates will allow the Army to neutralize targets before they strike military or civilian personnel (see them first and take them out). Through a state-of-the-art network, the FCS(BCT) will have vastly increased SA, survivability and lethality — ensuring that our Soldiers can take the fight to the enemy before he knows we are there and has time to react. By reducing vehicle crew sizes, logistics and maintenance burdens, the FCS(BCT) will have 50 percent more infantry Soldiers in the fight.

The FCS(BCT) is happening now. AETF Soldiers are training with FCS(BCT) hardware and software systems and will begin brigade-level evaluations of SO equipment in early summer 2008. FCS(BCT) SO capabilities/systems will reach operational brigades in the 2010 timeframe. The first MGV — the NLOS-C prototypes — are being built at locations in York, PA; Santa Clara, CA; Minneapolis, MN; Lima, OH; and Sterling Heights, MI, and will be completed in June 2008. In December 2007, the Army Chief of Staff directed the FCS(BCT) program to accelerate test schedules for the SUGV robot and the Class 1 UAV. As a result, AETF training and evaluations of these platforms started in mid-January 2008.

A MULE drives over a ditch during a demonstration at Fort Bliss in January 2008. (U.S. Army photo courtesy of FCS(BCT).)

Lessons Learned From Product Manager (PM) Infantry Combat Vehicle (ICV) Using Soldier Evaluation in the Design Phase

MAJ Todd Cline



Soldiers from A Co., 1st Battalion, 27th Infantry Regiment, 2nd Stryker Brigade Combat Team, exit their M1126 Stryker ICV. PM ICV's systems engineering approach to vehicle design will ensure that Soldiers have better ingress/egress capability. (U.S. Army photo by MC1 Daniel N. Woods.)

In September 2007, the PM for the Manned Ground Vehicle (MGV) XM1206 ICV, Future Combat Systems (Brigade Combat Team) (FCS(BCT)) conducted an ingress and egress demonstration to optimize squad configuration and verify ICV platform design characteristics. The demonstration was conducted using Soldiers from the Army Evaluation Task Force and a vehicle mock-up of the ICV mission module area. Demonstrations using mock-ups or prototypes often prove to be cost-effective ways to focus on certain requirements and bring valuable data and a unique real-world perspective to the design team. Mock-up demonstrations also assist PMs in prioritizing limited resources to important system areas.

PM ICV is using the systems engineering approach with this valuable Soldier feedback to incorporate design changes while balancing any cost, schedule and performance impacts. The objectives of this demonstration were to evaluate ICV mission module seating configuration and evaluate the time it took Soldiers for ingress/egress via ramp and door. The mock-up was constructed with the ability to reconfigure to different seating arrangements, as well as different ramp and door configurations.

The ICV is one of eight MGVs being designed for the FCS(BCT) and is being built centered on the 9-man dismountable infantry squad. This Soldier-centric design allows for the ICV to meet its mission requirement of transporting 11 personnel (2-man crew and 9-man squad) on the battlefield. The ICV delivers the dismounted force to the close battle and supports the infantry squad by providing self-defense and supporting fires.

Soldiers from the 1st Combat Arms Battalion, 5th Brigade, 1st Armored Division, traveled to Santa Clara, CA, to take part in the demonstration. The Soldiers' time in service ranged from only 16 months to combat veterans with about 12 years' experience. The Soldiers' ages ranged from 18 to 38, and their heights and weights ranged from 5'4" to 6'5" and 140 pounds to 250 pounds. During the demonstration, Soldiers carried Rapid Fielding Initiative equipment and Mission-Oriented Protective Posture (MOPP) gear, which provided realistic combat weight and added 100-120 pounds of weight to each Soldier.

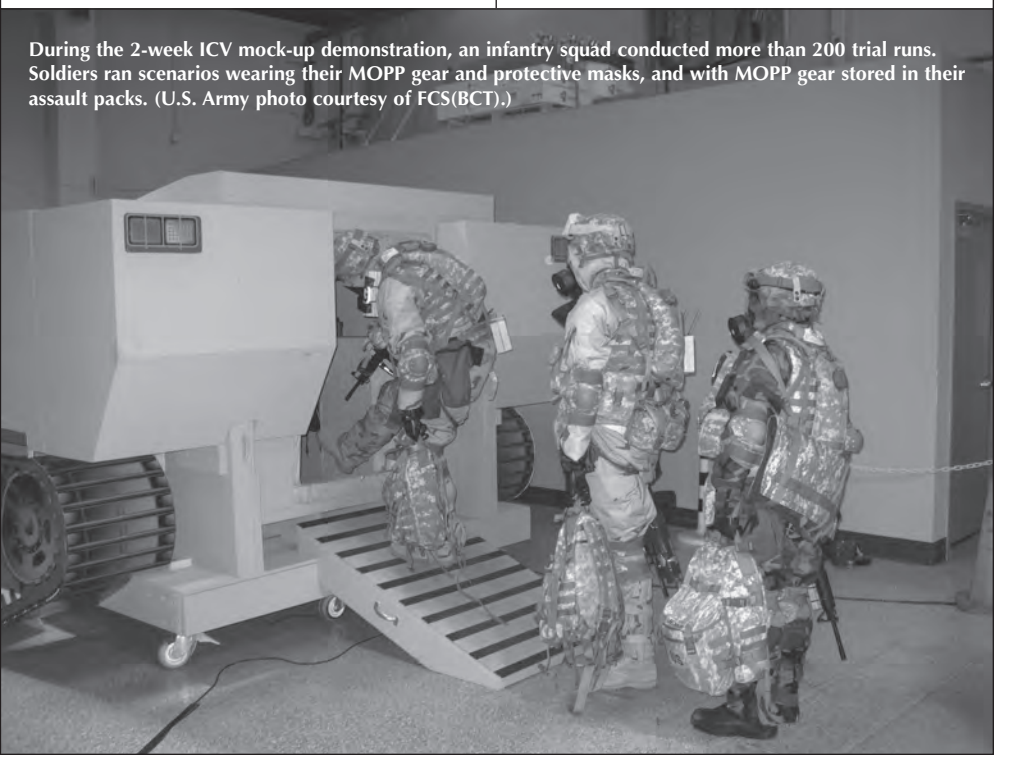
During the 2-week demonstration, the squad conducted more than 200 trial runs. Soldiers ran scenarios wearing their MOPP gear and protective masks, and with MOPP gear stored in their assault packs. Human factor, design and test engineers received and reviewed more than 300 questionnaires, which encompass the bulk of the final report. This Soldier feedback, which ranged from comments on seat design, safety belts, seating arrangements, Soldier space, ramp and door opening to identifying obstacles in design and safety-related issues, proved invaluable in optimizing the ICV design.

> Demonstrations using mock-ups or prototypes often prove to be cost-effective ways to focus on certain requirements and bring valuable data and a unique real-world perspective to the design team. Mock-up demonstrations also assist PMs in prioritizing limited resources to important system areas.

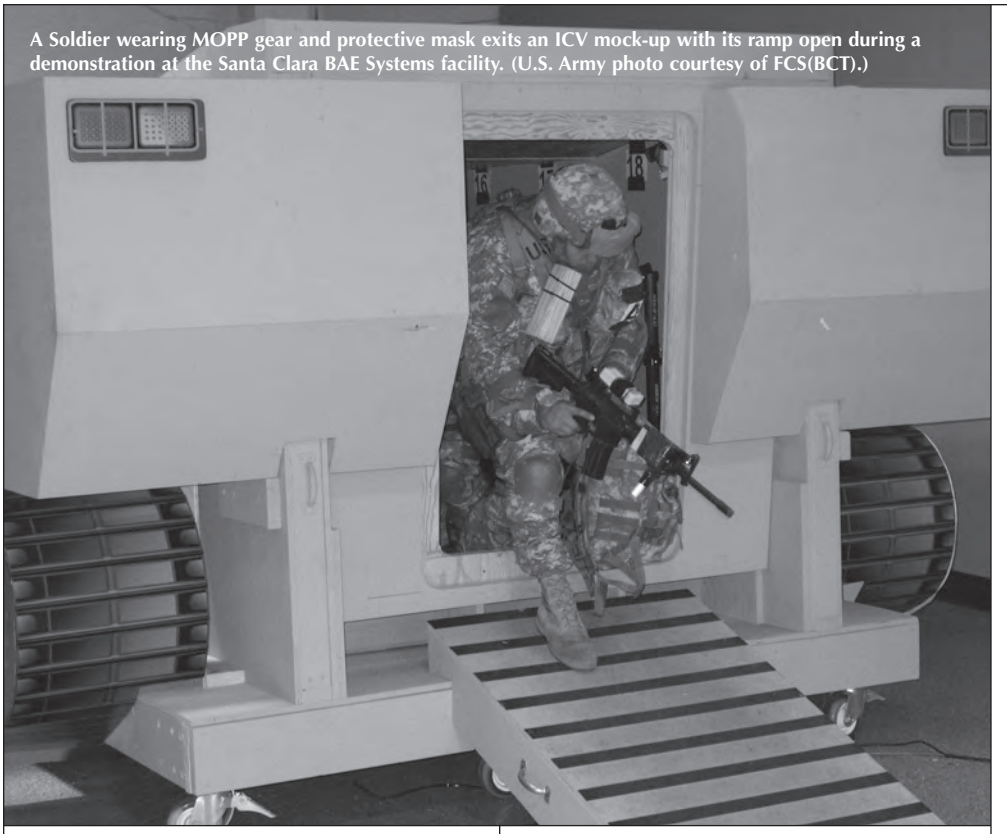
Lessons Learned

The ICV ingress/egress demonstration not only provided the FCS(BCT) program useful data, but also emphasized the importance of demonstrations, tests and user juries early in the system development process. FCS ICV ingress/egress demonstration lessons learned may benefit other defense acquisition programs planning similar events. Successful demonstrations require written plans, identification of resources and involvement of the test and safety communities. Here are some of the important lessons learned during the ICV's ingress/egress demonstration:

- *Establish a written test or demonstration plan*. A written plan helps the fabricators, testers, human factor engineers, design engineers and users understand the demonstration scope as well as the objectives and end data. The plan also helps to prevent others from adding scope to the event without proper time or funding resources.
- *Identify and schedule required resources.* Mock-ups may require the fabrication of surrogate items. The important



During the 2-week ICV mock-up demonstration, an infantry squad conducted more than 200 trial runs. Soldiers ran scenarios wearing their MOPP gear and protective masks, and with MOPP gear stored in their assault packs. (U.S. Army photo courtesy of FCS(BCT).)



A Soldier wearing MOPP gear and protective mask exits an ICV mock-up with its ramp open during a demonstration at the Santa Clara BAE Systems facility. (U.S. Army photo courtesy of FCS(BCT).)

point is to strive to make the demonstration as realistic as possible to enable best possible data collection.

- *Don't forget the Soldier.* Soldier requests take time to process, and some units require several months' advance notice for their approval process. Ensure to plan for Soldier equipment because some equipment is too bulky and heavy for commercial flights and may require special shipping. Sensitive items, such as night vision goggles, weapons, etc., may require additional site security for storage. Contact your test community for required safety documentation before letting Soldiers use any developmental equipment. The Developmental Test Center at Aberdeen Providing Ground, MD, provides Safety Releases and is a valuable resource in identifying additional approvals. Safety Releases provide commanders and PMs important information on risks of using the prototype or mock-up equipment and establish any limitations to the test or demonstration.
- *Review AR 70-25, Use of Volunteers as Subjects of Research.* Depending on the test or demonstration scope, a Human Use Committee (HUC) and Institution Review Board (IRB) may be required. Establish enough time in the schedule for the board and committee to review, comment on and approve the demonstration or test plan. Additional rules govern Soldiers being used on nongovernmental test sites or at a contractor's facility. One key point is that major changes to the approved plan will require another set of reviews and could delay the start of the event.
- *Be prepared for equipment to break, causing unwanted demonstration or test downtime.* The key to keeping a schedule moving is to have noncritical events that can fill space and do not require physical mock-up use. Examples include demographic questionnaires, measurements of Soldiers and their equipment in various configurations and design facility or test range tours. If you plan ahead, other demonstration excursions can be added, with prior approval from a HUC or IRB (if required), to collect additional data.

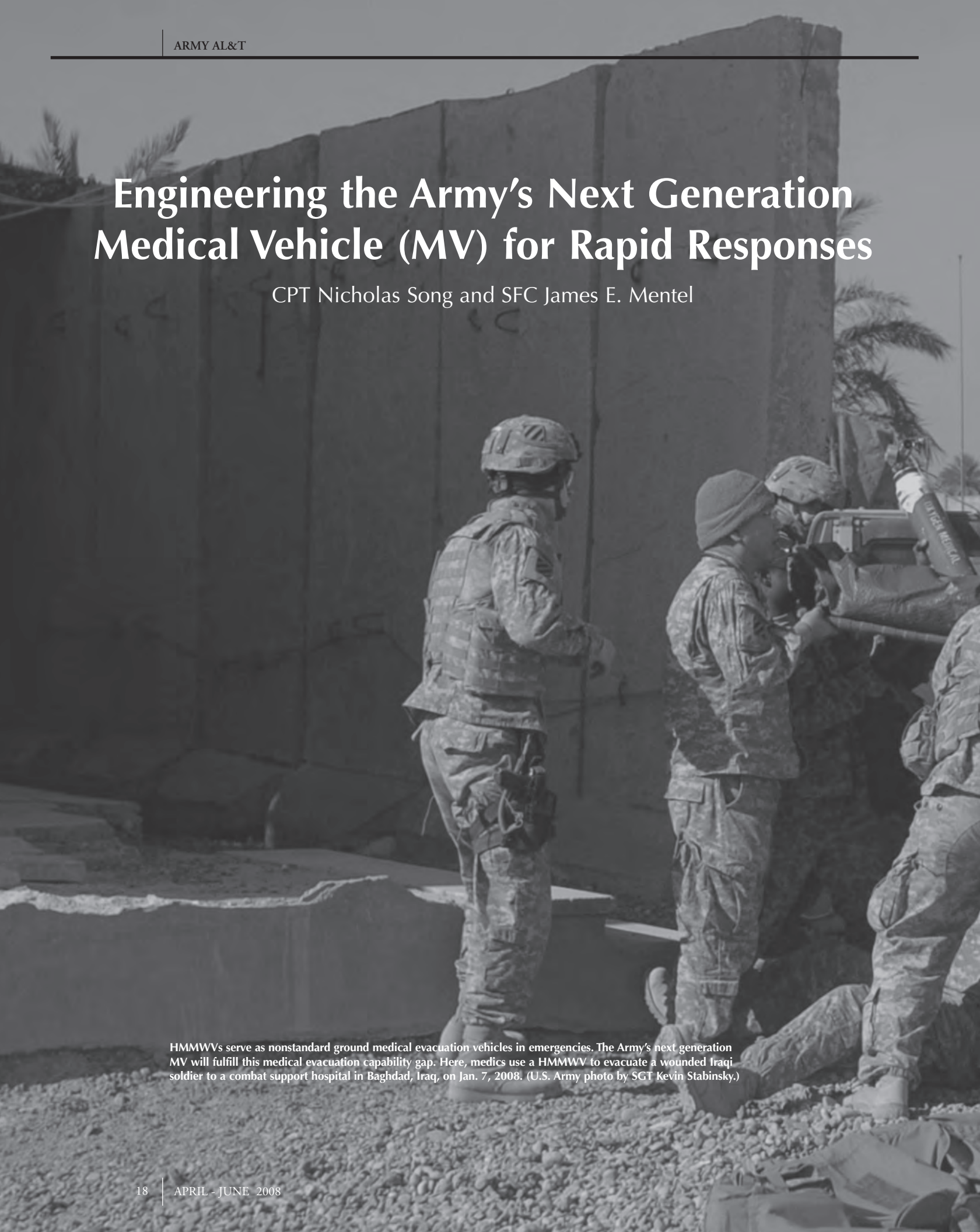
> Soldier feedback, which ranged from comments on seat design, safety belts, seating arrangements, Soldier space, ramp and door opening to identifying obstacles in design and safety-related issues, proved invaluable in optimizing the ICV design.

The FCS(BCT) ICV ingress/egress mock-up has led to PM and engineering design decisions that helped to optimize seating configuration, identify hazards and bring unforeseen design limitations to light that have aided in developing a Soldier-centric vehicle. The key to running a successful demonstration is to have clear objectives with a desired end-state or outcome (the plan), identify the participating Soldiers and equipment as early as possible, include outside organizations or agencies and ensure that the data being obtained will assist in the design (not just data of results).

MAJ TODD CLINE is the Assistant PM ICV, FCS(BCT). He holds a B.A. in communication from Grand Canyon University and an M.S. in material acquisition management from the Florida Institute of Technology. Cline is an Army Acquisition Corps member and is certified Level II in program management and Level I in lifecycle logistics.

Engineering the Army's Next Generation Medical Vehicle (MV) for Rapid Responses

CPT Nicholas Song and SFC James E. Mentel



HMMWVs serve as nonstandard ground medical evacuation vehicles in emergencies. The Army's next generation MV will fulfill this medical evacuation capability gap. Here, medics use a HMMWV to evacuate a wounded Iraqi soldier to a combat support hospital in Baghdad, Iraq, on Jan. 7, 2008. (U.S. Army photo by SGT Kevin Stabinsky.)

A medical platoon leader for the 1st Battalion, 504th Parachute Infantry Regiment, deployed in support of *Operation Iraqi Freedom (OIF)*, returned from his battalion's daily Battle Update Brief. He was dismayed by the information he learned from the battalion staff and battalion commander. He discussed the information with his platoon sergeant before disseminating it to his squad leaders.

A 1st Brigade, 3rd Infantry Division Soldier in an M113 armored medical evacuation vehicle transports mock wounded Soldiers during a mission readiness exercise at Fort Stewart, GA, in preparation for deployment to Iraq. (U.S. Army photo by MSG Johancharles Van Boers.)

"Sergeant, per the Iraqi Theater Policy, and due to the increasing threat of improvised explosive devices [IEDs] and enemy tactics, techniques and procedures [TTPs], soft-skinned vehicles are no longer allowed off the Forward Operating Base [FOB]. This means we cannot use our ambulances for ground medical evacuation," the lieutenant explained. "How are we going to support the battalion?"

"Relax sir," the sergeant replied. "Looks like we need to coordinate with battalion for armored HMMWVs [High-Mobility Multipurpose Wheeled Vehicles] to be used as nonstandard evacuation. They only hold one litter, but it is a short-term fix for now. For a long-term solution, we need to talk with the AMEDD C&S [U.S. Army Medical Department Center and Schools]. The Army desperately needs to modernize its ground medical evacuation capability. What we need is a highly mobile, survivable, networked MV with a Soldier-centric design incorporating input from medics and providers so these problems now can be mitigated for the Future Force."

Future Combat Systems (FCS) has developed the next generation MV that fills a capability gap desperately needed by the Current Force. The ongoing conflicts in Iraq and Afghanistan have proven that the Army is facing an adaptive and resilient enemy. The enemy has exposed and exploited vulnerabilities in U.S. and coalition forces' equipment, particularly manned ground vehicles (MGVs). Depending on the situation, Iraq theater policies sometimes limit or even prohibit nonarmored vehicles from operating outside of FOBs because of inadequate survivability against IEDs and anti-tank mines. These limitations and/or prohibitions directly impact combat medics and their ability to provide ground medical evacuation on the battlefield with currently fielded U.S. Army MVs: the M113 Tracked Ambulance and M996/M997 Field Litter Ambulance. Medics supporting combat operations must resort to using nonstandard vehicles with the appropriate level of armor protection needed to operate outside of FOBs. The FCS MV has a Soldier-centric design that incorporates input and continual feedback from the user. This involvement early in the systems engineering process optimizes the MV's capabilities and design, and ensures it meets critical functionality and survivability requirements.

The FCS LLHS can be reconfigured from litter to ambulatory configuration with no tools or removable parts in less than 2 minutes.

FCS MV

The FCS MV is one of 14 MGVs, unmanned ground vehicles and unmanned aerial vehicles. The MVs are designed on a common chassis with common parts to greatly reduce the FCS logistical footprint and to ensure MVs have mobility, survivability and sustainability equivalent to other FCS (Brigade Combat Team) (BCT) vehicles. Therefore, the new MVs will be able to keep pace with the Infantry Combat Vehicles and Mounted Combat Systems they support.

The FCS MV has two separate variants: MV-Evacuation (MV-E) and MV-Treatment (MV-T). MV-E has the capability to evacuate up to four litter patients, six ambulatory patients or a combination of three litter and three ambulatory patients. Some key MV design characteristics and capabilities include:

- 3-person crew.
- Medic workstation.
- Reconfigured Litter Lift Handling System (LLHS) with no tools.
- Oxygen concentrators.
- Vital signs monitors.
- Rapid Automated Medical Processing Systems (RAMPS).
- Medical Equipment Sets (MES) for ground ambulance.

The MV-T will replace the current Battalion Aid Station and provide Advanced Trauma Life Support anywhere on the battlefield. Some key MV-T design characteristics include:

- 4-person crew
- Treatment table with full body access
- Blood refrigerator
- Oxygen concentrators

- Medical lighting
- Vital signs monitor
- Quick deployable shelter
- Medic workstation
- MES for trauma and sick call

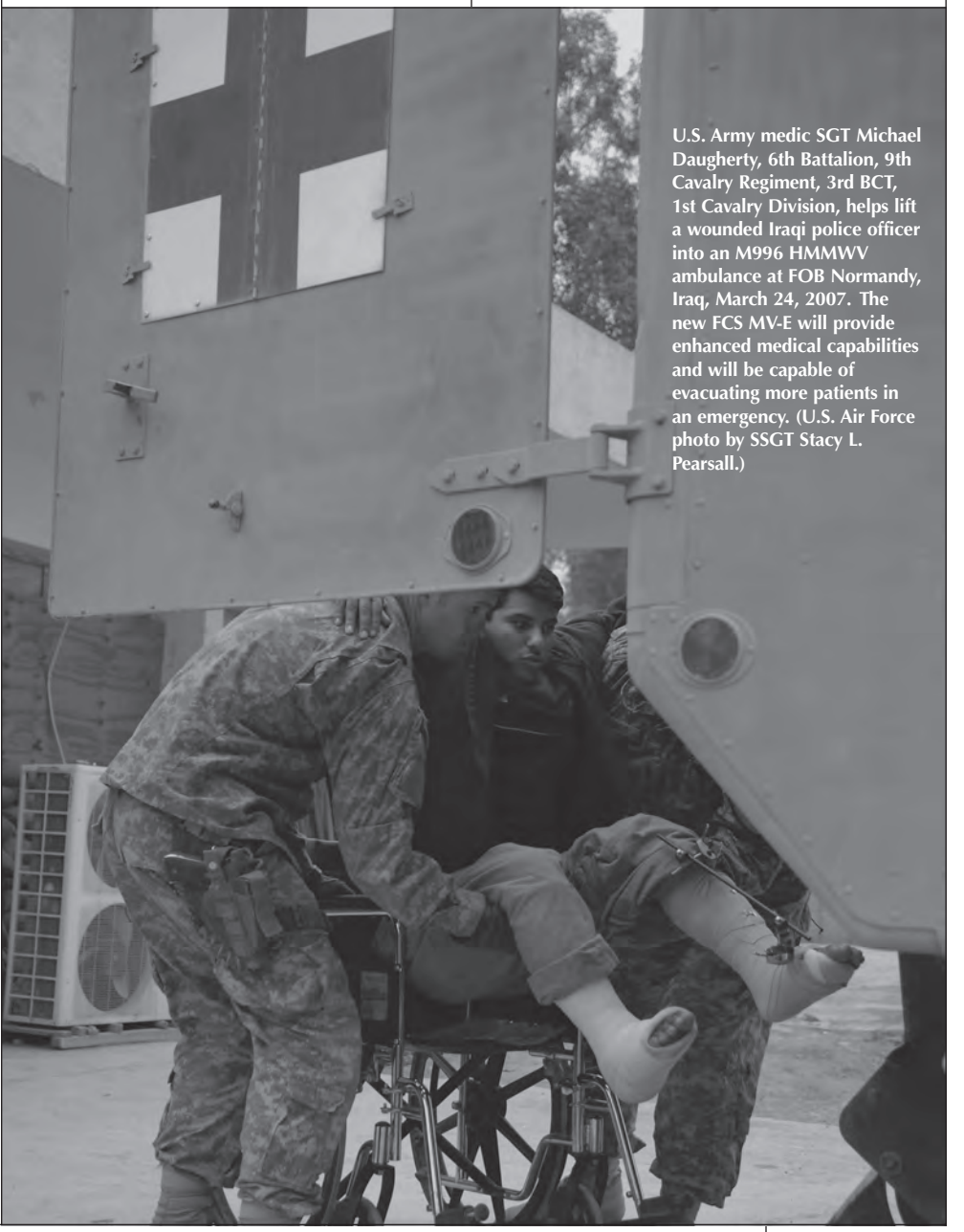
User Involvement

What separates the FCS MV from its predecessors is that the MV is the first mobile, survivable, networked combat medical evacuation and treatment vehicle being developed around the combat medic and medical providers. This Soldier-centric design ensures that the medical community influences the MV's design early in the development process. Every MV aspect is developed around the medical community, for the combat medics and doctors. Because of the FCS MV's importance to the AMEDD, key billets within the FCS program are filled by medical Military Occupational Specialty (MOS) personnel, who ensure that AMEDD is represented during the development process. Within the Product Management Office (PMO), a branch-qualified field medical assistant serves as the Assistant Product Manager (APM) for MV. Collocated with the PMO, a U.S. Army Training and Doctrine Command Capabilities Manager (TCM) medical noncommissioned officer (NCO) serves as the user representative and requirements lead. Together, the PM and TCM medical personnel work to ensure that appropriate coordination takes place and that the medics/providers — the targeted audience — are delivered a vehicle that allows them to do their job more effectively and efficiently.

To capitalize on lessons learned, the MV development integrated product team regularly interacts with operational units returning from combat deployments to discuss and receive updates on evolving friendly and enemy TTPs. The first step is identifying the problems and issues faced by Current Force medics and medical providers. The next step is to use their input on how to improve or fill the needed capability. Interaction with Current Force medical units has been vital in identifying capability gaps and in developing the MV's design concept and functionality. In September 2007, the PM and TCM coordinated to interview several combat medics, medical NCOs and medical providers from the 4th Infantry Division (4ID), Fort Hood, TX, who recently redeployed in support of *OIF*. The interviews helped identify problems that medics, BCT providers and lower echelons of health care face when capturing medical information digitally. A follow-up coordination session with 4ID providers was then conducted in November 2007 to gain more detailed information on how to resolve current issues. It is through these routine interactions with medical units that two critical pieces of equipment have been developed under the FCS MV: the LLHS and RAMPS.

FCS LLHS

The FCS LLHS resides on the MV-E and is a motorized litter system with the capability to transport up to four

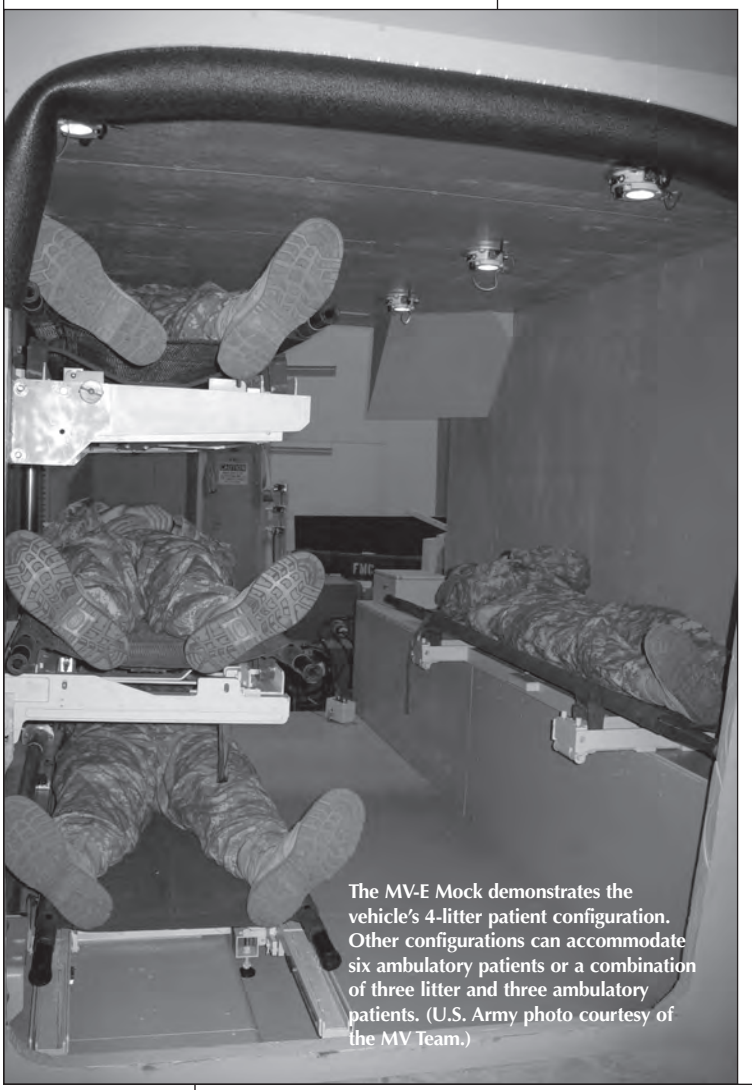


U.S. Army medic SGT Michael Daugherty, 6th Battalion, 9th Cavalry Regiment, 3rd BCT, 1st Cavalry Division, helps lift a wounded Iraqi police officer into an M996 HMMWV ambulance at FOB Normandy, Iraq, March 24, 2007. The new FCS MV-E will provide enhanced medical capabilities and will be capable of evacuating more patients in an emergency. (U.S. Air Force photo by SSGT Stacy L. Pearsall.)

litter patients, six ambulatory patients or a combination of three litter and three ambulatory patients. The FCS LLHS is designed with 3 litter births stacked vertically, with 22 inches between each birth, and a fourth litter on the MV-E's sponson that allows for full body access of patients. It is powered by a single motor that allows raising and lowering of the top litter and minimizes physical strain on the litter bearers during the loading and unloading process. The single motor allows for a synchronized raising and lowering of the entire litter birth, reducing any mechanical jams as found with previous litter lift systems. There is also a manual function incorporated into the design so that, in the event the motor fails, the litter can be raised and lowered manually.

The FCS LLHS can be reconfigured from litter to ambulatory configuration with no tools or removable parts in less than 2 minutes. The FCS LLHS contains a moveable litter tray that pulls out to the vehicle's center aisle allowing the litter to be loaded from the ramp or door, in the event of a ramp failure, and allowing the litter bearers to load the litter without having to enter the vehicle, thereby saving critical time. The litter is supported and secured by the litter stirrups, providing maximum security and overall safety for the patient. Placement of the medic's workstation and patient movement items (PMIs) inside the MV-E maximizes space, functionality and patient care. The LLHS design improves on many currently fielded systems' shortcomings. FCS LLHS design improvements are a direct result of user input and include: how patient litters are secured to the platform; the ability to reconfigure the LLHS from litter to ambulatory with no tools; the ability to load and unload the LLHS from the ramp door without having to enter the vehicle; and the storage of PMIs for immediate accessibility.

RAMPS stores information on a local database that resides on the MV and possesses the capability to send the information through the FCS network to higher echelons of medical care for their situational awareness on number of casualties, status and location.

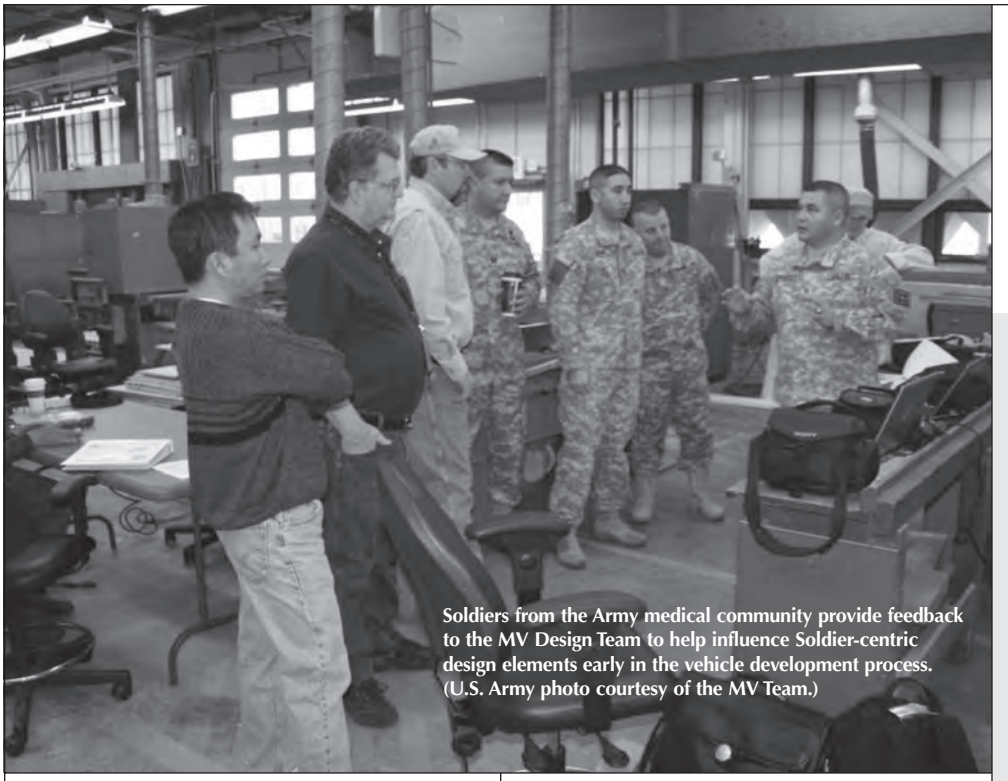


The MV-E Mock demonstrates the vehicle's 4-litter patient configuration. Other configurations can accommodate six ambulatory patients or a combination of three litter and three ambulatory patients. (U.S. Army photo courtesy of the MV Team.)

RAMPS

RAMPS provides the medic with the capability to digitally capture medical treatment data performed on the patient and medical status of an injured Soldier. RAMPS also stores the information on a local database that resides on the MV and possesses the capability to send the information through the FCS network to higher echelons of medical care for their situational awareness on number of casualties, status and location. The ability to capture this information on the MV and send the information prior to the MV's arrival at the medical treatment facility will enable medical providers to proactively prepare for and receive critically wounded Soldiers. In combat, where the cause of death and loss of limbs routinely involves severe trauma and major blood loss, every second counts. Passing this accurate information empowers the medical providers and leaders, allowing them to be proactive rather than reactive in their decision making.

RAMPS also sends the medical information via the FCS network to the Theater Medical Information Program to be stored in a patient's medical record. RAMPS can send and receive critical patient information. Significant effort is being made to provide medics with a user-friendly interface for inputting and recording patient information. User



Soldiers from the Army medical community provide feedback to the MV Design Team to help influence Soldier-centric design elements early in the vehicle development process. (U.S. Army photo courtesy of the MV Team.)

juries of physicians and physician assistants have helped validate and incorporate critical medical functionality into the RAMPS user interface. Medics' and medical providers' input provides software engineers with insight on how to best design the man-machine interface. This strong interaction between the PM and medical community has resulted in a system with a Soldier-friendly interface for capturing/entering medical data, maximizing patient treatment care and minimizing medic information input. RAMPS incorporates touch-screen technology, voice recognition software and PMIs, including a vital signs monitor, oxygen generator, intravenous pump and ultrasound. RAMPS also interfaces with an Electronic Information Carrier, a memory card issued to each Soldier that will contain a digital copy of his or her deployment medical record.

> The ability to capture this information on the MV and send the information prior to the MV's arrival at the medical treatment facility will enable medical providers to proactively prepare for and receive critically wounded Soldiers.

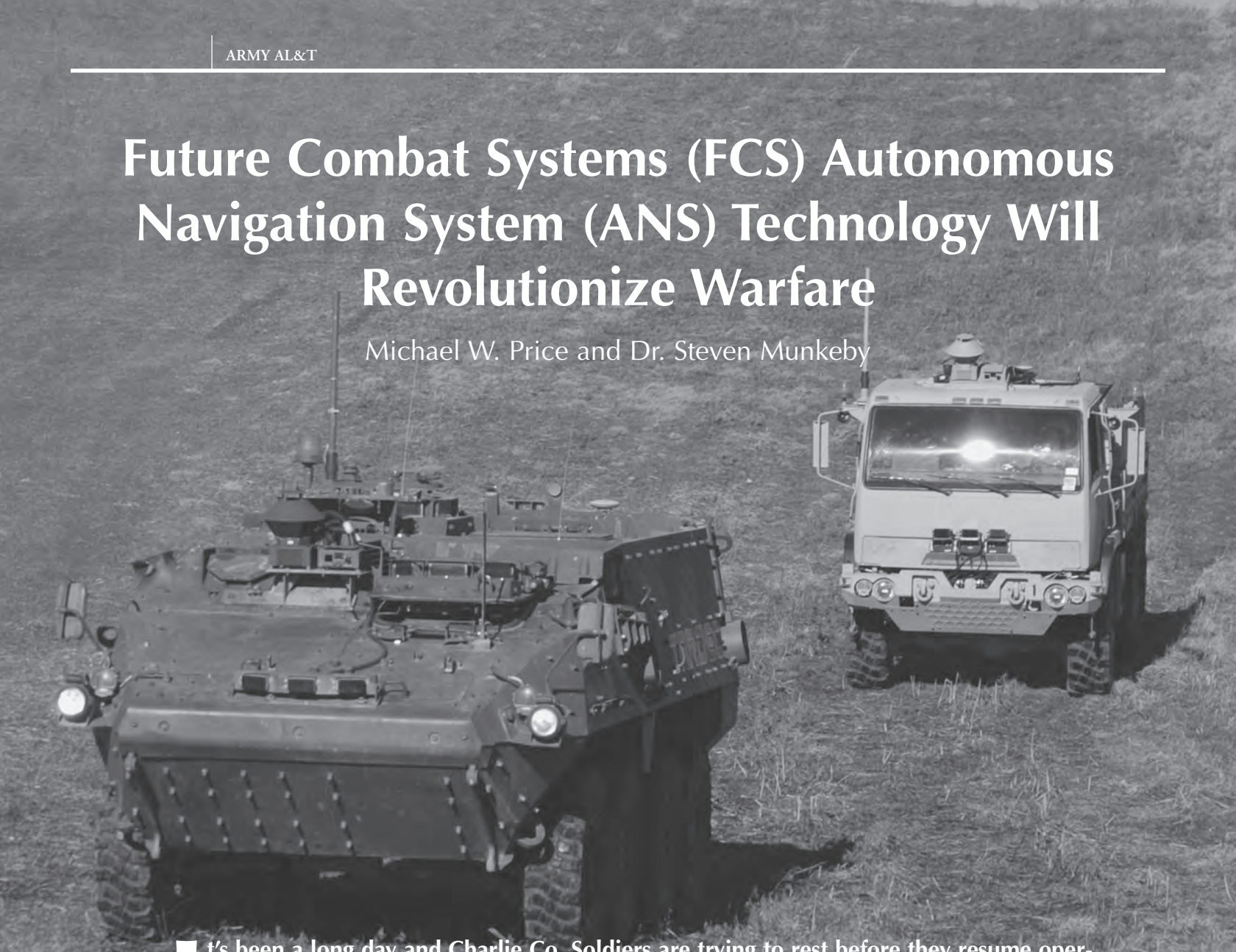
The FCS MV, LLHS and RAMPS are first-hand examples of technology developed with a medical community focus. From FCS program inception, AMEDD C&S has ensured proper representation, via medical MOS billets, within the PMO and TCMs. AMEDD representation embedded through the entire systems engineering process has been vital in ensuring that the operational requirements and needed functionality are incorporated into the MV's preliminary design to fill capability gaps desperately needed by the Current Force. Direct input and feedback from medics and medical providers within operational units has paid dividends during the design and early build phases as documented within the FCS LLHS and RAMPS design and development. Maintaining open communication with our customers has been vital in FCS's success to date and is the key in delivering equipment that makes Soldiers more combat effective and survivable.

CPT NICHOLAS SONG is a Medical Service Corps Officer assigned to Program Manager FCS(BCT) as an APM for PM FCS MV. Prior to that, he served as a Brigade Support Medical Co. (BSMC) Commander with 3rd BCT, 101st Airborne Division (AbnDiv) Air Assault. He has deployed in support of *OIF* (twice) and *Operation Enduring Freedom* as a Medical Platoon Leader and as a BSMC Company Commander. Song holds a B.S. in exercise science and sport studies from Rutgers, The State University of New Jersey. He is Level I certified in acquisition.

SFC JAMES E. MENTEL is an Army Combat Medic assigned as the TCM lead user representative for the FCS MV-E and MV-T variants. Prior to that, he served in various positions including Medical Evacuation NCO, Treatment NCO, Emergency Room NCO, Clinic NCO in charge, Medical Platoon Sergeant and as a Pathfinder Medic with the 101st AbnDiv (Air Assault). Mentel is certified as an Emergency Medical Technician, Advanced Combat Life Support Provider and has earned the coveted Expert Field Medical Badge.

Future Combat Systems (FCS) Autonomous Navigation System (ANS) Technology Will Revolutionize Warfare

Michael W. Price and Dr. Steven Munkeby



It's been a long day and Charlie Co. Soldiers are trying to rest before they resume operations. Out of the distance, a convoy arrives with rations, water, ammo and needed medical supplies. The First Sergeant is pleased that the supplies arrived safely and that his Soldiers weren't needed to escort the convoy back. This convoy was the newest member of Charlie Co., an unmanned Multifunctional Utility/Logistics and Equipment (MULE) platform that autonomously travels back to the supply point and returns without a Soldier escort. The MULE conducted this mission autonomously avoiding obstacles and navigating rugged terrain using the latest autonomous navigation sensors and software developed for the Army's FCS. ANS performs the driving and navigation functions for all FCS unmanned ground vehicles (UGVs) and indirect driving for the manned ground vehicles.

The ANS functions of move-on-route and detect and avoid obstacles were enhanced with leader-follower capabilities, which allow one UGV to follow another vehicle's path in convoy-like operations. Here, during Phase I of the RCX, the ANS-equipped Stryker ICV is the leader and the LMTV is the follower. (U.S. Army photo courtesy of FCS(BCT).)

"The capabilities that the UGV and ANS provide to the warfighter will revolutionize the way we conduct combat operations," remarked LTC Steve Noe, FCS UGV Product Manager (PM). "They will reduce risk to the Soldiers in hazardous situations and reduce Soldier workload and manpower requirements, particularly with the MULE family of vehicles during combat and convoy operations."

Currently in the System Development and Demonstration phase, UGVs, with the ANS fully integrated into their configurations, will perform tasks designed to move the UGVs around the battlefield with minimal human oversight. Some of these tasks include move-on-route, obstacle detection and avoidance, and leader/follower. Each task provides day and night navigation tactical behaviors capability in all types of weather for survival on the battlefield. "ANS is the centerpiece of UGV technology, 'the eyes and brains' that emulates the human skills to interpret its surroundings and plot a course," said Dan Folk, FCS UGV Deputy PM.

RCX Phase I

The ANS demonstrated its robustness recently during Phase 1 of the Robotic Convoy Experiment (RCX) conducted at the White Sands Missile Range (WSMR), NM, in August 2007. Through a series of test operations emulating a real-time tactical environment while simulating combat amid rugged terrain, wind and sand, the ANS proved itself as an effective navigation system for manned and unmanned vehicles. The RCX included experimental maneuvers to evaluate the system's capability to avoid obstacles and to navigate rugged terrain using the latest autonomous navigation sensors and software developed for the Army's FCS.

The capabilities that the UGV and ANS provide to the warfighter will revolutionize the way we conduct combat operations.

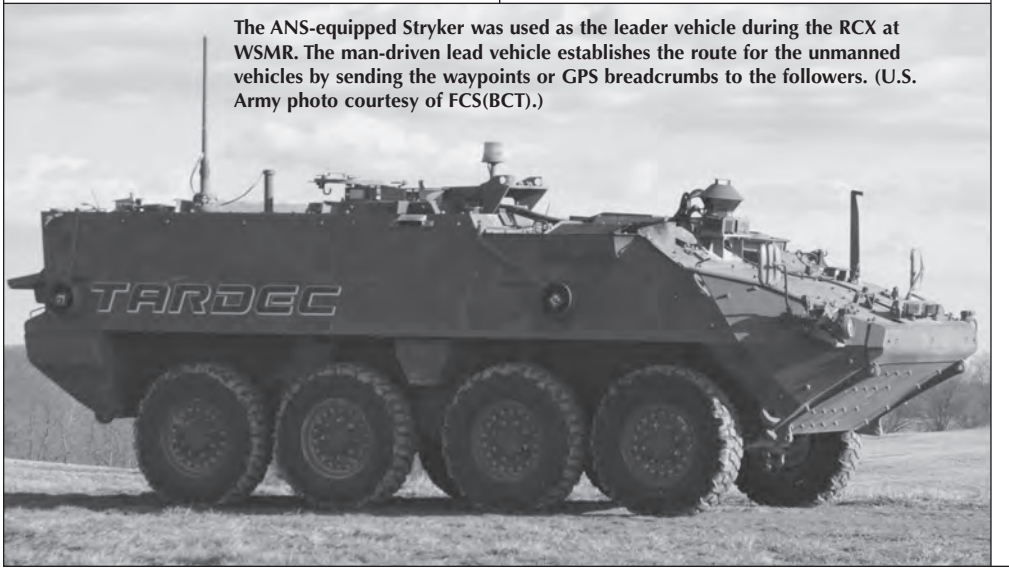
The RCX test vehicles were a Stryker Infantry Carrier Vehicle (ICV) and a Light Medium Tactical Vehicle (LMTV) equipped with ANS sensors, navigation and computing capabilities. The configuration allowed the test vehicles to be driven in teleoperation mode with a joystick. In addition to this capability, the ANS demonstrated remote capabilities beyond teleoperation where test vehicles navigated independent of direct Soldier control. Combining these two capabilities demonstrated the required FCS functionality for UGVs to move-on-route and detect and avoid obstacles using varying speeds and distances, numbers of waypoints, obstacle patterns and routes. ANS' cutting-edge autonomous navigation technologies are also confronting relevant environmental issues such as heat, dust, wind and rain.

During move-on-route, the ANS drives the vehicle by issuing speed and steering commands that maneuver the vehicle along a preplanned route. An ANS movement route is identified by designated waypoints, or Global Positioning System (GPS) breadcrumbs, coordinates that determine the route of travel. During the RCX-conducted tests, vehicle routes were conducted with and without obstacles.

Since the UGV maneuvers without a human making its decisions, an important function of unmanned vehicles is the autonomous decision-making ability to detect and avoid obstacles. During the RCX testing, obstacles were positioned on the vehicle's proposed route to vary the route and challenge the ANS' abilities. The ANS was presented with three different sets of obstacle patterns requiring it to appropriately decide whether to steer left or right.

Though robotic vehicles will never take the place of a Soldier, these vehicles will help reduce risk to Soldiers and possibly save lives at the same time. According to Folk, "ANS technology will revolutionize warfare on a scale comparable to the ironclads of the Civil War and the [German] Messerschmitt, the first jet fighter in World War II."

The ANS exceeded initial test objectives with teleoperational speeds, even in



The ANS-equipped Stryker was used as the leader vehicle during the RCX at WSMR. The man-driven lead vehicle establishes the route for the unmanned vehicles by sending the waypoints or GPS breadcrumbs to the followers. (U.S. Army photo courtesy of FCS(BCT).)

move-on-route with obstacle detection. Patti Rose, U.S. Army government co-lead for ANS, added, "We were pleased with the initial results. Not only were we able to move the vehicle along the specified routes at high speeds, we were able to detect and avoid obstacles while moving at those greater speeds."

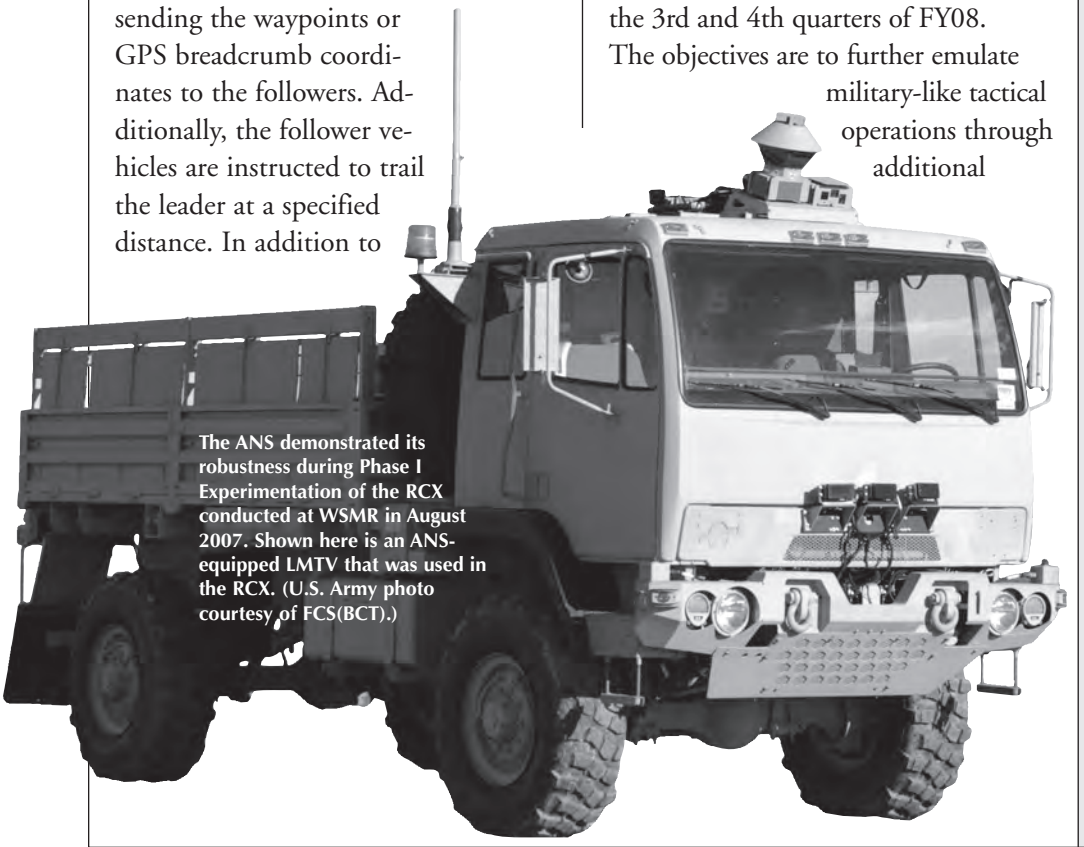
Leader-Follower Capabilities

Taking on this challenge of near-term convoy operations, the ANS functions of move-on-route and detect and avoid obstacles were enhanced with leader-follower capabilities, allowing one UGV to follow another vehicle's path in convoy-like operations. "Leader-follower," a term sometimes used interchangeably with "robotic convoy," evolved into the overall RCX goal while at WSMR. The leader-follower capability allows one man-driven vehicle to be followed by one or more unmanned vehicles in a convoy-like operation. The man-driven lead vehicle establishes the route for the unmanned follower vehicles by sending the waypoints or GPS breadcrumb coordinates to the followers. Additionally, the follower vehicles are instructed to trail the leader at a specified distance. In addition to the key accomplishments for speed and distance for teleoperational and move-on-route activities during RCX, the leader-follower "convoy operations" achieved high speeds with separation distances between the lead vehicle and follower even in heavy dust environments.

"The ANS program is developing a sophisticated autonomous route-following capability with obstacle detection and avoidance that will provide a future benefit to man-driven vehicles. The logistics implications are that ANS-equipped manned vehicles will alert drivers to hazards, allow drivers to rest or allow vehicle operation without drivers. We also see exciting opportunities for early spin out of some ANS features such as basic driver's aides and the leader-follower convoy capability demonstrated during our recent RCX," said Jay Kurtz, ANS Program Manager, General Dynamics Robotic Systems.

RCX Phase II

Phase II of the RCX is scheduled for the 3rd and 4th quarters of FY08. The objectives are to further emulate military-like tactical operations through additional experimentation with various routes, obstacle patterns and higher speeds. Further emphasis will be placed on ANS to demonstrate its ability to adapt and overcome unforeseen situations. FY08 experimentation will address the sustained speeds for longer periods of time and distances representative of current and future convoy operations covering various scenarios and situations. RCX successfully demonstrated more than 15 years of Pentagon-funded autonomous navigation work that is showing signs of reducing Soldier risk as envisioned in the FCS concept of operations. With preliminary test results as promising as they have been, Army officials believe unmanned vehicles might be applied to certain applications much earlier. An early potential application for these unmanned vehicles would include convoy operations in combat. As Noe summarized, "Helping Soldiers with their everyday high-risk tasks is a clear reason for developing the ANS capabilities as quickly as possible."



The ANS demonstrated its robustness during Phase I Experimentation of the RCX conducted at WSMR in August 2007. Shown here is an ANS-equipped LMTV that was used in the RCX. (U.S. Army photo courtesy of FCS(BCT).)

MICHAEL W. PRICE is an ANS Government Systems Engineer at PM FCS UGV. He holds a B.S. in mechanical engineering from Loyola Marymount University and is an Army Acquisition Corps member certified Level III in both program management and systems planning, research, development and engineering. Price was recently accepted as a Competitive Development Group/Army Acquisition Fellow – Class of 2008.

DR. STEVEN MUNKEBY is the Lead Systems Integrator PM ANS. He holds a B.S. in computer science from the University of Montana, an M.S. in systems management from the University of Southern California and a Ph.D. in management and organizational leadership from the University of Phoenix.

Multifunctional Utility/Logistics and Equipment (MULE) Vehicle Will Improve Soldier Mobility, Survivability and Lethality

MAJ D. Brian Byers

We are on the cusp of a paradigm shift in the Army. It has been mandated that one-third of Army vehicles are to be robotic beginning in 2015. So what progress are we making? The Army is using a wide range of small robots such as PackBot® and Talon for explosive ordnance disposal, improved explosive device detection and clearance, and reconnaissance and surveillance by dismounted Soldiers throughout the U.S. Central Command area of responsibility. These machines are typical of the rapid fielding mindset that we have embraced in our wartime setting. Yet, these are small robots with limited payloads and limited functionality. Just around the corner is a new breed of robots that will impact how we as an Army move and fight. Get ready for an old friend, the MULE!

A fully loaded MULE EEU is put through its paces on the open road during mobility testing. (Photo by Michael Norman, Lockheed Martin.)

The MULE EEU can tow a vehicle 3.5 times heavier than itself. Here, the MULE successfully tows a 5-ton truck. (Photo by Michael Norman, Lockheed Martin.)

The MULE is the multifunctional vehicle developed by Lockheed Martin Missiles and Fire Control (LM MFC) as part of the Army's Future Combat Systems (FCS) program. The MULE is a family of unmanned ground vehicles (UGVs) that will be in the 7,000 pound class of medium robots. Within 20 years, the MULE will be commonplace in every brigade in the Army. What makes these systems unique is the mobility, processing power, networked connectivity and robot size. The MULE family consists of three robotic vehicles: the MULE Transport (MULE-T), the MULE Countermine (MULE-C) and the Armed Robotic Vehicle-Assault (Light) (ARV-A(L)).

Each variant will lighten Soldier burdens in the near future.

The MULE family is based on a common mobility platform that serves as the vehicle's backbone. The common mobility platform is a 6-wheeled chassis housing power and propulsion systems, computers, Autonomous Navigation System (ANS) hardware and vehicle cooling components. By using this common mobility platform, maintenance will be simplified and common across formations. This will ease logistics burdens for multiple spare parts as well as decrease the amount of training Soldiers will need to conduct repairs. Power and propulsion within the common mobility platform will provide a vehicle that has extreme capabilities for its weight. With its engineering model, the Engineering Evaluation Unit (EEU), the MULE has demonstrated power to tow a vehicle 3.5 times heavier than itself. This flexibility will allow the robot to support limited vehicle recovery operations within brigades, freeing Soldiers and equipment from these dull and sometimes dangerous tasks.

The MULE EEU, configured as a MULE-T, is undergoing capability testing at Camp Gruber, OK. The MULE-T can carry two squads' worth of weapons, ammo and equipment. (Photo by Michael Norman, Lockheed Martin.)

MULE-T

MULE-T is designed to be the Soldiers' "pickup truck." With a payload of more than 1,900 pounds, the MULE-T will take loads off Soldiers' backs. Designed to carry more than two squads' worth of equipment, it provides commanders a flexible platform to move supplies and equipment throughout the operational environment, freeing Soldiers to focus on combat tasks. This ability to form robotic convoys will further take Soldiers out of harm's way by letting these robust robots carry loads instead of placing drivers on the road. The capability of a medium robot to autonomously navigate on the modern battlefield frees Soldiers from having to "teleoperate" it as we do robots today. By integrating ANS onto the MULE, the robot is now able to

perceive its environment and act upon that perception. This frees a Soldier from having to "drive" the robot. It also allows the commander to plan routes throughout the operational environment, thereby increasing tempo throughout the spectrum of operations. Commanders are only limited by their imagination on how to employ the robot.

MULE-C

MULE-C uses the Ground Standoff Mine Detection System (GSTAMIDS) for FCS to identify, mark and neutralize mines in support of mounted forces. Working within a networked force, MULE-C will move to an area of interest that may contain landmines. The unit commander would then employ MULE-Cs to scan the area using the GSTAMIDS to identify landmines for neutralization. The MULE-C would take the GSTAMIDS and place neutralizers on the ground automatically to destroy/neutralize the landmine threat. Additionally, the MULE-C provides a lane-marking capability that identifies the "cleared" lane for following vehicles. This lane is visible in both day and night conditions. This capability provided by the MULE-C removes Soldiers from the dangerous work of searching for and neutralizing mines, as well as marking lanes in minefields for follow-on forces. By automating these tasks, the MULE allows manpower to be used on other combat-related tasks and not remain "pinned down" in the slow and dangerous work of mine clearing.

ARV-A(L)

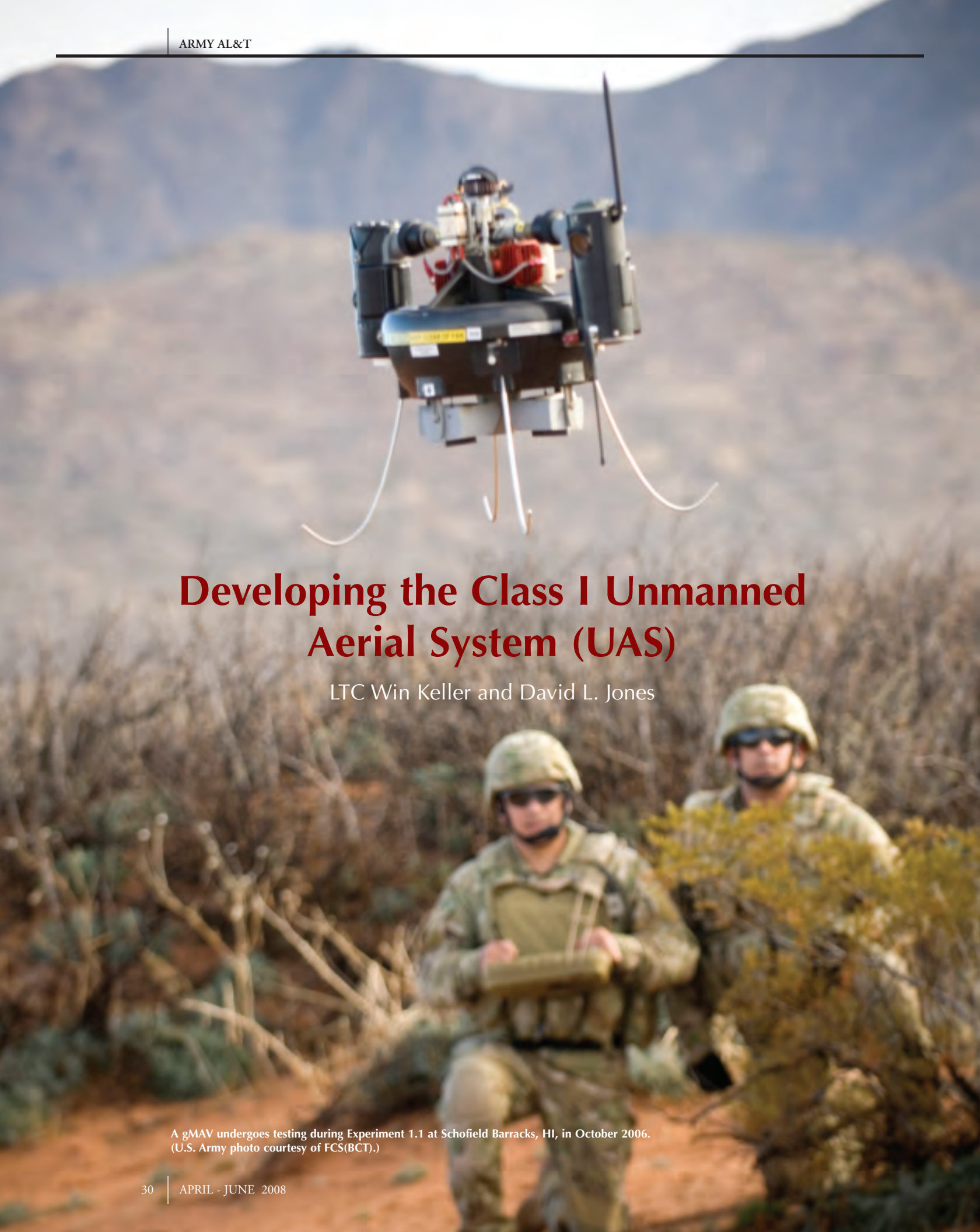
ARV-A(L) is an armed robot that provides support to dismounted operations and can conduct reconnaissance missions. The ARV-A(L) will be armed with an M240 machine gun and Javelin missiles. This firepower will greatly enhance the survivability and lethality of dismounted Soldier formations. When coupled with its ability to conduct semi-autonomous navigation and networked sensor array, the ability of dismounted Soldiers to see far beyond their current capabilities is exponentially enhanced. Dismounted Soldiers will have a small, highly mobile lethality platform that can be used as a reconnaissance asset instead of Soldiers in urban and other environments. The platoon's ability to have a mobile "support by fire" asset increases that unit's lethality, responsiveness and survivability. The ARV-A(L) sensors will also be connected to the FCS network, providing higher echelons real-time tactical data that can be acted upon by other platforms/assets. By being able to leverage the network, the platoon does not have to engage the enemy "toe-to-toe." This further increases Soldiers' lethality and survivability because of this new standoff capability.

The ability to leverage information is critical to the MULE family's success. This is already being seen in the LM MFC MULE engineering model, the EEU. The LM MFC is setting standards in diagnostic and prognostic data collection that will influence not just the MULE design and implementation, but also the Army work for diagnostics and prognostics. As Dr. Charlie Dawson, Lead Systems Integrator EEU Lead, Science Applications International Corp., explained, "As the primary deliverable, the data collected from a year of extensive testing has proven to be valuable not only to the baseline MULE program, but to the UGV community as well. A wide range of data over an equally diverse range of conditions has been captured and can be used for multiple benefits. As an example, being able to tie actual vehicle operation data together with maintenance and repair logs is allowing the creation of early hardware reliability and maintainability projections. Also, data captured from this vehicle provides a rare insight into induced environments on a midsized UGV that complementary systems, such as sensor suites, will need to address."

This means that early in the product development cycle we understand what data is available and how it is tied to vehicle performance. This allows the Army to better project when parts will fail, further reducing Soldier sustainment burdens due to a greatly reduced logistics train. It also will result in a lower life-cycle cost for spares for the MULE in the future.

The MULE EEU conducts ANS integration testing using a common mobility platform. (Photo by Michael Norman, Lockheed Martin.)

MAJ D. BRIAN BYERS is the Assistant Product Manager for FCS UGVs. He has a B.A. in history from the University of Louisville and an M.B.A. from the University of Phoenix. Byers is Level III certified in program management and is an Army Acquisition Corps member. He is a U.S. Army Command and General Staff College graduate and has attended numerous military schools.



Developing the Class I Unmanned Aerial System (UAS)

LTC Win Keller and David L. Jones

A gMAV undergoes testing during Experiment 1.1 at Schofield Barracks, HI, in October 2006. (U.S. Army photo courtesy of FCS(BCT).)

Military leaders have been seeking the bird's-eye view for warfare long before the airplane's invention. While the hot air balloon was no doubt invaluable in the Civil War, today's Soldiers need a light and practical aerial vehicle that watches without additional risk to their platoon. They need the Class I UAS. The UAS team within the Future Combat Systems (Brigade Combat Team) (FCS(BCT)) is capitalizing on the lessons learned by the Defense Advanced Research Projects Agency (DARPA) and Program Executive Office (PEO) Aviation, and using it to develop and deliver the most effective Unmanned Aerial Vehicle (UAV) as quickly as possible. In addition, FCS has implemented experiments and user tests early on in development to incorporate firsthand Soldier knowledge and experience into the Class I UAS design. Soldier input in the development phase is essential to making the Class I UAS what the platoon needs in combat.

Class I UAS

The Class I UAS is a platoon-level asset that will provide an organic, real-time reconnaissance, surveillance and target acquisition (RSTA) capability in a lightweight air vehicle (AV). The Class I UAS features a Heavy Fuel Engine (HFE) and an electro-optical (EO)/infrared (IR)/laser designator (LD)/laser range finder (LRF) sensor. The Class I UAS consists of a Class I UAV, a centralized controller and a minimal set of ancillary and support equipment.

The Class I UAS provides dismounted Soldiers with RSTA. It uses autonomous flight and navigation and will work within the FCS network. Individual Soldiers can dynamically update routes and target information. It provides dedicated reconnaissance support and early warning to the BCT Soldiers in environments not suited for larger assets. The Class I UAS provides a hover and stare capability, which is not available to Current Force UAS, enabling RSTA in urban and complex terrain. The system, which includes one AV, a control device and ground support equipment, will be transportable in two custom Modular Lightweight Load-carrying Equipment (MOLLE) packs. The Class I UAS will also be inaudible at 500 feet, have about 60 minutes of endurance and be deployable in 5 minutes.

Micro-Air Vehicle (MAV) Advanced Concept Technology Demonstration (ACTD)

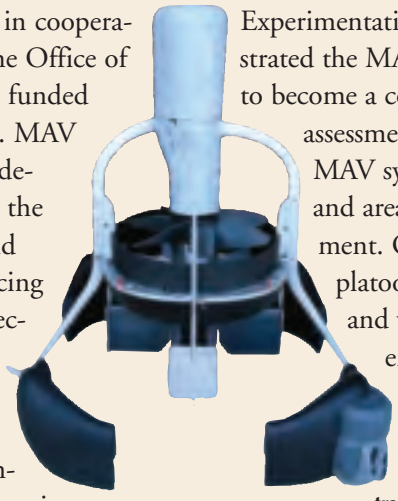
In May 2002, the Army, in cooperation with DARPA and the Office of the Secretary of Defense, funded the MAV ACTD project. MAV ACTD's purpose was to develop a UAV system that the platoon could operate and maintain, thereby enhancing the platoon's military effectiveness through greatly improved situational awareness (SA) provided through organic aerial imagery. The MAV ACTD's primary objectives were as follows:

- Establish the military utility of a backpackable, affordable, easy-to-operate and responsive reconnaissance and surveillance system through experimentation.
- Use EO/IR sensors on a small ducted fan AV, exploiting vertical flight capability to provide improved SA for Soldiers in complex terrain.
- Gain insights into the MAV's impact on doctrine, organization, tactics and modernization plans.

Test MAV (tMAV) Experimentation

The MAV system was then transitioned to the 25th Infantry Division (25ID) at Schofield Barracks, HI, for fielding. The materiel manager for the project was Project Manager UAS, PEO Aviation. After initial integration and flight testing, tMAV experimentation was conducted at the Army's Infantry Center at Fort Benning, GA, and also with the 25ID at Schofield Barracks, where the focus was on an initial assessment of the t-MAV system's military utility. Four experimentation scenarios were used: reconnaissance of military operations in urban terrain site; assault to clear a building in the Military Operations on Urban Terrain site; and route reconnaissance and convoy escort.

Experimentation clearly demonstrated the MAV system's potential to become a combat multiplier. The assessment identified both the MAV system's positive aspects and areas needing improvement. On the plus side, the platoon leader gained SA and was able to confirm enemy targets. Information gained by MAV



Shown here is the Class 1 SDD AV that AETF Soldiers trained with to prepare for experimentation in July 2008. (U.S. Army photo courtesy of FCS(BCT).)

A gMAV AV on display with its two custom MOLLE packs. (U.S. Army photo courtesy of FCS(BCT).)

resulted in changes to the course of action, demonstrated the ability to simultaneously emplace two AVs and demonstrated a 2-man team concept for deploying two MAV systems at once. Soldier input for areas needing improvement included AV endurance, Global Positioning System acquisition time, stronger data link signal/greater range and improved imagery/zoom capability. The lessons learned from this experiment led to enhancements in the next MAV iteration — the gasoline engine MAV (gMAV).

A USN explosive ordnance disposal unit deployed with the gMAV and conducted an in-theater assessment. While official results are not available, initial indications are that the system performed well.

gMAV

After upgrades and improvements, the gMAV was sent to Schofield Barracks in October 2006 for the formal MAV ACTD Military Utility Assessment (MUA). The MUA was considered a success, as indicated by the following feedback received from Soldiers who participated:

- "Provides significant military utility to the lowest echelon."
- "Very easy to operate."
- "Operating in conjunction with the Stryker … the MAV significantly contributed to persistent surveillance."

Follow-On Efforts to the MAV ACTD

Lessons learned from the MUA are being used to develop the Class I and accelerate the Class I Block 0 UAS to the Army Evaluation Task Force (AETF) for Concept of Operations (CONOPS) and to develop the necessary tactics, techniques and procedures (TTPs). The Class I Block 0 UAS will be based on the gMAV airframe with numerous upgrades, including a sensor gimbal, networked radios, improved user interface, remote start and launch, and an electric refueling. Additional congressional funding provided to the Program Manager FCS(BCT) and the U.S. Navy (USN) was leveraged to make these critical upgrades.

DARPA has funded a 5-horsepower HFE for the Class I UAS. The engine has completed more than 62 hours of bench operation. Four prototypes were delivered in January 2008. The 4-stroke engine will provide safer operation, reduced noise and improved endurance with a common fuel.

The gMAV has received an experimental flight certificate from the Federal Aviation Administration, allowing operations within controlled national airspace (NAS). Several civil law enforcement agencies are experimenting with the gMAV. These efforts will expand the understanding and application of unmanned systems in the NAS.

A USN explosive ordnance disposal unit deployed with the gMAV and conducted an in-theater assessment. While official results are not available, initial indications are that the system performed well.

The 25ID continues to train with and use the gMAV. The unit deployed with the gMAV to the National Training Center at Fort Irwin, CA, in late summer 2006, while preparing for deployment to theater. Their request to deploy to Iraq with the gMAV was approved.

FCS(BCT) Experiment 1.1

FCS(BCT) Experiment 1.1, which paired the design engineers with combat veterans who had recently deployed to Iraq and Afghanistan, was held in March 2007. Bringing Soldiers into the development phase with live training has allowed essential user feedback early in the design phase. Along with the gMAV, the experiment included the FCS network, Urban and Tactical Ground Sensors, and the Small Unmanned Ground Vehicle. The gMAV was used within the FCS network to perform reconnaissance and target identification, including sending data to FCS ground vehicles and manned/unmanned teaming with Apache helicopters. Soldiers stressed that this technology would be so beneficial in theater that they'd take it "as is." Other feedback included the following:

- "The IR sensor pinpointed the enemy even after the sun went down. We could have really used this in Iraq."
- "The UAV helped us identify a breech during the exercise. If this had been real combat, it would have saved lives."
- "Class I UAV would have saved lives in Iraq because we could have seen over walls. It would have protected our resupply squad."

The gMAV was used within the FCS network to perform reconnaissance and target identification, including sending data to FCS ground vehicles and manned/unmanned teaming with Apache helicopters.

Class I Block 0 Acceleration

As both a risk reduction program for the FCS Class I UAS System Development and Demonstration (SDD) and a way to accelerate Class I to the field, the FCS program has begun an effort to accelerate Class I Block 0 UAS development. The AETF at Fort Bliss, TX, began receiving training on the systems in February 2008, which will lead to an experiment scheduled for July 2008. The acceleration effort's focus is to get the system in the hands of Soldiers to aid in the development of CONOPS and TTPs for the Class I Block 0 system and for Class I UAS SDD risk reduction. This effort will also provide a great opportunity to gain invaluable insight from Soldiers on system operations and functionality. The feedback can then be used to develop vehicle enhancements and improvements rapidly. During a demonstration conducted in mid-January 2008 at Fort Bliss, AETF Soldiers had their first chance to execute a tactical scenario incorporating sensor imagery from the Class I AV. The Soldiers were extremely impressed by the imagery that provided them a significantly increased SA level before dismounting their vehicles.

A 25ID Soldier operates a gMAV during Experiment 1.1 testing. (U.S. Army photo courtesy of FCS(BCT).)

Originally, the Class I UAS was to have only an EO/IR sensor. With the deferment of Class II and Class III UAS to objective requirement and the MAV ACTD MUA findings, the Class I UAS was redesigned with an EO/IR/LD/LRF sensor and an increase in altitude. The Class I UAS propulsion system is also being redesigned to use a larger HFE to accommodate the EO/IR/LD/LRF payload.

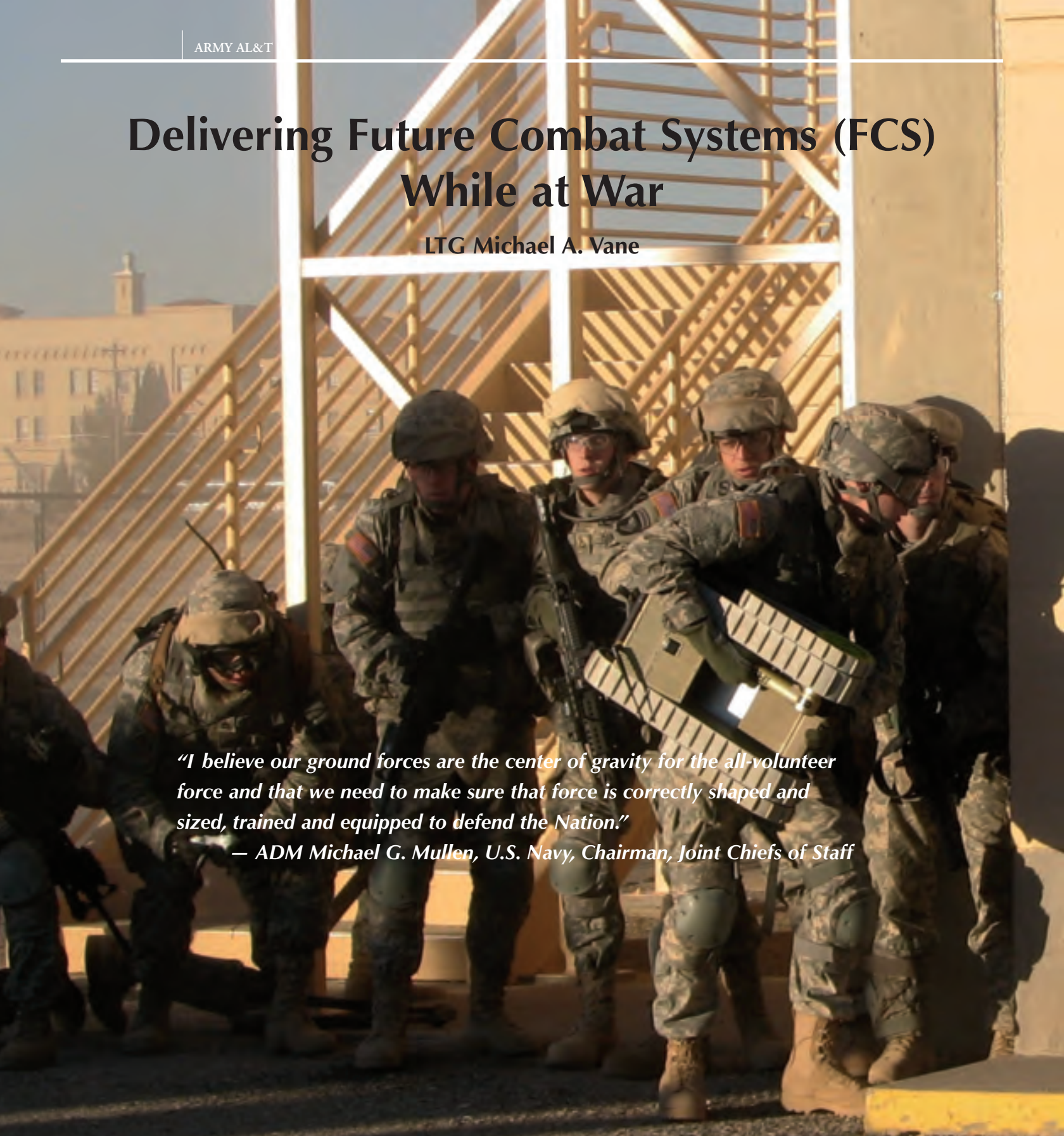
Key acquisition and test milestones for the Class I are a Preliminary Design Review in late 2008 and a Critical Design Review in late 2009. Risk reduction flight of the AV will be conducted in late 2009, with a first flight of the integrated Class I UAS in 2011. Initial Operating Capability and Full Operational Capability are aligned with the FCS program and will be in 2015 and 2017, respectively.

LTC WIN KELLER is the Product Manager Future Force (FF) UAS. He has a B.S. in business from Northeast Louisiana University. Keller is an Army Acquisition Corps (AAC) member and is Level III certified in program management.

DAVID L. JONES is the Class I UAS Lead for the FF UAS. He has a B.S. in electrical engineering and an M.S. in industrial and systems engineering, both from the University of Alabama-Huntsville. Jones is an AAC member and is certified Level III in systems engineering/systems planning, research, development and engineering; production, quality and manufacturing; and program management; and Level I in test and evaluation.

Delivering Future Combat Systems (FCS) While at War

LTG Michael A. Vane



"I believe our ground forces are the center of gravity for the all-volunteer force and that we need to make sure that force is correctly shaped and sized, trained and equipped to defend the Nation."

— ADM Michael G. Mullen, U.S. Navy, Chairman, Joint Chiefs of Staff

A strong team of government and industry personnel, including Soldiers from the 5th Brigade, 1st Armored Division, AETF, at Fort Bliss, TX, are delivering FCS today. Here, Soldiers prepare to clear a building using an FCS Small Unmanned Ground Vehicle (SUGV) during Acceleration Testing in January 2008. (U.S. Army photo courtesy of FCS(BCT).)

In simple terms, Army modernization deals with equipping the Army's Future Modular Force. The Chairman's focus on "correctly" equipping ground forces frames the Army's approach to FCS. While upgrading current equipment to meet Current Force needs, we are also modernizing the Army to deal with the complex and challenging future. A strong team from government and industry, including Soldiers from the 5th Brigade, 1st Armored Division, Army Evaluation Task Force (AETF), at Fort Bliss, TX, are delivering FCS today. The AETF recently completed new equipment training and began evaluating the first set of FCS spin out (SO) capabilities. As MG Charles A. Cartwright, Program Manager (PM) Future Combat Systems (Brigade Combat Team) (FCS(BCT)), so accurately stated, "The days of Microsoft® PowerPoint slides are over."

Since entering the System Development and Demonstration phase at Milestone B in May 2003, the FCS program progressed rapidly and evolved in numerous ways. FCS increased from 14 to 18 systems at one point, but returned to 14 systems with the 2008 budget submission. The fielding tempo also changed, especially with the July 2004 addition of SOs for selected technologies across the force beyond the FCS(BCT). We accelerated selected FCS technologies while delaying others for further study and development. However, ongoing conflicts in Afghanistan and Iraq forced the Army to balance current warfighting needs with modernization by shifting resources from FCS to support the current fight. The demands of war will continue to challenge the Army's ability to maintain the balance. The net result is an FCS program that looks rather different in terms of time and schedule, but remains true to the goal of providing a strategically responsive, Joint interdependent, precision maneuver force that is dominant across the full range of military operations.

Operational Environment Challenges

In 2004, the Army jump-started the transformation of direct combat units from division-based to brigade-based by leveraging the FCS Unit of Action organizational design. Today's modular units were designed to better operate across the entire spectrum of conflict while conducting full-spectrum operations (offense, defense, stability and civil support). This Modular Force has performed superbly across the globe, but faces an adaptive enemy and ever-changing environment. Since the Afghanistan invasion, combatant commanders submitted hundreds of Operational Needs Statements (ONS). These statements identify Current Force shortfalls and request materiel or other solutions, such as doctrine, training, organization, etc., to close those gaps. These ONS show that field commanders are mainly requesting better battle command, lethality, survivability and sustainment. Interestingly, each of these capability areas coincides with one of the seven original FCS Key Performance Parameters. While commanders in contact request things that are immediately available (i.e., not future capabilities), these ONS serve to ensure that the materiel solutions underway within the FCS program are on track to provide Soldiers the types of capabilities they need.

The lessons learned from current operations are also driving changes in FCS materiel and the FCS(BCT) design. While the bulk of the FCS(BCT) unit design remains intact, we have changed the FCS(BCT) to address capability gaps from current operations and new projections of the future operational environment. Adding the Army Lightweight Counter Mortar radar is a clear example of the Current Force influencing the Future Force. To maximize the embedded training and mission-rehearsal capabilities in FCS manned ground vehicles, master trainers were added to the FCS(BCT). Current operation nonlethal activities are also leading to organizational change. We added Judge Advocate General, Civil Affairs and Engineer, elements to address planning activities across the spectrum of conflict. Additional FCS(BCT) changes under consideration include more intelligence fusion and route clearance elements.

Through a continuing, disciplined assessment process, materiel requirements are also adapting. For example, examining improvised explosive device threats led to upgrading armor for manned vehicles to prevent penetrations. Another current operations example affecting product design is the addition of "floating" seats to prevent the transmission of blast

A Soldier on the move with his SUGV during Experiment 1.1 held at White Sands Missile Range (WSMR), NM. (U.S. Army photo courtesy of FCS(BCT).)

Here, Soldiers prepare a Bradley B-Kit during SO exercises in January 2008. (U.S. Army photo courtesy of FCS(BCT).)

energy through the vehicle hull to a Soldier's body. Development of parallel capabilities helps to ensure that revisions are keeping pace through almost annual updates. Although change is always difficult in terms of costs and schedule, the FCS program has made great strides to meet the challenges of a changing operational environment.

The Army's preeminent challenge is to reconcile expeditionary agility and responsiveness with the staying power, durability and adaptability to carry a conflict to a victorious conclusion, no matter what form it eventually takes. We must design, develop and resource Army forces for each unit to operate across the entire spectrum of conflict with little augmentation. Of course, the breadth of this approach presents physical and mental challenges. To achieve full-spectrum-capable land forces, we are moving from a platform-centric modernization strategy to one that focuses on an organization's overall capabilities. Fortunately, the FCS(BCT) was born of an organizational approach using the collective FCS family of systems as the foundation.

A Soldier places a U-UGS during Experiment 1.1 at WSMR while another Soldier looks on. The U-UGS is already at Fort Bliss. (U.S. Army photo courtesy of FCS(BCT).)

The campaign of learning continues through multiple analytical efforts including the Capabilities Needs Analysis (CNA). The CNA process identifies requirements and capability gaps to support Joint-required capabilities across doctrine, organization, training, materiel, leadership and education, personnel and facilities. The Army Capabilities Integration Center (ARCIC) leads this analysis in its "thinking for the Army" role — easy to say, but hard to do. It is especially important to have a group of dedicated professionals looking beyond today's issues and exploring how to best prepare the Army to meet the Joint Force Commander's requirements of tomorrow. Our links with academia, industry and labs around the country are essential to helping us learn and to developing and bringing capabilities into the force. Through our concept development,

experimentation efforts and role as the Army's capability integrator, we work to make sure the Army remains a valued interdependent, Joint team member. We stress moving from the Current to the Future Force and not the Current versus the Future Force.

Future Force Integration Directorate (FFID)

Key to the Army's success in delivering FCS while at war is ARCIC's FFID that directs the AETF. Established in April 2007, its mission is to synchronize the delivery, preparation and evaluation of all FCS-related capabilities. The FFID represents a new way of developing and fielding capabilities for the Army. Building on the Army's experience with Stryker, the FFID brings together the materiel developers (PM FCS(BCT), FCS Lead Systems Integrator, etc.), the testing community (U.S. Army Test and Evaluation Command) and the requirements community (ARCIC, U.S. Army Training and Doctrine Command (TRADOC) Schools and Centers, Center for Army Lessons Learned, etc.). The goal is to develop and field the best possible materiel while simultaneously creating the doctrine; tactics, techniques and procedures; organization; and training procedures needed to deliver a complete capability package to units rather than simply giving them new equipment and letting them develop everything else on their own. In short, there should not be "drive-by" fieldings to units in contact where they figure it out by themselves.

The FFID integrates modernization efforts in support of Army transformation to provide FCS to operational units by FY10 and the first FCS(BCT) around the year 2016. The FFID will sustain an environment for the successful testing, evaluation and integration of capabilities for the Current and Future Modular Forces. They will also accelerate the delivery of select FCS capabilities to the Current Force to reduce operational risk before fielding the first FCS(BCT). The FFID will develop organizational training and leader development products, synchronize and coordinate plans for developmental activities, develop doctrine and organization products, apply lessons learned, and update and synchronize systems development documents. FFID employs the AETF to confirm that products are ready for the fight.

AETF will build and train a combat-ready force, thoroughly grounded in current and emerging Army doctrine, and incorporate all FCS technologies and capabilities to create the Army's first FCS(BCT) and complete all development and test requirements. To demonstrate the importance of FCS, the Army has already committed more than 1,000 Soldiers to the AETF while prosecuting the war. Seasoned combat veterans are putting FCS technologies through extensive evaluations and tests to ensure that we deliver complete capability packages. We will have doctrine, leader development and training products arrive along with the materiel as the Army fields FCS to fighting units.

Critical Steps Forward

This year represents a critical step forward for FCS. For the first time, the program is using procurement funds to deliver FCS systems and components for evaluation. Non-Line-of-Sight Launch Systems, Integrated Computer Systems for network, and Urban and Tactical Unattended Ground Sensors (U-UGS/T-UGS) are already at Fort Bliss. Furthermore, the team will conduct numerous evaluations of FCS SO capabilities in 2008. The first Technical Field Test began in late February, and will be followed by the Limited User Test in June and the Future Force Integrated Mission Test in July. This year is critical to the Army's plan for fielding selected FCS capabilities to all BCTs beginning with 6 BCTs in 2010, while adding 15 FCS(BCTs) at a rate of 1 per year beginning in 2016.

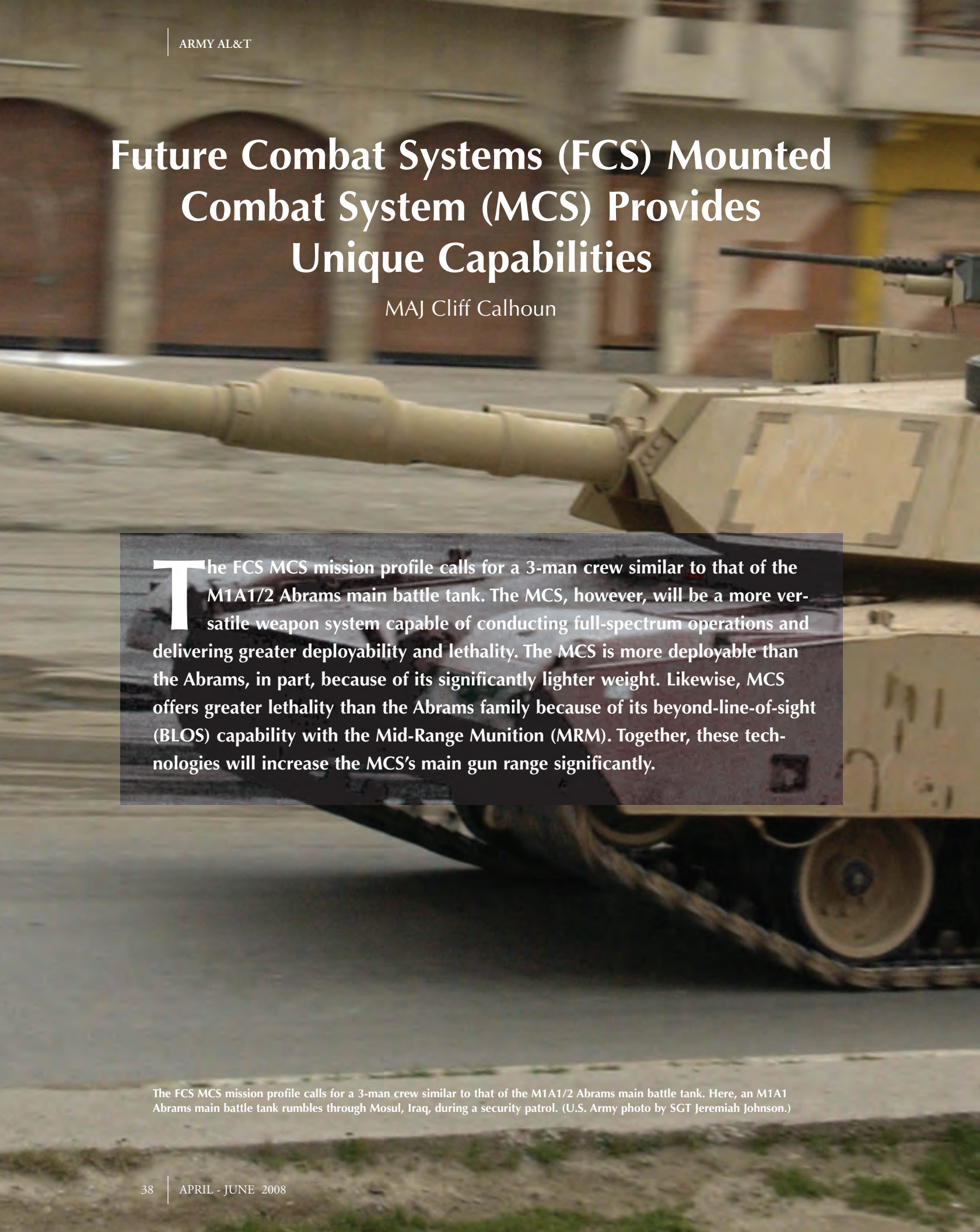
A strong team from government and industry is delivering FCS today at Fort Bliss, to ensure Soldiers of tomorrow have the correct equipment. Everything they do leads to a Soldier having to close with and engage the enemy in direct and close combat. As we work through the challenges to bring the FCS(BCT) to fruition, this tenet must remain at the forefront. Everything we do must support the Soldier.

LTG MICHAEL A. VANE is the Deputy Commanding General, Future Director, ARCIC TRADOC. He holds a B.S. from the U.S. Military Academy and an M.S. in joint command, control and communications from the Naval Postgraduate School. Vane is a graduate of the Signal Officer Basic and Air Defense Artillery Officer Advanced Courses, the U.S. Army Command and General Staff College and the U.S. Army War College.

A Soldier trains with a T-UGS at WSMR. (U.S. Army photo courtesy of FCS(BCT).)

Future Combat Systems (FCS) Mounted Combat System (MCS) Provides Unique Capabilities

MAJ Cliff Calhoun



The FCS MCS mission profile calls for a 3-man crew similar to that of the M1A1/2 Abrams main battle tank. The MCS, however, will be a more versatile weapon system capable of conducting full-spectrum operations and delivering greater deployability and lethality. The MCS is more deployable than the Abrams, in part, because of its significantly lighter weight. Likewise, MCS offers greater lethality than the Abrams family because of its beyond-line-of-sight (BLOS) capability with the Mid-Range Munition (MRM). Together, these technologies will increase the MCS's main gun range significantly.

The FCS MCS mission profile calls for a 3-man crew similar to that of the M1A1/2 Abrams main battle tank. Here, an M1A1 Abrams main battle tank rumbles through Mosul, Iraq, during a security patrol. (U.S. Army photo by SGT Jeremiah Johnson.)

The FCS MCS will provide unique capabilities to the FCS Brigade Combat Team (BCT) through several new technologies and advanced manufacturing processes. As compared to the Current Force, the MCS offers greater lethality at a lighter weight. For the MCS to fulfill its mission, a tailored mission module is essential for the system to meet transportability requirements, and new ammunition is required to enable BLOS engagements.

MRM

To maintain survivability while being capable of defeating enemy main battle tanks, the MCS will stretch the battlefield with the situational awareness gained through the system-of-systems network and high density of sensors. With the 120mm XM360 gun and the BLOS-capable MRM, the BCT commander will be able to maneuver "out of contact" to positions of advantage, helping provide standoff from the enemy's lethality envelope. Through the integrated sensor network, the MCS will be able to process information about targets throughout the FCS(BCT) operational environment and destroy targets with its main gun and MRM through both LOS and BLOS engagements. BLOS engagements are not a different way to do indirect fire, but an extension of close combat direct fire. BLOS employs direct fire targeting because the gunner pulling the trigger sees the target directly through a sensor system. This will enable future gunners to kill targets at significantly greater ranges than their Abrams gunner predecessors.

The MCS offers greater lethality than the Abrams family because of its BLOS capability with the MRM. (U.S. Army photo.)

The MRM cartridge is a "fire-and-forget" gun-launched munition that will provide the MCS with BLOS lethality, and the MCS will be able to fully employ the MRM at its greatest range. MRM operates in three modes:

- In *autonomous* mode, the fired round searches for and engages a target.
- In *designate* mode, the MRM searches for a laser spot and engages. If the spot is lost or not found, it reverts to autonomous mode.
- In *designate only* mode, the MRM will designate but not revert to autonomous mode.

Prior to firing, battlefield command and control information from the network is transmitted through an Ammunition Data Link (ADL) that allows

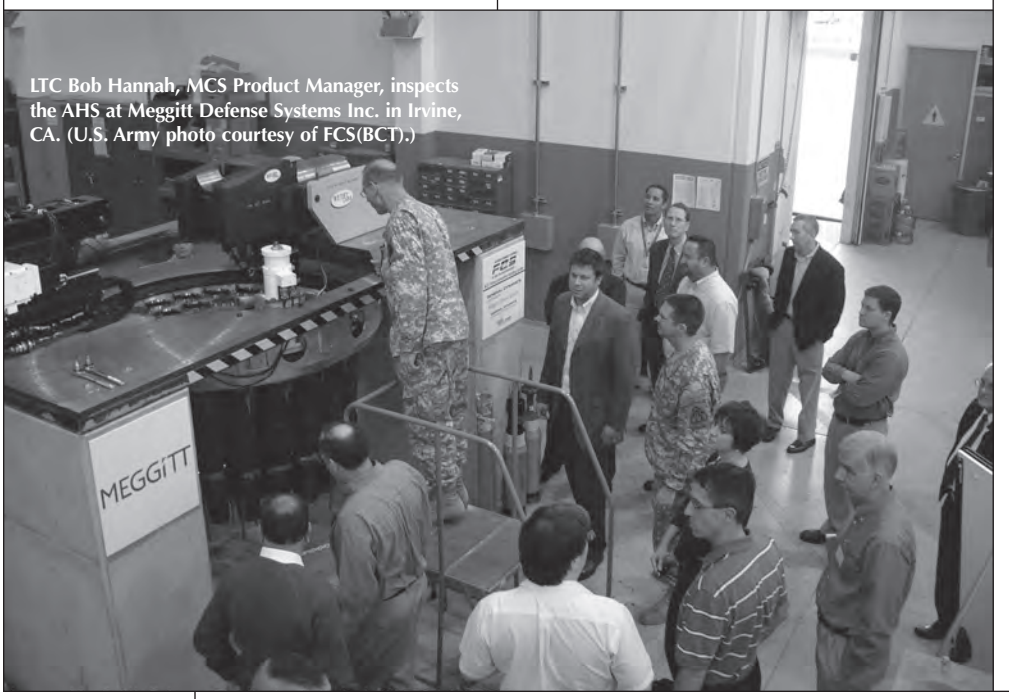
the MRM to communicate with the MCS fire control system. In other words, the network signals the MCS and the ADL provides target information to the MRM. The ADL then transmits the firing solution information that the MRM needs to guide itself to the target. Once fired, no further command from the MCS is required. The MRM and ADL capabilities are key to the FCS(BCT), but must be delivered in a lighter weight gun than is currently available.

Lethality at a Lighter Weight

Since the MCS is a much lighter platform than the M1 Abrams family, it requires a lighter gun than the Abrams M256. This lighter gun must provide lower recoil while offering the Abrams the ability to fire 120mm ammunition. To meet this challenge, the lightweight 120mm gun is being produced at Watervliet Arsenal, NY, and designed by Benet Laboratories under a Cooperative Research and Development Agreement (CRADA) between the U.S. Army Armament Research, Development and Engineering Center and General Dynamics Land Systems. One requirement dictated under the CRADA is that the primary weapon assembly (PWA) must be capable of firing all 120mm ammunition currently in the Army's inventory as well as planned developmental ammunition. The gun was developed to replicate the current 120mm M256 cannon's performance on the M1A2 in a lightweight, compact design. The mission configuration for XM360 is 2,100 pounds lighter than the M256, and this lighter weight requirement drives several gun characteristics.

The PWA uses a high-efficiency muzzle brake to reduce firing shock to the vehicle and crew and to provide reduced impulse for the MCS's lighter weight. Through a series of holes at the end of the barrel (pepperpot), the muzzle brake redirects some of the escaping propellant gasses. This redirection reduces firing impulse and manages the blast field to dampen recoil force. This system helps the MCS to fire 120mm main gun ammunition from a vehicle weighing roughly half the Abrams weight.

To achieve this reduced weight, the gun features a lightweight mount, compact cradle design, titanium recoil rails, modular recuperators and recoil brakes. The greatest potential for weight reduction in a large caliber weapon is in the barrel. In the PWA, ultra-high-strength materials are used to reduce the wall thicknesses when compared to the M256. The tube itself is made from ultra-high-strength gun steel with a composite wrap using the filament wound process. To compensate for muzzle movement from the lighter barrel, the FCS program is developing two new technologies to be used with the PWA: the Dynamic Muzzle Reference Sensor (DMRS) and the Advanced Fire Inhibit System (AFIS). DMRS and AFIS are both expected to have prototypes demonstrated in relevant environment by the MCS Critical Design Review.



LTC Bob Hannah, MCS Product Manager, inspects the AHS at Meggitt Defense Systems Inc. in Irvine, CA. (U.S. Army photo courtesy of FCS(BCT).)

DMRS and AFIS

A consequence of reduced weight is increased gun tube flexure. This movement is amplified when the vehicle is moving. The AFIS is being integrated to compensate for this movement and improve MCS accuracy, especially during on-the-move engagements. The AFIS provides an accuracy-enhancing, muzzle position prediction algorithm. The DMFS will measure the bend angle of the gun muzzle with respect to the gun mount and provide the AFIS with the data necessary to compensate for the muzzle movement. This measurement enables the AFIS to use its algorithms to inhibit the trigger-pull initiated firing pulse until the optimal moment. The DMFS/AFIS enhanced fire control is expected to reduce MCS impact dispersion by nearly one-third. This will significantly increase hit probability at extended range, increasing system lethality. This lethality is also enhanced by the MCS's ability to deliver a high sustained rate of fire through its Ammunition Handling System (AHS).

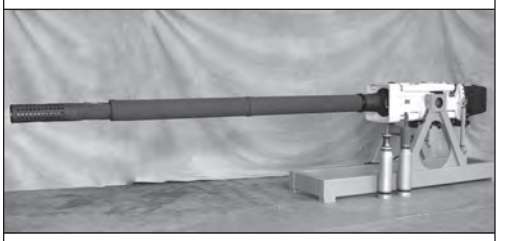
The 120mm XM360 gun shown here undergoing testing will enable the FCS(BCT) commander to better maneuver to positions of advantage to avoid enemy direct fire. (U.S. Army photo courtesy of FCS(BCT).)

AHS

The roles on the MCS 3-man crew go to the vehicle crewman (whose duties most closely resemble that of the Abrams driver), the mission specialist (gunner) and the crew chief (tank commander). The main gun is not loaded by a crew member, but instead through the fully automated AHS whose Turret Transfer Unit (TTU) interfaces with the Turret Basket Magazine (TBM) to load the XM360. By automating the loading function, the AHS removes that burden from the crew. With a 3-man instead of a 4-man crew, the FCS(BCT) will realize significant military personnel savings for Future Forces.

Unlike a crew member, the autoloader will not physically tire, so the AHS-equipped MCS will be able to provide the rate of fire required to destroy targets throughout a wide sector. To meet the MCS's stretched battlefield demands, the AHS features a ready-round TBM that is compatible with both current and developmental 120mm ammunition (9 more ready rounds than the M1A2). Careful handling is a concern with the Army's caseless ammunition, so the TBM canisters support the ammunition by both the case base and the warhead to help prevent ammunition damage.

An XM360 test firing at Aberdeen Proving Ground, MD. (U.S. Army photo courtesy of FCS(BCT).)



Lethality is enhanced by the MCS's ability to deliver a high sustained rate of fire through its AHS (shown here). (U.S. Army photo courtesy of FCS(BCT).)

The interface between the TBM and the gun that is incorporated to upload, download, load, unload, stubcase eject and misfire eject is the TTU. Through testing, the TTU proves to provide positive control to accurately place ammunition in the PWA and prevent damage to the round. The system incorporates the Round Identification Camera Unit to identify the type of ammunition being loaded. The camera reads the standard marking on the main gun ammunition's case base using optical character recognition. By identifying each round as it is loaded, the system will place ammunition in the TBM so that it remains balanced. One final safety measure is an ultrasonic sensor in the TTU that will diagnose the separation of a round during operation, should that occur.

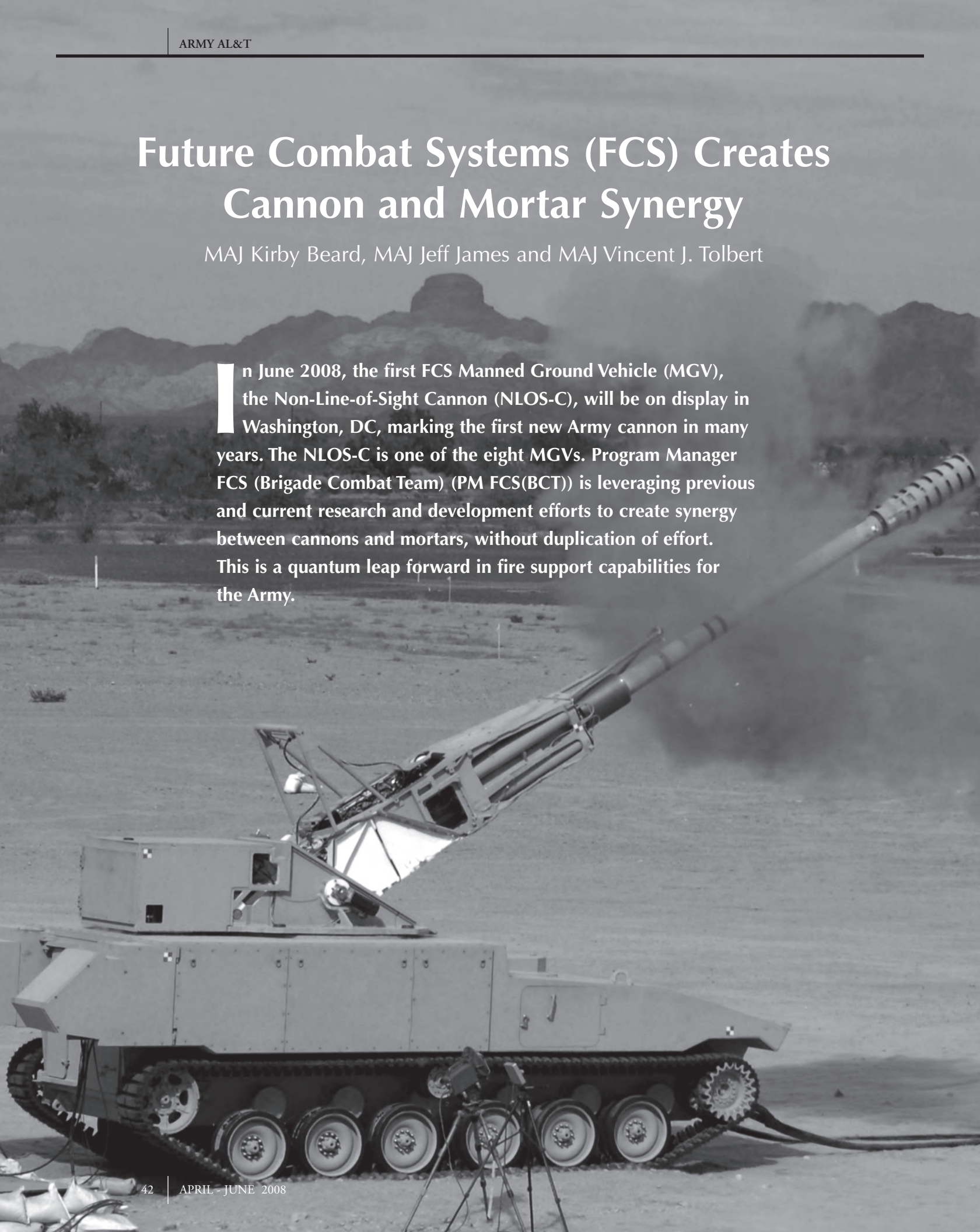
Path Ahead

To reduce risk and improve system readiness, the MCS team is integrating the PWA and related technologies in a firing fixture, which is essentially a turret on a test stand that will provide valuable data to alleviate production risks and provide new capabilities to Soldiers. Testing plans include development and safety testing of the guns from 2007 to 2009, and integration of the guns into MCS preproduction vehicles in 2009-2010. Successful testing and integration are the key factors that will enable the MCS to conduct full-spectrum operations and to "deliver precision fires at a rapid rate to destroy multiple targets at standoff ranges."

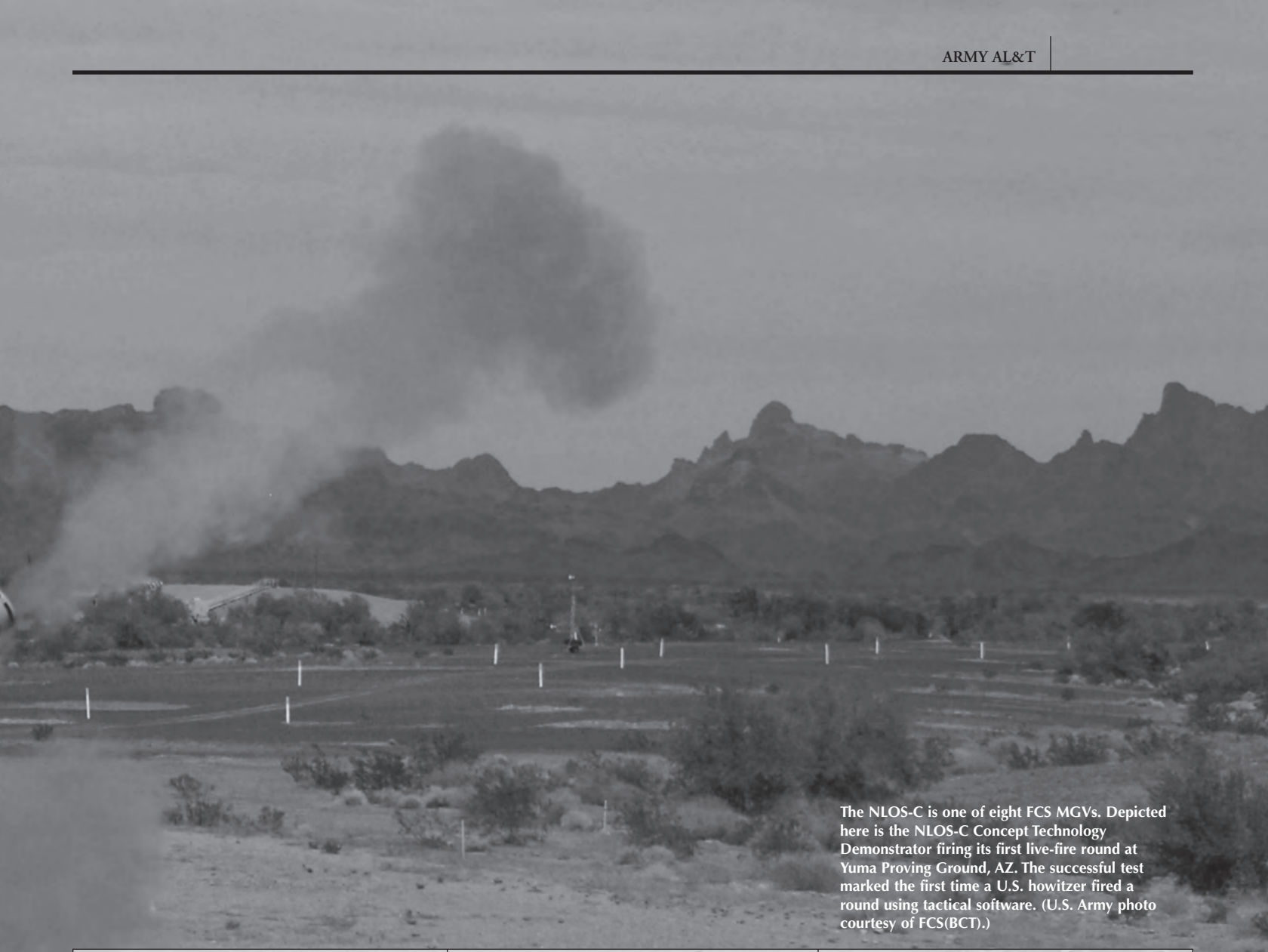
MAJ CLIFF CALHOUN is the MCS Assistant Product Manager in Warren, MI. He holds a B.A. in business administration from Georgia State University and an M.B.A. from the Naval Postgraduate School. Calhoun is an Army Acquisition Corps member who is Level II certified in contracting and Level I in program management.

Future Combat Systems (FCS) Creates Cannon and Mortar Synergy

MAJ Kirby Beard, MAJ Jeff James and MAJ Vincent J. Tolbert



In June 2008, the first FCS Manned Ground Vehicle (MGV), the Non-Line-of-Sight Cannon (NLOS-C), will be on display in Washington, DC, marking the first new Army cannon in many years. The NLOS-C is one of the eight MGVs. Program Manager FCS (Brigade Combat Team) (PM FCS(BCT)) is leveraging previous and current research and development efforts to create synergy between cannons and mortars, without duplication of effort. This is a quantum leap forward in fire support capabilities for the Army.



The NLOS-C is one of eight FCS MGVs. Depicted here is the NLOS-C Concept Technology Demonstrator firing its first live-fire round at Yuma Proving Ground, AZ. The successful test marked the first time a U.S. howitzer fired a round using tactical software. (U.S. Army photo courtesy of FCS(BCT).)

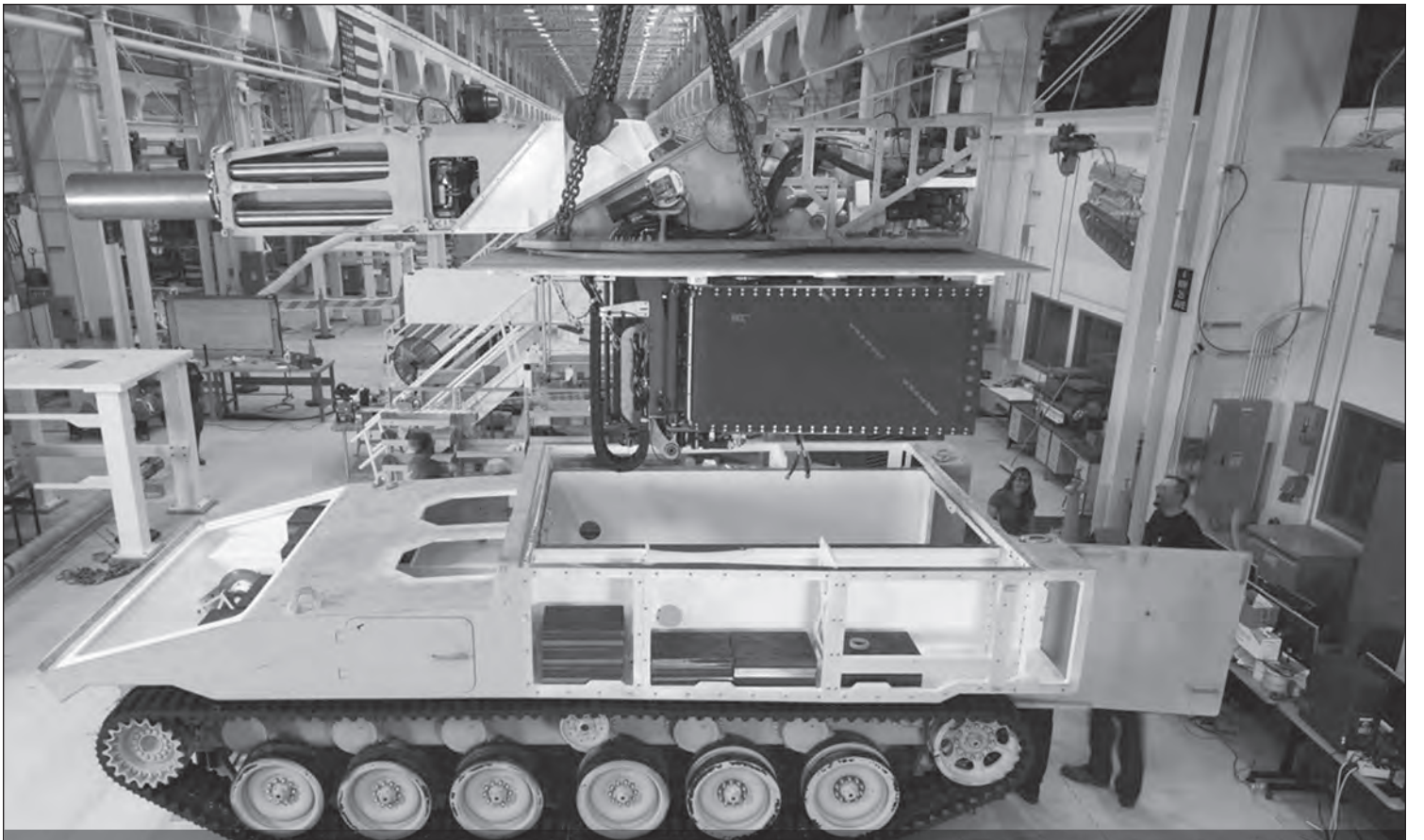
The NLOS-C is the organic indirect fire support component of the FCS(BCT) System-of-Systems (SoS), with a high level of commonality with other MGV variants. NLOS-C provides networked, extended-range, responsive and sustained precision attack of point and area targets. It has a fully automated armament system firing a suite of conventional and special purpose munitions to provide a variety of effects on demand. The NLOS-C will be able to move rapidly, stop quickly and deliver lethal first round effects on target in record time.

The NLOS-Mortar (NLOS-M) is the organic indirect fire support component of the FCS(BCT) SoS, also with a high level of commonality with other MGV variants. Like the NLOS-C, the NLOS-M will transform mortars' traditional role on the battlefield by providing deadly, accurate and responsive short- to mid-range fire support critical to Soldiers in the close fight. Very similar to NLOS-C, NLOS-M uses automation to index, present and fire rounds with minimal manual touching or adjusting by the crew. Above all, the crew performs its fire mission under the protection of armored vehicles.

NLOS-C provides networked, extended-range, responsive and sustained precision attack of point and area targets. It has a fully automated armament system firing a suite of conventional and special purpose munitions to provide a variety of effects on demand.

Improved Lethality Through Automation

For many years, the artillery and infantry fire support communities have worked toward automating the fire support chain links to improve fire support by increasing both speed and accuracy to deliver fires when and where the maneuver commander desires.



NLOS-C firing platform initial assembly at BAE Systems in Minneapolis, MN. The NLOS-C will have a high level of common parts with the other FCS MGVs. This will be a long-term benefit in the NLOS-C's sustainability. (Photo courtesy of BAE Systems.)

Automation increases fire support responsiveness by decreasing the time required for computing technical firing solutions, and emplacing and displacing firing platforms. Most importantly, automation decreases manpower requirements to facilitate smaller crews or allows crew members to focus on other Soldier tasks. Lastly, automation makes multiple-round, simultaneous-impact missions possible, allowing a single firing platform to create effects on target that previously required several platforms firing in coordinated unison.

During the late 1990s, the Crusader program was envisioned as the greatest leap forward in completing the process of automating the fire support chain. When the program was terminated in mid-2002, a short-term bridge contract was put in place to migrate the technological developments and workforce into the FCS program, which was approaching Milestone B in mid-2003. This proved valuable as the NLOS-C has remained the leader in terms of FCS MGV variant development.

NLOS-C Features

The NLOS-C contains several automated components that improve its battlefield effectiveness when compared to manual systems prevalent today in the Current Force. These automated features allow the NLOS-C to achieve an accurate and unprecedented sustained rate of fire of up to six rounds per minute, including a 4-round multiple-round, simultaneous-impact capability, while also reducing the self-propelled howitzer crew from four to two.

When the NLOS-C receives a fire order, the Automated Fire Control System (AFCS) onboard computer permits the real-time automated calculation of accurate firing data, and the refinement of firing data to hone accuracy on subsequent rounds and subsequent missions. The Projectile Tracking System is a phased array radar that measures the muzzle velocity and ballistic trajectory of each round as it departs the cannon, then feeds the information back into the AFCS, allowing the NLOS-C to adjust firing data to obtain greater round-to-round and mission-to-mission accuracy based on the minute ammunition differences and the battlefield conditions experienced.

The NLOS-C uses a Global Positioning System and an Inertial Navigation System to remain constantly informed of its own location, permitting rapid and precise emplacements and eliminating the need for external aiming reference points such as a collimator or aiming poles. The lack of external aiming references and the ability to move and rapidly

reemplace also facilitates frequent survivability or tactical movement displacements.

The NLOS-C ammunition handling system is fully automated and comprised of several subcomponents that enable firing without manual handling. The propellant and projectile storage magazines make all onboard ammunition combinations available on any fire mission. When the fire mission data is calculated, the propellant and projectile shuttles transfer the fuzed projectile and propellant to the loader/rammer assembly. Along the way, the Enhanced Portable Inductive Artillery Fuze Setter automatically sets the electronic fuze to the desired setting. If a rocket assisted projectile (RAP) is selected, the fuse is set and the RAP plug removed automatically prior to loading.

> NLOS-M will transform mortars' traditional role on the battlefield by providing deadly, accurate and responsive short- to mid-range fire support critical to Soldiers in the close fight.

The loader/rammer assembly loads the projectile into the breach, uniformly and consistently rams the projectile and loads the propelling change. The breech closes and the laser ignition system ignites the propellant on cue. Following firing, the breech opens and the Automated Cooling and Cleaning System (ACCS) sprays a water/glycol mixture to extinguish residual propellant embers, clean the laser window, wet the breech seal and cool the propellant chamber.

The NLOS-C system demonstrator began firing in August 2003 and has fired more than 2,200 rounds, testing and validating that a 155mm cannon could be fired from a lightweight platform. It also demonstrated the concept of a hybrid electric drive propulsion system. (See Page 36 of the October-December 2007 edition of *Army AL&T* Magazine for a related story.) This propulsion system will be used in all FCS vehicles. The system demonstrator was also used to mature the ammunition handling system, the laser ignition, the optimized muzzle break and the ACCS. The NLOS-C firing platform fired its first round in October 2006 and has fired more than 1,200 rounds, testing and validating the objective ammunition handling system, platform stability, ammunition compatibility testing and sustained rate of fire.

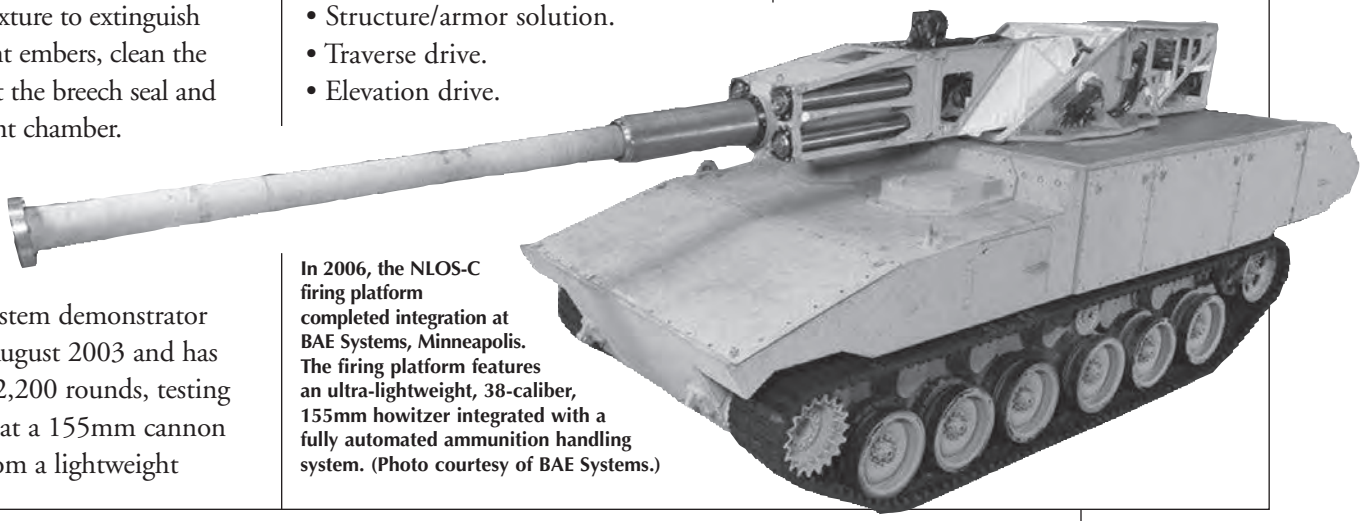
In the leader/follower concept, when a work product is common to NLOS-C and NLOS-M, NLOS-C provides the personnel to provide the product for both variants. However, if the common work requires a modification for NLOS-M specific needs, personnel are shared between variants to improve efficiencies. The leader (NLOS-C) provides:

- Common turret.
- Common traverse bearing.
- Structure/armor solution.
- Traverse drive.
- Elevation drive.
- Common recoil components.
- Automated Mortar Cooling System/ Automated Cannon Cooling System.
- Common components.
- Electrical architecture.
- Common installations (although most are a result of the FCS commonality requirements).
- Kitted approach.

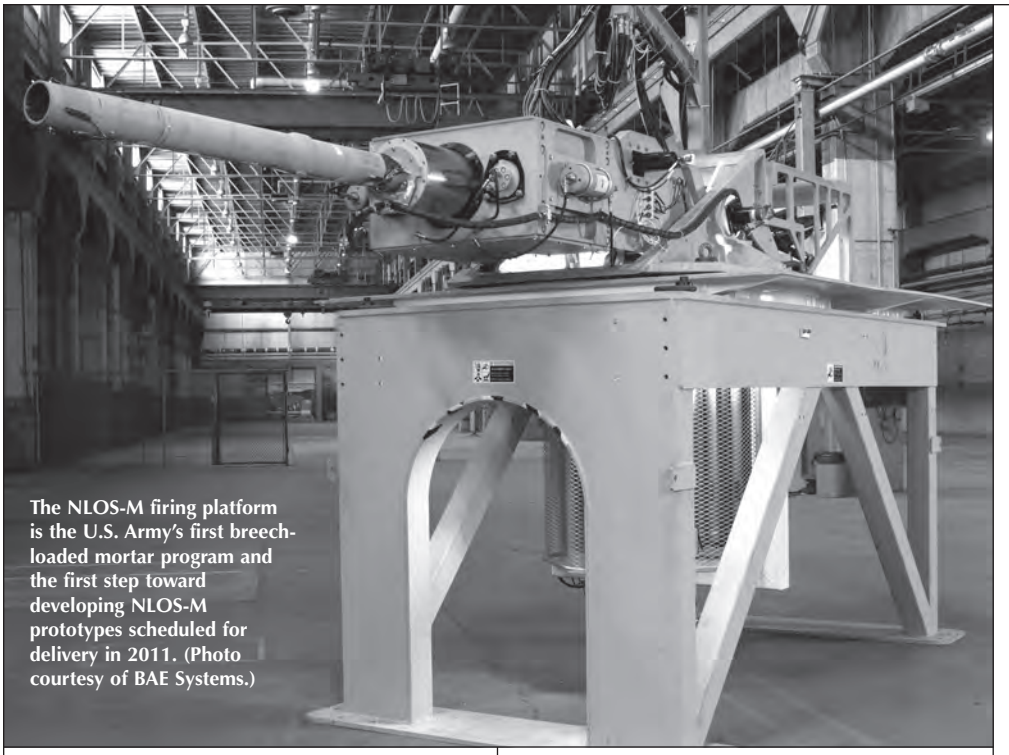
As noted above, common design groups and common analysis groups are staffed by the same personnel by NLOS-C and NLOS-M to leverage learning and design work that can be used by both vehicles. The follower (NLOS-M) modifies:

- Turret for NLOS-M-specific gun mount.
- Recoil elements for recoil length and quantities.
- Structure/armor solution (possibly).
- NLOS-M-unique requirements for kitted approach.

Both systems have two fully automated carousel-type magazines. The NLOS-C has one magazine to hold 155mm fused projectiles and another to hold Modular Artillery Charge System (MACS) increments. During firing, the handling system retrieves one projectile from the projectile magazine and the appropriate number of MACS increments from the charge magazine. The projectile is automatically uploaded



In 2006, the NLOS-C firing platform completed integration at BAE Systems, Minneapolis. The firing platform features an ultra-lightweight, 38-caliber, 155mm howitzer integrated with a fully automated ammunition handling system. (Photo courtesy of BAE Systems.)



The NLOS-M firing platform is the U.S. Army's first breech-loaded mortar program and the first step toward developing NLOS-M prototypes scheduled for delivery in 2011. (Photo courtesy of BAE Systems.)

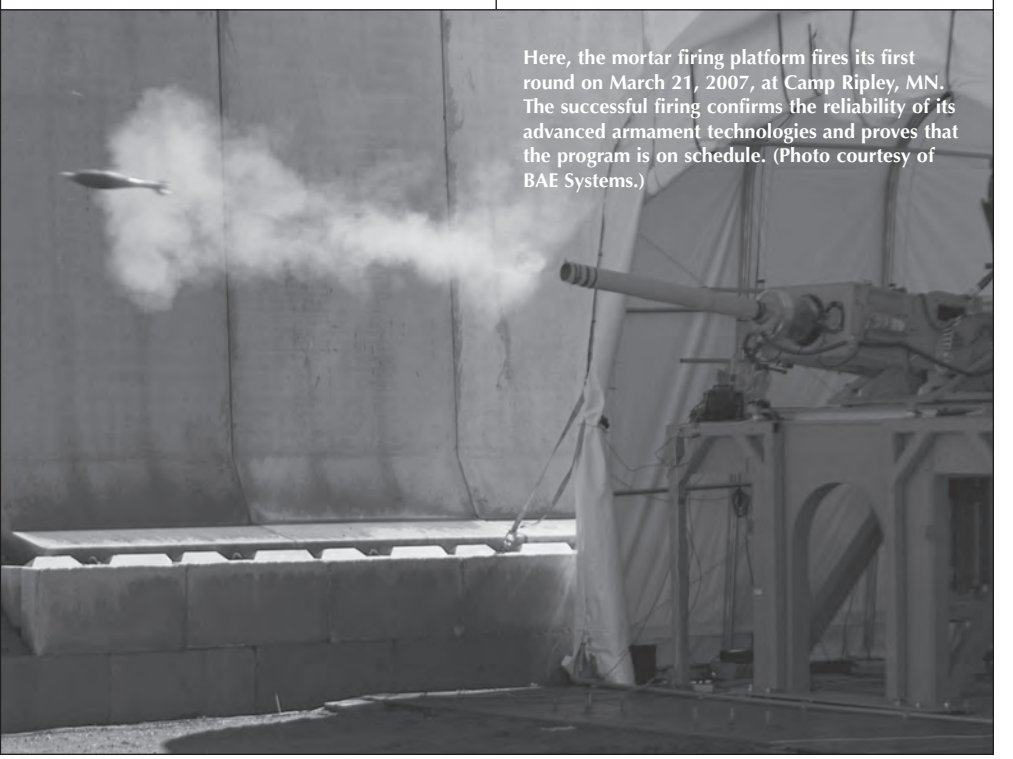
and rammed into the breech, followed by the MACS increments. The NLOS-M loading process is nearly identical to the cannon, except for an additional step requiring the Soldier to set the fuse and charge on the mortar round before it is automatically loaded into the breech. The two NLOS-M magazines are very similar to the NLOS-C in how they operate and, in many cases, the components are scaled versions of the cannon design. No modifications to the 120mm mortar rounds are required to fire from an NLOS-M. The magazine is taller to accommodate future precision-guided munitions currently under development. The automation has made fire missions more efficient, faster and less labor-intensive. Eliminating the physical handling of ammunition enables high rates of fire delivering ordnance at 16 rounds per minute for planned missions with minimal physical effort by the crew.

Another common capability designed into the system that helps the NLOS-C and NLOS-M sustain high rates of fire is the ACCS for the NLOS-C and the Automated Mortar Cooling System for the NLOS-M. The two are practically identical to one another in design and function to keep the tube cool and clean, enabling high rates of fire for long durations. Keeping the tube clean also prolongs the amount of time NLOS-C or NLOS-M can stay in the fight until they have to pull off-line to do a thorough cleaning. With this capability, Soldier workload is reduced and system lethality and responsiveness are increased.

The NLOS-C and NLOS-M structures are comprised of the following:

- Turret structure
- Traverse bearing
- Top plate
- Hull structure
- Crew bulkhead and door
- Rear door
- Side egress door
- Crew hatches
- Turret and chassis armor panels
- Gun cover assembly

With the exception of the differences in the crew bulkhead and door due to the difference in the number of crew, all of the structure components are the same or nearly identical between the two variants. This is because the structure's basic behavior when loaded under gun firing or mobility load cases is fairly consistent between the variants, allowing the turret structure, traverse bearing, top plate and hull structure to use the same structural load paths and interfaces. To ensure structural integrity, collaboration with



Here, the mortar firing platform fires its first round on March 21, 2007, at Camp Ripley, MN. The successful firing confirms the reliability of its advanced armament technologies and proves that the program is on schedule. (Photo courtesy of BAE Systems.)

NLOS-C firing platform being assembled at BAE Systems in Minneapolis. The first NLOS-C prototype will be completed in June 2008. NLOS-C prototypes will enter Army evaluations in 2008 and 2009. (Photo courtesy of BAE Systems.)

external centers of excellence allowed for the development of load-carrying members that efficiently support either the cannon or mortar loads. Further leader/follower benefits have also been pursued in ballistic survivability and compartmentation since the basic requirements and behaviors of the structural components for those functions are so similar. Additionally, since a common structural layout and similar interfaces were achieved, hatches, armor panels and doors are all very similar between the variants, further enhancing leader/follower benefits through consistent accessibility and maintainability approaches.

The NLOS-M firing platform was unveiled in March 2007, just 6 months after the NLOS-C firing platform began testing. To date, the NLOS-M firing platform has fired more than 600 rounds, testing the functionality of the firing platform and collecting engineering data for further NLOS-M prototype development. Current testing will document residue build-up, interior ballistics and tube heating. The testing is also being used to mature the in-bore air regulation system (IBARS) to become a major NLOS-M function. IBARS will allow the NLOS-M to fire rounds at low elevations and allow the crew to eject a misfired round from the tube without having to go through extensive and time-consuming misfire procedures — a unique ability not found on traditional mortar systems.

The NLOS-C and NLOS-M are greater than 80 percent common across the two platforms and with the MGV common chassis. The high level of NLOS-C/NLOS-M hardware and software commonality dramatically reduced the costs and risks of mortar development while meeting schedule and performance goals.

The leader/follower relationship between the NLOS-C and NLOS-M enabled the NLOS-C to define a path for all MGV vehicles. The NLOS-M benefited significantly from early and accelerated NLOS-C development, sharing engineering time, expertise and many common components. Some NLOS-C components were directly incorporated into the NLOS-M and some with only slight modification. The NLOS-C and NLOS-M are greater than 80 percent common across the two platforms and with the MGV common chassis. The high level of NLOS-C/NLOS-M hardware and software commonality dramatically reduced the costs and risks of mortar development while meeting schedule and performance goals. These benefits are significant given the limited resources and other military demands for funding, ensuring the program spends its resources efficiently and effectively.

MAJ KIRBY BEARD is the Assistant Product Manager (APM) for the FCS program's MGV Initial Production (NLOS-C) effort at the U.S. Army Tank-automotive and Armaments Command in Warren, MI. He holds a B.S. in accounting from Franklin and Marshall College and an M.S. in management from the Naval Postgraduate School. He is Level III certified in contracting and is an Army Acquisition Corps (AAC) member.

MAJ JEFF JAMES is the NLOS-M APM in the MGV FCS program, Minneapolis. He holds a B.S. in aviation management from Southern Illinois University. This is his first AAC assignment.

MAJ VINCENT J. TOLBERT is the NLOS-C APM in the MGV FCS program. He holds a B.S. in physical education from the University of Central Oklahoma. His last assignment was as the NLOS-C Project Officer in the U.S. Army Training and Doctrine Command Systems Manager (TSM) Cannons at Fort Sill, OK. He also was the Test Officer for the Limited Users Test for the Mobile Gun System in TSM Tanks, Fort Knox, KY. Tolbert is an AAC member.

Safeguarding Against Organizational Conflict of Interest (OCI) on the Future Combat Systems (FCS) Program

Sandra T. Toenjes

It's an average workday. You're enjoying your first cup of coffee while leafing through the newspaper. A headline demands your attention: *Responsible Public Servant Denies Conflict of Interest*. You quickly scan the article in an attempt to extract names. Gratefully, it's not related to your program or agency.

Here, participants are educated on source selection best-value trade-off methodology, processes and procedures in preparation for a fully integrated evaluation. (U.S. Army photo by Jill Nicholson, FCS(BCT) SP30 Directorate.)

The impact of a conflict of interest is significant. Whether we view ourselves as shareholders, citizens or casual observers, the mere appearance of impropriety is enough to undermine our confidence in individuals, corporations and the reputations of entire professions. Government employees are all too aware of the public scrutiny placed on the acquisition process in an attempt to ensure prudent expenditure of precious taxpayer dollars.

To provide the best-value product or service to meet customer needs, each member of an acquisition team has the responsibility to exercise sound business judgment in selecting a prime contractor. The FCS program expands this responsibility by having established competitive trade-off source selection procedures and processes used by the Lead Systems Integrator (LSI), the Boeing Co., in selecting subcontractors representing the best of industry to develop the FCS System-of-Systems (SoS).

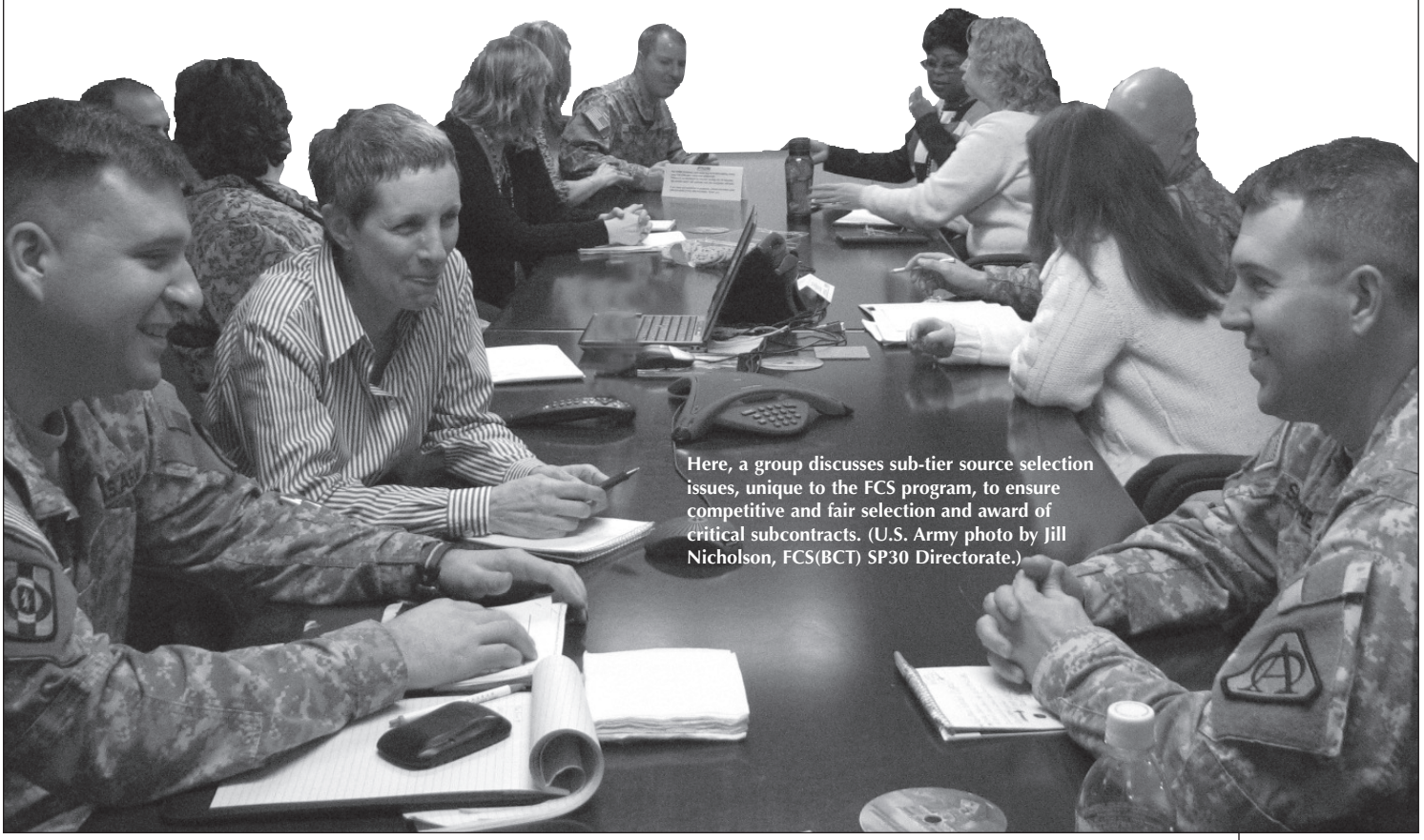
The LSI used the Army Source Selection Guide and the trade-off source selection procedures of *Federal Acquisition Regulation, Part 15*, as the model for establishing its generic source selection evaluation plan and processes to support competitive trade-off source selections during the FCS program's System Development and Demonstration (SDD) Phase. The LSI has successfully implemented this plan leading to the selection and awarding more than 20 major/critical subcontracts.

To provide the best-value product or service to meet customer needs, each member of an acquisition team has the responsibility to exercise sound business judgment in selecting a prime contractor.

OCI Safeguards

Both the SDD contract and the LSI's generic source selection evaluation plan incorporated language to safeguard against OCI. The prime contract OCI clause includes two key prohibitions — both the LSI for FCS SDD and its subcontractor, Science Applications International Corp. (SAIC), are prohibited from competing for work under the SDD contract at any tier. Also, the clause prohibits subcontractors from preparing Request for Proposal (RFP) documents and from conducting or participating in a source selection if any part of its organization submits a proposal. The clause also requires the LSI to flow down an OCI provision in its subcontracts at all tiers.

Since Boeing and SAIC are prohibited from competing under the SDD contract, that eliminates all possible OCI issues at that level. At the subcontractor levels, the FCS OCI safeguards work as follows. Let's assume an FCS



Here, a group discusses sub-tier source selection issues, unique to the FCS program, to ensure competitive and fair selection and award of critical subcontracts. (U.S. Army photo by Jill Nicholson, FCS(BCT) SP30 Directorate.)

Here, conflict of interest screening and OCI training topics are being discussed. Source selection evaluators are required to complete this training. (U.S. Army photo by Jill Nicholson, FCS(BCT) SP30 Directorate.)

first tier subcontractor is planning to conduct a competition to select a lower tier subcontractor. If the FCS first tier subcontractor intends to submit a proposal for that lower tier work, the subcontractor submits a Notice of Intent (NOI) to the LSI and is considered "conflicted." In other words, the subcontractor cannot prepare RFP documents or conduct or participate in a source selection. At this point, the LSI takes action to assume the competitive source selection from the conflicted subcontractor. Any documentation that had been developed by the conflicted subcontractor prior to the NOI is sanitized by the LSI and government to prevent any competitive advantage during the solicitation and evaluation process.

From this point on, the LSI conducts the source selection. Once the award is made, the conflicted subcontractor assumes the contract back from the LSI, pursuant to an assignment agreement that is executed between the LSI and the conflicted subcontractor.

Overcoming Conflicts

The transfer of source selection responsibility from the conflicted subcontractor to the LSI poses some interesting challenges. For instance, frequently, proposals are received that contain differing terms and conditions that require resolution. Since our conflicted subcontractor is both a competitor and the ultimate customer (buyer), the LSI is precluded from contacting the conflicted subcontractor during discussions to resolve competitor term and condition issues. Therefore, a neutral third party is needed to contact the conflicted subcontractor regarding the terms and conditions at issue. A government acquisition team member (who is also not on the source selection evaluation team (SSET)) fulfills this third party role using a technologically savvy method of secure communication, known as FCS's Advanced Collaborative Environment (ACE).

ACE's successful integration into the source selection process to mitigate OCI ensures maximum competition from the best of industry and selection of the overall best-value proposal and SoS solution.

Similar to Army Knowledge Online, one of ACE's many capabilities is that of a document storage system with the ability to limit access to only select users. It is in this way that the restricted conversation between the government and the conflicted subcontractor is accomplished. The government then forwards the results to the LSI, which completes a fully integrated evaluation, makes the final selection and awards the contract.

The LSI also established mandatory training for all SSET members that included elements of the subcontract OCI clause, firewall and procurement integrity, and a focus on appropriate communication between the LSI and conflicted subcontractor. Prospective contractor SSET members must complete and sign a conflict of interest questionnaire to screen out personnel with potential conflicts. Proprietary Information Agreements are executed to ensure the protection of proprietary data of the parties and third party data.

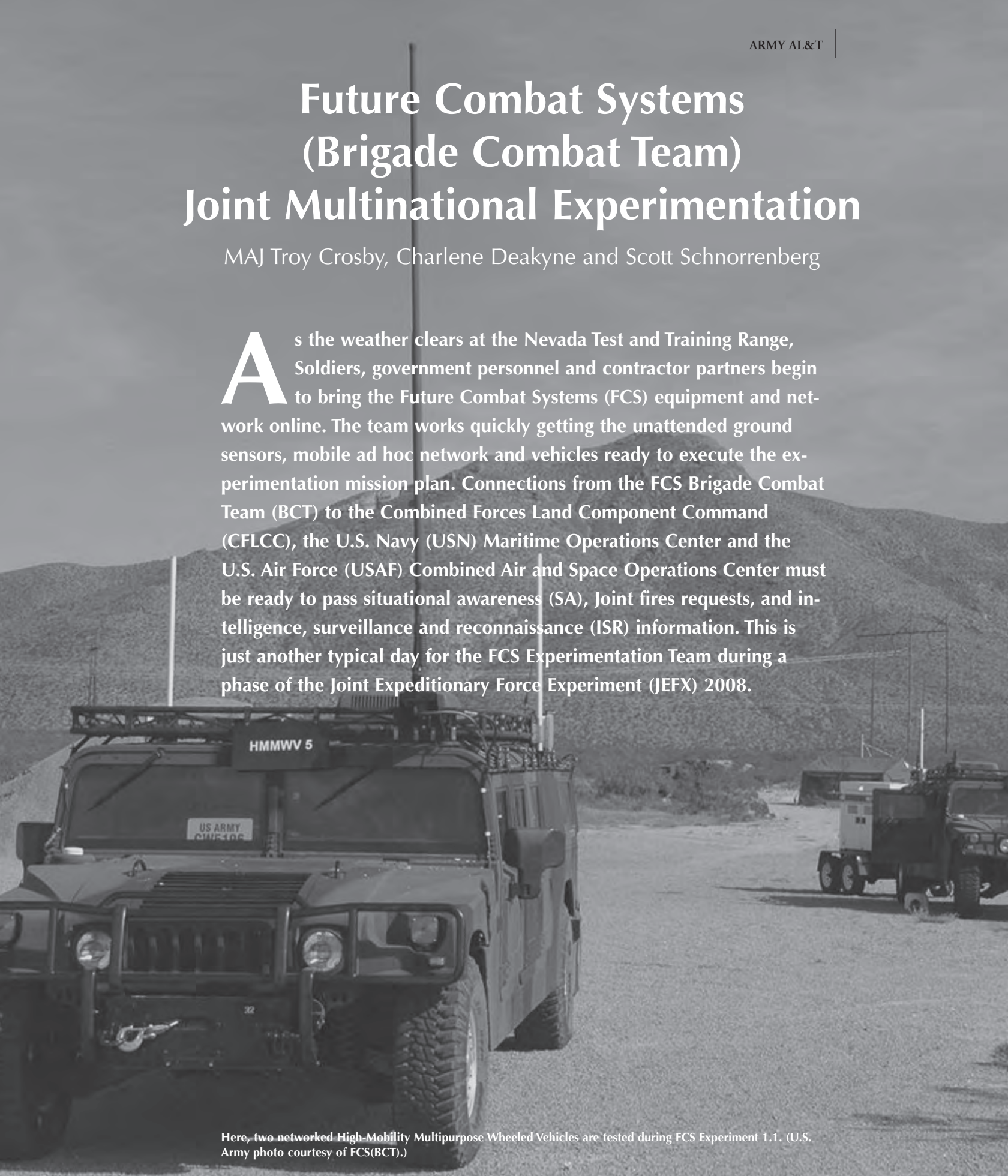
In the FCS Source Selection Organization, the government and industry are working together to maintain the integrity of competitive processes and ensure impartiality from the requirements development phase to proposal evaluation and final selection decision. ACE's successful integration into the source selection process to mitigate OCI ensures maximum competition from the best of industry and selection of the overall best-value proposal and SoS solution.

SANDRA T. TOENJES is an Associate Director in the Acquisition Directorate of Program Manager FCS (Brigade Combat Team (BCT)). She has a B.A. in psychology from the University of Michigan and more than 22 years experience in acquisition. Toenjes is an Army Acquisition Corps member who is certified Level III in contracting and Level II in program management.

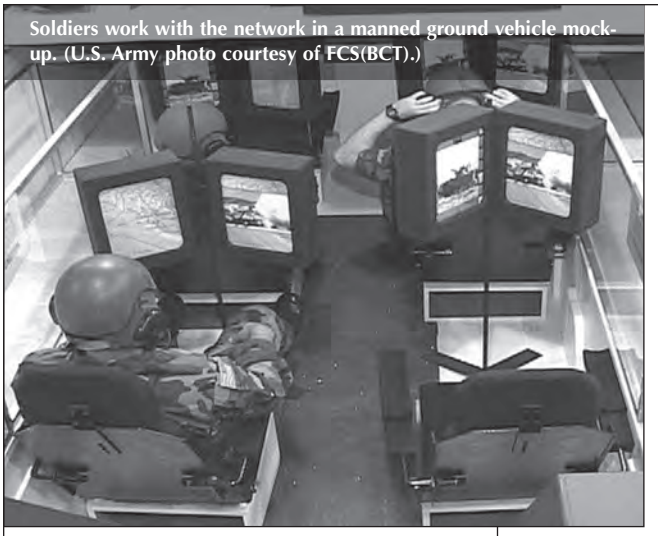
Future Combat Systems (Brigade Combat Team) Joint Multinational Experimentation

MAJ Troy Crosby, Charlene Deakyne and Scott Schnorrenberg

As the weather clears at the Nevada Test and Training Range, Soldiers, government personnel and contractor partners begin to bring the Future Combat Systems (FCS) equipment and network online. The team works quickly getting the unattended ground sensors, mobile ad hoc network and vehicles ready to execute the experimentation mission plan. Connections from the FCS Brigade Combat Team (BCT) to the Combined Forces Land Component Command (CFLCC), the U.S. Navy (USN) Maritime Operations Center and the U.S. Air Force (USAF) Combined Air and Space Operations Center must be ready to pass situational awareness (SA), Joint fires requests, and intelligence, surveillance and reconnaissance (ISR) information. This is just another typical day for the FCS Experimentation Team during a phase of the Joint Expeditionary Force Experiment (JEFX) 2008.



Here, two networked High-Mobility Multipurpose Wheeled Vehicles are tested during FCS Experiment 1.1. (U.S. Army photo courtesy of FCS(BCT).)


Soldiers work with the network in a manned ground vehicle mock-up. (U.S. Army photo courtesy of FCS(BCT).)

The FCS Joint and Multinational Experimentation Team is comprised of representatives from the U.S. Army FCS(BCT) Joint, Interagency and Multinational Interoperability (JIMI) Product Office, the Lead Systems Integrator (Boeing Co. and Science Applications International Corp.) and the One Team Partners — all working together to accomplish FCS experimentation goals. The main focus for the FCS Experimentation Team is to provide insight to one of the FCS program's greatest assets to the Army — its integrated, interoperable and highly capable network system. The FCS network will be a major component of the JEFX 2008.

The JEFX 2008 is the seventh in a series of USAF experiments providing a multidimensional, multinational, multiservice environment for the end-to-end exploration, assessment and transition of Joint and coalition warfighter capabilities. The JEFX series of experiments focuses on Joint Air Operations including close air support, air defense, air operations planning, airspace management, target list generation and sensor sharing. JEFX combines live air, space, naval and ground forces; operational concepts; and technologies for enhancement of capabilities in a collaborative environment.

In March 2006, the FCS program submitted an initiative titled "FCS Network Integration and Joint Interoperability" to the USAF-sponsored JEFX. The USAF identified six operational focus areas addressed during the experiment. The FCS initiative is linked with two of these: Joint Forces Component Commander-ISR Global Management and Global Force Readiness Management.

FCS will exploit evolving enterprise services to provide near-real-time Soldier access to critical SA and effectors. The team will conduct Joint Networked Fires using a family of networked sensors to provide enhanced Soldier protection and lethality while preventing fratricide. Experimentation results will be used to assess the current state of FCS network integration and interoperability, reducing related risks to the FCS Program of Record, and helping to refine evolving doctrine and training support products. Proven FCS technology will be provided to global war on terrorism warfighters through scheduled spin outs (SOs) beginning in 2008.

The FCS initiative plan for JEFX 2008 builds upon previous FCS experimentation in JEFX 2006, which involved dissemination of SA and support to time-sensitive targeting. The FCS initiative will improve network integration and Joint interoperability through warfighter collaboration and connectivity. FCS experimentation includes the network's five layers, and integrates distributed common ground System-Army, Army Aviation and Space, and 10 to 12 networked nodes with manned ground vehicles (surrogates). It also includes unmanned air systems, integrating with USAF platforms and networks focused on the "live fly." The execution of technical threads includes Joint Networked Fires and Airspace Management, and employs Net-centric Enterprise Services.

In JEFX 2008, FCS will focus on using unmanned aerial vehicles as a sensor and communications relay in a Joint airspace constrained environment. The FCS Experimentation Team will also test and demonstrate data and information transfer, communications interoperability, operational procedures, operational situation understanding and warfighter machine interface functionality. JEFX 2008 also provides FCS interoperability with the USAF, U.S. Marine Corps (USMC), USN and United Kingdom (U.K.) forces.

During JEFX 2008-1's execution in November 2007, FCS operated systems from a Boeing Facility in Huntington Beach, CA; Fort Monmouth, NJ; and Langley Air Force Base (AFB), VA. Distributed site connectivity was achieved via secure domain. FCS distributed SA via the Global Information Grid, developed a Joint common operating picture and conducted strike missions using elements within the USMC, USAF Tactical Air Control Party, CFLCC and Air Support Operations Center. JEFX 2008-1 was a lab-based demonstration but will transition


A Soldier tests the network during Experiment 1.1. (U.S. Army photo courtesy of FCS(BCT).)

to a field experiment focused on live fly in JEFX 2008-2 and 2008-3.

The FCS experimentation goal is to explore the benefits of service-oriented architectures (SOAs) and to learn more about how different Joint/multinational architectures can interoperate. To achieve this, FCS is participating in several experiments concurrently, including JEFX 2008, Joint Limited Technical Experiment (LTE) and the Coalition Warrior Interoperability Demonstration (CWID).

Joint LTE

The Army FCS(BCT) Network Systems Integration Program Manager, U.S. Naval Warfare Development Command and the USAF Electronic Systems Center (ESC) supported participation in a Joint LTE in August 2007. The LTE was a distributed event executed by the Network Analysis Integration Lab from Fort Monmouth; Space and Naval Warfare Systems Command out of San Diego, CA, and Charleston, SC; Naval Air Warfare Center, China Lake, CA; and ESC, Hanscom AFB, MA. The SOA LTE's overarching objective was the performance and interoperability of the Consolidated Afloat Network Enterprise Services and Consolidated Net-centric Data Environment reference implementations in a tactical environment with FCS. The LTE integrated the two service-oriented environments for Joint data exchange. The lessons learned suggest numerous avenues for further FCS experimentation.

CWID

In October 2007, an FCS trial submission was selected for participation in the 2008 CWID that will be conducted in June 2008. The CWID is the Chairman of the Joint Chiefs of Staff's annual event enabling civilian and military authorities to discover and investigate command, control, communications, computers, ISR (C4ISR) solutions focusing on relevant and timely objectives for enhancing interoperability and information sharing between agencies. The CWID focuses on net-centric solutions to identify C4ISR gaps that the traditional DOD acquisition process is not addressing.

> The main focus for the FCS Experimentation Team is to provide insight to one of the FCS program's greatest assets to the Army — its integrated, interoperable and highly capable network system.

The FCS Interoperability Trial will support the CWID objective to improve coalition and Joint C4ISR architecture. In its first CWID as a participant, FCS intends to exchange Blue and Red SA data with the U.K. command and control systems and publish this same information to higher headquarters echelons on the CWID network. Collaboration applications will be employed between FCS and U.K. systems to aid in fires mission management. The initial demonstration builds a foundation for future experimentation and cooperation between FCS and the U.K. acquisition organizations.

The purposes of FCS experimentation are to assess program risk mitigation, prove out research and development progress (maturity) of specific network-centric hardware and software items, and ensure interoperability between Joint, Current and Future Forces operating in an ad hoc, mobile network. Participation in JEFX 2008, the Joint LTE and CWID provides an early opportunity to assess progress on a set of FCS platforms and network products integrated for use in a laboratory and field environment. These experiments provide high payoff in the form of knowledge, insight and understanding in support of FCS program execution and the capabilities SO to the Current Force. The leveraging of experimentation allows early integration of developmental platforms, network hardware and software, and tactical satellite communications for the program, allowing delivery of FCS capabilities to the Army. The bottom line for the FCS Experimentation Team is it provides insight to one of the greatest assets of the FCS program to the Army: its integrated, interoperable and capable network system as a lethal weapon for our current and future warfighters.

MAJ TROY CROSBY is an FCS(BCT) program Joint Assistant Product Manager assigned to the JIMI Product Office. He is the lead for the FCS(BCT) Network System Integration Program Office for JEFX 2008. Crosby holds a B.A. in business administration from James Madison University, an M.B.A. from Webster University and an M.S. in information systems technology from the George Washington University. He is an Army Acquisition Corps member certified Level II in both information technology and program management.

CHARLENE DEAKYNE is a defense contractor working for the FCS(BCT) JIMI Product Office and supporting the FCS JEFX 2008. She holds a B.S. in mathematics from the University of Alabama and an M.S. in computer science from the University of Alabama-Huntsville.

SCOTT SCHNORRENBERG is a defense contractor working for the FCS(BCT) JIMI Product Office. He is the lead technical engineer for JEFX 2008. Schnorrenberg holds a B.A. in psychology from Auburn University.

From the Acquisition Support Center Director

On Jan. 3, 2008, Dean G. Popps became the Acting Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASAALT) and Army Acquisition Executive (AAE). As the Acting ASAALT, he serves as the Senior Procurement Executive, the Science Advisor to the Secretary of the Army and the Army's Senior Research and Development Official. Mr. Popps also assumes principal responsibility for all Army logistical matters and continues serving as the ASAALT Principal Deputy, a position he has held since July 24, 2004. We wish Mr. Popps the very best as the Acting ASAALT/AAE. Under Mr. Popp's leadership, our workforce will continue to get the much-needed products to our Nation's Soldiers, as quickly as possible, as they bravely fight the global war on terrorism.

Human Capital Development Plan

These are exciting times for Army contracting as the Army transitions to an expeditionary force that will provide contracting support across the full spectrum of Army operations. Contracting support's future is a strong link between the generating and operating forces that will support a wide variety of operations. Expeditionary contracting has evolved to provide initial contingency and sustainment contracting support with a CONUS reachback capability. The Modified Table of Organization and Equipment will expand to support expeditionary operations and combatant commanders' daily operations. By working closely with the Department of the Army G-3 Director of Force Management, we have bolstered operational structure by adding 3 contracting support brigades, 5 contingency contracting battalions, 3 senior contingency contracting teams and 48 additional contingency contracting teams. Furthermore, we are expanding our acquisition contracting to include the U.S. Army Corps of Engineers (Military Construction), the Defense Logistics Agency (Material), the U.S. Army Materiel Command (System/Materiel/Base Operations) and the Special Operations community. The end state is a strategically developed and employed acquisition structure that will support the Army's requirements across Joint operations.

The U.S. Army Acquisition Support Center continues to work closely with DOD and the Defense Acquisition University (DAU) in addressing acquisition workforce issues. Recently, DAU has been focusing on competency assessments for all acquisition career fields (ACFs). Many of you may have received e-mail invitations from the Center for Naval Analysis to participate in the competency assessment for your particular field of expertise. I encourage you to complete this assessment. It takes less than an hour to complete and it's your opportunity to help identify workforce capabilities and gaps that can be addressed by training or other means.

The Army continues to work closely with the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) in planning *Section 852, 2008 National Defense Authorization Act, Department of Defense Acquisition Workforce Development Fund*. When implemented, this fund will assist the Army and other services in supporting the recruitment, retention and development of our valuable acquisition workforce. More information on this topic will be shared in the future.

The USD(AT&L) Human Capital Strategic Plan is amended annually to reflect its strategic focus on people and the goal to develop and maintain a "high-performing, agile and ethical workforce." This plan provides a summary of DOD and service accomplishments and initiatives that support this goal. I suggest that you visit this document and its updates at **http://www.dau.mil/workforce/hcsp.pdf** to learn more about DOD acquisition workforce characteristics as well as some best practices that may be applied within your own organization. For more information, contact Mary McHale at (703) 805-1234/DSN 655-1234 or **mary.mchale@us.army.mil**.

Craig A. Spisak
Director, U.S. Army
Acquisition Support Center

Contracting Community Highlights

As many of you may know, I have accepted a wonderful opportunity to serve as the Executive Director of the AbilityOne Program. This column will be my last opportunity to address you as the Deputy Assistant Secretary of the Army for Policy and Procurement. It is difficult to believe that nearly 6 years have passed since I came onboard. Each year brought new challenges, new successes and much professional satisfaction. You are the finest contracting professionals I have ever known.

The upcoming months will see unprecedented change for the Army's contracting community. Contracting will be reinstituted as an acquisition core competency. General Officer (GO) billets for contracting positions are being considered. This will increase the community's visibility and stature. The new GO billets will provide increased promotion potential for Army officers and enhance training and assignments for officers as well as noncommissioned officers. We also anticipate increases in the workforce and opportunities to bring interns onboard. Organizational changes at the headquarters and commands will impact all levels of the community and workforce. Change, especially rapid and far-reaching change, can seem overwhelming. All of us know these changes signal the recognition and value being placed in Army contracting. This is clearly a positive change.

The Army contracting community's future is full of potential. I encourage you to seize every opportunity to improve yourself, the community and the world-class support you provide the Soldiers. I ask that you be ever vigilant while upholding the highest ethical standards. Continue to be "one community serving our Soldiers, serving our Nation." Thank you for the opportunity to work with you, know you and be a part of the outstanding things you have done in this community. I wish each of you continued success and rich blessings in your journey.

Ms. Tina Ballard
Deputy Assistant Secretary of the Army
(Policy and Procurement)

U.S. Army Sustainment Command (ASC) Stands Up Southwest Asia (SWA) Support Branch

Jake M. Adrian

Calling on experience and expertise, the Army has tapped ASC to bring its contingency contracting strength to bear for warfighters in SWA. On Sept. 14, 2007, the ASC Acquisition Center CONUS-based Contracting Reachback Cell (CRBC) was established to support the 408th Contracting Support Brigade (CSB). Its intent is to use CONUS contracting office strengths to execute contracts on behalf of OCONUS warfighters. This CRBC has since been renamed the SWA Support Branch under the ASC Acquisition Center's Field Support Division. The CRBC conforms with a Sept. 7, 2007, Secretary of the Army Operational Order that transferred authority of contracts exceeding $1 million from Army Contracting Agency-Kuwait to the U.S. Army Materiel Command, which assigned the mission to ASC because of four important factors:

- ASC has extensive experience executing high-dollar service contracts with performance in SWA.
- ASC uses the Logistic Civil Augmentation Program's Management Structure in theater, a high-dollar service contract administered by ASC.
- ASC has a 230-person Acquisition Center at Rock Island Arsenal (RIA), IL, which provides contracting experts, including cost/price analysts, policy analysts, property administrators and legal counsel.
- ASC has worldwide reach that is tied directly to the warfighter through Army field support brigades and contingency contracting brigades that are aligned in every area of operations.

Reachback Implementation

Since Sept. 11, 2001, there has been a massive increase in the 408th CSB's annual workload from approximately $150 million to nearly $1 billion. Requirements and contract complexity have increased and there has been a lack of a defined requirements process. In addition, the organization faced personnel challenges that include limited staffing, inexperienced personnel dealing with more complex contracts and difficulty recruiting for SWA deployments. Facing a huge increase in volume and velocity, management control and oversight suffered, which allowed fraud to raise its ugly head.

On Oct. 1, 2007, ASC assumed control of most requirements with remaining contracts following at logical transition points.

ASC SWA Reachback Cell members (left to right): Joe Loftus, Cindy Ball, Barb Voss, Cynthia Pleasant, Amber Thompson, Tina Grove, Bob Pulscher, Jake Adrian, Dean Brabant, Jeremy Miller, Sue Phares and Mike Hutchinson. (ASC photo by Sharon Crawford.)

The SWA Support Branch was established with eight dedicated contracting personnel with more support to follow.

SWA Support Branch Accomplishments

At RIA, the group is split into two teams. One team is dedicated entirely to the Combat Support Services Contract-Kuwait (CSSC-K), a base-plus-9-option-year, cost-plus-award-fee contract valued at $1.9 billion. CSSC-K initially had seven Undefinitized Contractual Actions (UCAs) issued against it. With the help of ASC's Financial Services Division and its assigned cost/price analysts, four UCAs are in negotiations with one comprised of five additional UCAs. The initial proposed price for the four UCAs is approximately $500 million. The team has also negotiated seven new actions against the contract, saving an additional $18.4 million through intensive negotiations via teleconferences and trips to SWA. For the first time in 6 years, a Contracting Purchasing System Review was conducted on the CSSC-K contractor in November 2007.

The other team has the remainder of the transferred contracts, including SmartZone, a communication systems contract shared with the Kuwait Ministry of Defense; dining facilities; Standard Army Management Information Systems; and Bulk Fuel and Heavy Lift Six, a commercial line haul program. Kuwait Non-Tactical Vehicles (NTVs), a $145 million base-plus-2-option-year contract, is the team's first major acquisition that resulted in four contract awards. The current value of all non-CSSC-K contracts is $2.1 billion. ASC has assumed responsibility for approximately $4 billion of SWA contracts.

With the Kuwait NTV contracts, ASC has shown that it can effectively and efficiently solicit and award an OCONUS program with a value of up to $145 million in less than 90 days from a CONUS contracting office. The award of the Kuwait NTV contracts is estimated to save the U.S. government $36.6 million over the life of the program.

Goals

Handing off some of its workload to ASC should help the Kuwait Contracting Office to provide better service to warfighters and improve administration and oversight. Taking the concept a step further, ASC intends to show that reachback contracting also has value for Principal Assistants Responsible for Contracting in Europe, Korea and South America. Ultimately, the reachback concept's goal is to ensure the best contract structure is used to deliver goods and services to troops while reducing costs and getting a better deal for American taxpayers.

Jake M. Adrian is a Contract Specialist with the ASC SWA Reachback Cell. He can be reached at (309) 782-6824/DSN 793-6824 or ***jake.adrian@us.army.mil****.*

AbilityOne Program and PRIDE Industries Start New Fort Bliss Base Facilities Support Operations

George Brian Foulkes

Can people with severe disabilities provide the level of service required to maintain facilities on an Army installation transitioning from a U.S. Army Training and Doctrine Command activity with 9,000 Soldiers to a U.S. Army Forces Command Power Projection Platform with 30,000 or more Soldiers? The answer was "Absolutely!" when the Fort Bliss, TX, leaders committed to an AbilityOne (formerly *Javits-Wagner-O'Day Act*) solution for the Fort Bliss Directorate of Public Works (DPW) facility maintenance contract.

The question was first asked last year during a meeting with a National Industries for the Severely Handicapped (NISH) representative who came to Fort Bliss to discuss contract opportunities for AbilityOne, a national program that creates employment for people with severe disabilities or blindness, by securing federal contracts for its 600 nationwide community-based nonprofit agencies (NPAs). NISH, a national NPA, facilitates AbilityOne, which has created employment opportunities for nearly 48,000 Americans who are blind or have severe disabilities.

After much research, numerous meetings with the installation leadership and a NISH search for quality, capable

NPAs, a partnership between AbilityOne and PRIDE Industries Inc. was formed, creating nearly 150 jobs at Fort Bliss. PRIDE takes over the facilities support operations at Fort Bliss with experience in successfully managing Navy, Air Force and NASA facilities. The NPAs have maintained service contracts with DOD for 20 years.

After following AbilityOne protocols, *Federal Register* announcements and reviews from the Purchases from People Who Are Blind or Severely Disabled Committee, the work was added to the Procurement List and announced in August 2007. The Directorate of Contracting (DOC) Team, along with the DPW and PRIDE leads, awarded a fixed-price contract that began Oct. 1, 2007, with a value estimated at $51.2 million over 5 years.

In preparation for the transition, PRIDE wrote, published and distributed an introductory welcome brochure for the Fort Bliss community that features phone numbers and contact information for key services and management leads, "how to" instructions for work orders, and frequently asked questions and answers. After a flawless transition, the PRIDE, DPW and NISH teams are now successfully engaged in managing the installation's facility support operations.

"I think it [AbiltyOne] will be a model for the future," said COL Robert Burns, Fort Bliss Garrison Commander, at a NISH award presentation last September. "There are a lot of people with eyes on this and we have no other option but to succeed. I honestly believe we're going to hit a home run."

George Brian Foulkes is the DOC Director at the Fort Bliss Army Contracting Agency.

AbilityOne PROGRAM ™

Formerly the Javits-Wagner-O'Day Program

North Atlantic Regional Contracting Office (NARCO) Helps Launch Military Advanced Training Center (MATC)

LTC John C. Pastino and Craig Coleman

NARCO at Walter Reed Army Medical Center (WRAMC), Washington, DC, has made several major purchases for the new $10 million MATC that opened Sept. 13, 2007, on the center's campus. With sophisticated computer and video monitoring systems and the latest prosthetics, MATC's mission is to enhance amputee and functional limb loss care for wounded warriors in transition, returning them to the highest possible levels of activity using state-of-the-art technology. Designed for easy use, MATC offers rehabilitating Soldiers cutting-edge equipment in a single location.

NARCO supported the MATC launch by purchasing equipment costing more than $1.8 million, including a ramp system, video system, a massive truss to support the video system and the Computer Assisted Rehab Environment (CAREN) system.

LTC John C. Pastino, NARCO Director, saw the numerous injuries suffered by Soldiers coming back from war when he was serving as Chief of Logistics at Landstuhl Regional Medical Center (LRMC), Germany. At LRMC, Pastino was able to provide assistance and now can see the complete medical treatment from end-to-end as the Director of Contracting. "It's a sad day when any Soldier gets hurt or injured, but when we can provide the state-of-the-art equipment and medical supplies to Soldiers in a fast and responsive mode, it makes the day a little better for all of us."

Left to right: LTC John C. Pastino, NARCO Director; David Johnson, Contracting Officer; Felipe Romo, Contract Specialist; Linda Giles, Contract Specialist; Herb Suber, Contracting Officer; and Robert Shepherd, Contract Specialist. (WRAMC photo by Winston Wilson.)

The 31,000 square-foot MATC houses more than 15 specialists, including physicians, nurse case managers, therapists, psychologists, social workers, benefits counselors and Department of Veterans Affairs (VA) representatives.

Retired COL Charles Scoville, Chief of Amputee Service, said the building is designed to bring together the multidisciplinary team that cares for warriors in transition. "Our team will provide care from initial surgery through reintegration of warriors to their units or a seamless transition to VA care."

The MATC contains a myriad of clinical features and enhancements. The Center for Performance and Clinical Research — known as the gait lab — measures strides, but according to Scoville, MATC researchers are measuring far more than a runner's gait. Scoville said data collected by engineers play a significant role in assuring proper prosthetic fit and alignment and appropriate foot or knee selection. The gait lab contains six calibrated force plates, four for walking and two longer plates for running. It also includes a dual force-plate treadmill for running analysis and research protocols for prolonged activity. The system has 23 infrared cameras mounted around the room to gather data. The current system uses only eight cameras. "This makes collaborative research opportunities within this facility virtually limitless," Scoville continued.

The 31,000-square-foot MATC offers unprecedented medical care and services for amputees and functional limb-loss patients. Here, a wounded warrior makes a "solo" step at the MATC media day in September 2007. (WRAMC photo by SFC Roger Mommaerts Jr.)

The CAREN system, designed to build a virtual environment around a patient performing tasks on a treadmill bolted to a helicopter simulator, uses a video capture system similar to the traditional gait lab, but with an interactive platform that responds to the patient's every move. "There are only three CAREN systems like this one in the world," Scoville remarked. "Its platform is so sensitive you can stand a pencil on its end and the platform will keep it vertical."

MATC offers "one-stop-shopping" for warrior care that includes therapy and exercise areas and computer simulation training for military-specific tasks. Here, a wounded warrior lifts weights at the MATC media day in September 2007. (WRAMC photo by SFC Roger Mommaerts Jr.)

CAREN also assists warriors recovering from Post-Traumatic Stress Disorder by reintroducing patients to both simple and complex environments and measuring their performance while ensuring absolute safety. "We can continually add stressors," Scoville explained. "We can start with patients walking on an empty street and gradually add parked cars, traffic, pedestrians and noise. We'll take patients to the edge of discomfort, but not beyond what they can handle."

Warriors in transition will be able to communicate via video teleconference with units in Iraq or Afghanistan or with family back home by reserving the Telemedicine Conference Room.

Scoville noted that doctors, nurses and medics in the combat zone and LRMC can also follow their patients' progress. "Soldiers can communicate with the people who took care of them at each step of their treatment," he continued. "It gives the medical people in theater a chance to see how they [former patients] are doing, which they normally wouldn't have."

Additionally, MATC features a rope climb and rock wall; uneven terrain and incline parallel bars; vehicular simulators; a fire arms training simulator; physical therapy, athletic and exercise areas; an occupational therapy clinic; prosthetic training and skills training areas; prosthetic adjustment and fitting rooms; and separate exam rooms for all amputee-related care. The 225-foot indoor track surrounding the second floor interior boasts the world's first oval support harness. "It allows the Soldiers to walk or run without a therapist tethered to them," added Scoville. "Patients can recover more quickly because the therapist is free to provide immediate feedback to patients while observing their gait. We got a lot for the money."

The $10 million center augments the capabilities of existing WRAMC facilities and supports the goal of returning to duty multiskilled leaders who personify the Warrior Ethos in all aspects. According to the U.S. Army Corps of Engineers, the MATC was constructed 3 months ahead of schedule in cooperation with the U.S. Army Health Facilities Planning Agency and Turner Construction Co.

MAJ David Rozelle, MATC Project Officer, credited the early completion date to teamwork. "This has been a balancing act, which is why we could install equipment at the same time we put in flooring and completed other elements of the building."

NARCO's mission is to provide sound business advice and quality contracting support that is responsive to today's health care requirements while preparing for changes in contracting demands to support the health care environment of the future.

LTC John C. Pastino is the NARCO Director. He is Level III certified in contracting and purchasing and is an Army Acquisition Corps member.

Craig Coleman is the Assistant Editor for the Stripe newspaper at WRAMC.

U.S. Army Corps of Engineers (USACE) Creates National Contracting Organization

Theresa M. Garnes

USACE continues to respond to the Nation's call in peace and war, consistently adapting to meet the country's changing needs. As the world's premier public engineering organization, USACE supports Iraq and Afghanistan's reconstruction efforts and responds to numerous recovery missions. To keep up with the challenging pace of its contracting missions and to begin the process of acting as one contracting corps, USACE created the National Contracting Organization (NCO). The one contracting corps concept stems from DOD and Army guidance, which highlights the importance of contracting officials retaining their functional independence to allow unbiased contract advice on sound business principles.

USACE's NCO is an integrated network of contracting offices that spans the globe with 57 sites in CONUS, Hawaii,

USACE's new NCO was established on April 24, 2007. Here, COL Norbert S. Doyle, Director of Contracting HQ, USACE, answers questions at the organization's first leadership conference held June 11-13, 2007. (USACE photo by John Hoffman.)

Alaska, Korea, Japan, Germany, Kuwait, Afghanistan and Iraq. These offices employ more than 1,100 contract specialists, contracting officers and support personnel who award contracts and serve as advisors to decision makers. The USACE Headquarters (HQ) office includes three divisions: Contract Policy, Program Evaluation and Workforce Development. These divisions provide strategic focus and are responsible for developing policy, handling workforce development issues and responding to program evaluation issues. Three field Principal Assistants Responsible for Contracting (PARCs) have been strategically located in Dallas, TX; Winchester, VA; and Atlanta, GA; to handle mission execution and provide technical oversight. In addition, nine Regional Contracting Chiefs (RCCs) oversee contracting services and leverage regional contracting support. The PARCs, RCCs and the Center Contracting Chiefs now report directly to the Directorate of Contracting. Previously, these assets reported to the District and Center Commanders.

"I have been especially impressed by the commitment and performance of the contracting workforce as we help USACE provide its world-class performance with the disaster response and the global war on terrorism [GWOT], while skillfully performing the normal work of USACE," explained Sandra R. Riley, former USACE Director of Contracting. "These are very visible and challenging times for not only USACE, but for the Nation as well. But, while we had been successful in this Herculean task, it had come at great individual and organizational cost."

"USACE has not had clearly defined roles and responsibilities and has operated under resource constraints, which have been exacerbated by demands for assistance with [Hurricane] Katrina and GWOT, while simultaneously assuring the daily demands remain operational," continued Riley.

"This shortage is further challenged with skill imbalances in some places, along with the inability to realign work to meet the changing demands in other places. Add to these challenges the absence of electronic tools, current policy, standardized processes and training to expedite our work."

To address the challenges, Riley stresses the importance of making contracting a core competency, partnering internally and externally, and building a world-class professional contracting branch.

Theresa M. Garnes is the USACE Contracting Chief of Workforce Development. She can be reached at (202) 761-8646/DSN 763-8646 or ***theresa.garnes@us.army.mil****.*

CPP and TA accelerate the fielding of capabilities to Soldiers and benefit the Nation through stimulated technological innovation, improved manufacturing capability, increased competition and productivity, and economic growth. Here, PFC Kenneth Armbrister, Co. A, 1st Battalion, 30th Infantry Brigade, 3rd Infantry Division (ID), scans for enemy activity during *Operation Browning* in southern Arab Jabour, Iraq, Jan. 28, 2008. (U.S. Army photo by SGT Luis Delgadillo.)

Army Small Business Innovation Research (SBIR) Program

Susan Nichols and Jennifer M. Thompson

The SBIR is a congressionally mandated Army program designed to provide small, high-tech businesses the opportunity to propose innovative research and development (R&D) solutions in response to critical Army needs, and to provide "seed" money to a select group of U.S. small businesses to conduct R&D in support of Army technology requirements. The Army SBIR program is carried out by the U.S. Army Research, Development and Engineering Command (RDECOM).

What's New?

The program has been in existence since 1984, but substantial new program enhancements have taken place over the past 2 years, creating objectives to increase technology transition and commercialization success. These initiatives, the Commercialization Pilot Program (CPP) and Technical Assistance (TA), accelerate the fielding of capabilities to Soldiers and benefit the Nation through stimulated technological innovation, improved manufacturing capability, increased competition and productivity, and economic growth.

CPP

CPP, established in response to the *2006 National Defense Authorization Act*, is a 2-phase process as follows:

- Assess, identify and recommend SBIR Phase II firms that strongly align with CPP goals.
- Assist the recommended firms to achieve accelerated commercialization and transition success.

Phase I firms that have exceptional results and have identified strategies or paths for transition from research to an operational capability are invited to participate in the SBIR as a Phase II project. Phase II represents a major R&D effort culminating in a well-defined deliverable prototype.

The CPP looks for Phase II SBIR firms that address high-priority Army needs, exhibit potential for accelerated transition and offer high-commercialization potential as measured through the CPP-defined return on investment metric.

The Army selected MILCOM Venture Partners (MVP) to manage CPP. MVP supports CPP objectives, including identifying and recommending CPP firms, assisting with market research and business planning, matching CPP firms with customers and facilitating collaboration, supporting technology transition plans and recommending funding levels from an FY08 $15 million allocation to CPP firms' commercialization plans.

SBIR recently approved 25 small businesses to participate in the current CPP FY. This year's CPP firm spans a broad spectrum of the Army's technology portfolio and end-user applications including next generation night vision sensors, advanced unmanned vehicle control devices, medical diagnostics to improve Soldier survivability, low-profile scanning arrays for satellite communications, improved personal

armor, health and monitoring systems to increase aircraft effectiveness while reducing operational costs and high-performance, low-signature tactical generators.

TA

Following the *SBIR Reauthorization Act of 2000, Public Law 106-554, Section 9 of the Small Business Act (15 U.S. Code 638)*, the Army is providing TA services to small businesses with SBIR projects. Real success for an SBIR project goes beyond solving a research problem. Ultimately, the Army would like SBIR technologies developed into a useable prototype and transitioned into a military or commercial product. The Army understands that for many small businesses and their potential customers, the path to successful transition can be extremely difficult and is therefore providing TA.

TA advocates (TAAs) assigned to five Army regions provide assistance to small businesses that have projects with the participating organizations. The TAAs are talented and experienced industry professionals with varied backgrounds. They work closely with small businesses to ensure their technologies/products fit the company's goals and Army requirements. They assist small businesses in making better technical decisions and solving technical problems, thereby minimizing the risks associated with the SBIR projects. Using their experience, TAAs play an important role in commercializing new products and processes by identifying potential military and/or commercialization partners.

Coordinating with the government research manager, SBIR awardees and any stakeholder TAAs will provide Phase III transition plans for Phase II projects. The Phase III plan will transition and document the strategy, requirements and resources to change the SBIR project into an acquisition program, larger science and technology (S&T) effort or a standalone product or service.

Another important TAA role is to work with the government on technology transition planning and developing integration road maps. By participating in acquisition requirements development, technology assessment and technology transition planning and management activities, TAAs will identify SBIR technology insertion points into an acquisition program executive office (PEO)/program manager (PM) program or a larger S&T program. TA and more PEO/PM involvement in managing the yearly $270 million in SBIR research will result in more relevant products/services to meet near-term needs, resulting in increased transition opportunities.

This year's CPP firm spans a broad spectrum of the Army's technology portfolio and end-user applications. Here, combat medics SPCs Aimee Collver and Vanessa Bolognese, 25th ID, pull security during a mission in Amerli, Iraq. (U.S. Army photo by SPC Mike Alberts.)

Although both the CPP and TA are in their infancy, feedback from the small business community and government researchers has been overwhelmingly positive. Through these two initiatives, SBIR can tap into the innovativeness and creativity of the small business community and meet some of the Army's most critical R&D requirements. Ultimately, this will provide our deployed Soldiers with world-class and state-of-the-art technologies while also helping small businesses to commercialize their products.

For more information on the Army SBIR program and these two new initiatives, visit their Web site at **www.armysbir.com**.

Susan Nichols is the Army SBIR PM. She has a B.S. in management/computer information systems from Park University.

Jennifer M. Thompson, Administrative Specialist for Phacil Inc., works on the RDECOM Army SBIR.

Natick Contracting Division (NCD) Interns Quickly Adapt to New Contracting Reports

Nathan Jordan

Beginning in FY07, reporting of contracts to Congress changed from the *Individual Contracting Action Report (DD Form 350)* to the Federal Procurement Data System-Next Generation Contract Action Reports (CAR) system. As this was a new procedure, there was a learning curve that delayed CAR reporting. This applied to the U.S. Army Research,

NCD Intern Coordinator Maria Dunton (second from left), with interns Mark Marchioli, Valerie DeAngelis and Judy Collier. Mark Marchioli is one of the NCD interns creating a CAR system training briefing. (Photo by Matthew Foster, Avatar Computing Inc.)

Development and Engineering Command Acquisition Center (RDECOM-AC) NCD at the U.S. Army Soldier Systems Center, Natick, MA, where more than $70 million in obligations had yet to be reported.

With the end of the FY quickly approaching, NCD interns volunteered for a tasker from the acting NCD Division Chief to resolve all outstanding actions by Oct. 15, 2007. The team began the tasker in late August, addressing minor CAR issues. Despite the team's efforts, by mid-September, outstanding actions increased from approximately 200 to more than 350, totaling more than $70 million unreported.

From mid-September to the October deadline, the team increased its efforts and successfully decreased outstanding actions to seven with a value of more than $580,000, with $500,000 unreportable because of a base contract issue. Estimates indicate that the team completed more than 500 CARs during this short period.

Help in resolving these issues came from an NCD information technology contractor. Additionally, Standard Procurement System help desk support was crucial to successfully completing this task.

The NCD interns are creating a training briefing for the NCD contracting workforce on CAR. Once they brief the division, the number of unreported actions should decrease and future issues should be minimized.

Nathan Jordan is an RDECOM-AC-NCD Contracting Division Army Civilian Training, Education and Development System Intern.

TACOM LCMC Acquisition Center Selects Trainer of the Year

Carrie English

The U.S. Army TACOM Life Cycle Management Command (LCMC) Acquisition Center, Warren, MI, selected Karen Forsgren as its 2007 Trainer of the Year at the second annual award presentation on Oct. 9, 2007. Forsgren, Contract Specialist in the Tactical Vehicles Division for 7 years, has trained 11 buyers in 7 years and is currently training 2 interns. She offers the following training tips:

- Find out how interns like to learn or what works best for them.
- Teach interns to use the Acquisition Center's Electronic Resource Center and the *Federal Acquisition Regulation*.
- Have some fun once work is completed and the customer is happy.

Forsgren received a name-engraved Acquisition Center coin and a Certificate of Appreciation signed by Harry P. Hallock, Director, TACOM LCMC Acquisition Center.

Karen Forsgren proudly displays her Trainer of the Year award. She is flanked by Associate Director for Contracting Marty Green (left) and Associate Director for Operations Art Siirila. (TACOM LCMC photo by Elizabeth Carnegie.)

The Trainer of the Year award, created by the New Employee Focus Group in 2005, recognizes excellence in knowledge/experience, training ability, organizational skill, character and leadership. The Trainer of the Year award committee formed a group of Acquisition Center interns to select the 2007 winner. The committee asked Acquisition Center employees, with a maximum of 3 years employment, to submit an essay describing a trainer they thought was exceptional at his or her job.

Carrie English is a Contract Specialist in the Tactical Vehicle Contracting Division, TACOM LCMC Acquisition Center. She can be reached at (586) 574-8466/DSN 786-8466 or ***carrie.english@us.army.mil****.*

U.S. Army Materiel Command (AMC) Announces 2006 Frank S. Besson Jr. Award Winners

The AMC Frank S. Besson Jr. Award, established in honor of AMC's first commander for his lifelong acquisition achievements, recognizes outstanding accomplishments in the AMC contracting community. The Besson Award is one of the few

The WWSS C-E LCMC Contracting Team 2006 Besson Award winners (from left): Athena Loesch, John Onieal, Justin Filler, John Traversone and William Newell. (C-E LCMC photo by Charles Ross.)

that exclusively honors the AMC contracting workforce for accomplishments supporting the diversity of AMC's contracting missions. AMC presents Besson Awards annually for exceptional achievements by an outstanding military officer (functional area 51), a civilian careerist, a civilian intern and a contracting team.

MG William M. Lenaers, TACOM LCMC Commanding General, presents Mary Pasqual the Besson Award, Civilian Intern category, at an awards ceremony Oct. 4, 2007, in Warren, MI. (TACOM LCMC photo by Elizabeth Carnegie.)

Jeffrey Parsons, AMC's Director of Contracting, selected the following individuals for 2006 Besson Awards:

Civilian Careerist — John Kaddatz, U.S. Army Sustainment Command (ASC)
Military Officer — LTC Jay Carr, ASC
Civilian Intern — Mary Pasqual, U.S. Army TACOM Life Cycle Management Command (LCMC)
Contracting Team — The World Wide Satellite Systems (WWSS), U.S. Army Communications-Electronics (C-E) LCMC

The AMC major subordinate commands presented the awards to the recipients for their success as contracting professionals.

AMC is now seeking nominations for the 2007 Besson Awards. For additional information, contact April Miller at (703) 806-8233/DSN 656-8233 or **april.miller1@us.army.mil**.

Italian Contracting Specialist Begins 36th Year of Customer-Focused Procurement

MAJ John Coombs

Giancarlo Zancan, a Local National (LN) Contract Specialist and Contracting Officer (KO) at the Regional Contracting Office-Italy (RCO-I), U.S. Army Contracting Command Europe (USACCE), has served more than 35 years of government service. What's his secret to superior contracting support? "First, call the customer and establish a relationship," said Zancan. "Don't send a problem requirement back without working with the customer to make it right."

RCO-I provides acquisition support to the U.S. Army Garrison in Vicenza, Italy, including Southern European Task Force (SETAF), 173rd Airborne Infantry Brigade, and several military communities and units in northern Italy. The RCO-I has been recognized 5 of the last 6 years as the best contracting office in USACCE. "Giancarlo has been a key contributor to the continued success of this office," said Frank Petty, RCO-I's Chief. "Our customer satisfaction levels continually exceed 99 percent and a lot of the positive feedback from our customers includes personal thanks to Giancarlo."

Zancan has an exceptional memory for contractors, their prices and their performance. "He is an expert on the local market and is the workhorse of our commercial items contracting effort," added Petty. "The bulk of our FY-end commercial item purchasing surge is handled by Giancarlo."

Zancan began his career with the Army in 1973 as a supply clerk for the Directorate of Engineering and Housing. In 1978, he was recruited by the contracting office because of his expertise in supply support of equipment and mechanical items. He has faithfully supported the Army through many tough times, including the kidnapping in 1981 of BG James Dozier, then SETAF's Chief of Staff, by the terrorist group Red Brigade. "Many Soldiers point to Sept. 11, 2001, and the attacks on the

LN Giancarlo Zancan, RCO-I, USACCE Contracting Specialist and KO, has more than 35 years of government service. (Photo courtesy of USACCE RCO-I.)

Pentagon as a turning point," said Zancan. "But for me in Italy, Sept. 11 was a return to an Army threatened worldwide, as I recalled the Red Brigade." Zancan procured support for increased security measures then, and has continued to support the Army for the last 3 decades, purchasing supplies and services to support multiple deployments to Africa, the Balkans and the Persian Gulf.

Zancan takes pride in providing superior contracting support and notes it's in his nature to work with others and support their needs. "I like the people, the customers. I like helping everyone."

MAJ John Coombs, formerly of the USACCE RCO-I, is an Army Research Fellow at RAND Corp.

Farewell to *Army AL&T* Magazine's Editor-in-Chief

Army AL&T Magazine's editorial staff would like to extend a heartfelt "thank you" and "good luck" to departing Editor-in-Chief Michael I. Roddin as he takes on new opportunities as the Strategic Communications Director for the U.S. Army Tank Automotive Research, Development and Engineering Center in Warren, MI.

Roddin served as *Army AL&T* Magazine's Editor-in-Chief for almost 5 years, providing consistent expertise and guidance on every aspect of the magazine production process. He authored numerous articles, conducted interviews and helped transform the magazine into one of the Army's most respected publications. After assuming his duties as Editor-in-Chief, Roddin instituted a fresh look to the magazine — a change that was met with extensive positive feedback from readers and leadership, as evidenced by his selection as the 2005 Secretary of the Army Editor of the Year. Roddin also adapted and updated the magazine accordingly when it was changed from bi-monthly to quarterly publication and from an individual-based to an organization-based subscription in 2006.

Roddin also initiated the launch of our sister publication, *Army AL&T Online Monthly*, in April 2006. This electronic magazine, which is sent to more than 50,000 subscribers, has become a valuable, timely source of information for the Acquisition, Logistics and Technology (AL&T) Workforce. Roddin instituted the updated layout and format of *Army AL&T Online Monthly* that began with the January 2008 issue. This updated look and feel has also received optimistic and affirmative responses from the AL&T community. The successes of both *Army AL&T* Magazine and *Army AL&T Online Monthly* are due in great part to Roddin's creativity, expertise and leadership.

Jointly serving as the Strategic Communications Director for the U.S. Army Acquisition Support Center (USAASC), Roddin was also responsible for the oversight, management and execution of all USAASC strategic communication programs and provided direction to communicating USAASC's mission and vision to the acquisition community and the Army at large. He initiated the new USAASC Web site design and launch in 2007, which resulted in a more user-friendly site and better communication means to the field. Roddin oversaw and managed USAASC's participation in the Association of the United States Army Annual Exposition and Meeting, and provided planning and support to several Assistant Secretary of the Army for AL&T-sponsored events, including the Competitive Development Group/Army Acquisition Fellowship Orientation and Graduation; U.S. Army Acquisition Corps Annual Awards Ceremony; Senior Leaders Conference; and Procuring Contracting Officer and Intern Training Symposium, among others.

Roddin's strong work ethic and expertise are supported by his extensive education. He holds B.S. degrees in English and journalism from the University of Maine and an M.A. in marketing from the University of Southern California. He is also a U.S. Army Command and General Staff College and Defense Information School graduate, as well as an Army Training With Industry program alumnus. Roddin is a 3-time Army Keith L. Ware Journalism Award recipient.

The *Army AL&T* Magazine staff and the entire USAASC organization will greatly miss his outstanding expertise, leadership and guidance and wish him great success in his future professional endeavors.

Here, Michael I. Roddin (left) receives a Commander's Award for Civilian Service from USAASC Director Craig A. Spisak. (U.S. Army photo by Richard A. Mattox.)

U.S. Army Acquisition Corps (AAC) Annual Awards

Call for Nominations

The time is quickly approaching for the U.S. Army Call for Nominations for the Army Acquisition Excellence (AAE) Awards, Project/Product Manager and Acquisition Director (PM/AcqDir) of the Year Awards, and the David Packard Award. The winners of the AAE and PM/AcqDir of the Year Awards will be presented at the 2008 AAC Annual Awards Ceremony on October 5, 2008. The David Packard Award will be presented on another date.

- The **AAE Awards** recognize Army acquisition workforce individuals or teams whose performance and contributions set them apart from their peers. These awards directly reflect the outstanding achievements made in supporting Soldiers and the Army's Business Transformation efforts.
- The **PM/AcqDir Awards** applaud the PMs and Acquisition Directors whose outstanding contributions and achievements merit special recognition and provide a forum to showcase exceptional leadership within the AAC.
- The **David Packard Award** is given to DOD civilians and/or military organizations, groups and teams who have made highly significant contributions or demonstrated exemplary innovations and best business practices in the defense acquisition process. Call for Nominations will begin in April.

The nomination process begins in March. For more information on the awards and upcoming Call for Nomination dates, please visit our Web site at **http://www.asc.army.mil**.

Searching for 2008's brightest Acquisition Stars!

ARMY ACQUISITION, LOGISTICS & TECHNOLOGY
ISSN 0892-8657

DEPARTMENT OF THE ARMY
ARMY AL&T
9900 BELVOIR RD SUITE 101
FT BELVOIR, VA 22060-5567

http://asc.army.mil

IN THIS ISSUE:

UNITED STATES ARMY

USAASC
PREPARING FOR THE FUTURE

ACQUISITION SUPPORT CENTER